

Online Learning and Teaching from Kindergarten to Graduate School

**Michele Jacobsen & Cathryn Smith
Editors**



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for Teacher Education
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BOOK DESCRIPTION

This volume is the product of the collaboration of invited participants and editors at the Eleventh Working Conference of the Canadian Association for Teacher Education that was held online with the University of Calgary from October 14–16, 2021. The impetus for the conference theme, online learning and teaching from kindergarten to graduate school, emerged alongside the worldwide pivot to online education in response to the global pandemic. This volume examines a variety of ways in which Canadian researchers in teacher education are analyzing, designing, and evaluating diverse online learning pedagogies, learner experiences and outcomes in K-12 and post-secondary education contexts. Chapters are organized in four sections: 1) Online Learning & Teaching in K-12, 2) Relationships & Relationality in Online Learning & Teaching, 3) Online Learning & Teaching in Higher Education, and 4) Conceptualizing Learner Centered Models in Higher Education. Knowledge building and collaboration through the working conference and the chapters in this publication aim to enhance and extend understanding, communication, and critical analysis among Canadian and global teacher educators; this publication also seeks to contribute to research and practice in response to the imperative that “teacher education programs must prepare teachers for the schools of the future – teachers who are experts in disciplinary content, knowledgeable about the latest research on how people learn, and able to respond creatively to support each student’s optimal learning” (Sawyer, 2022, p. 671) in diverse modalities and contexts for learning including online, blended, hybrid, and in person engagements.

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Canadian Research on Online Learning and Teaching from Kindergarten to Graduate School

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Welcome

This book is the eleventh in a series of peer-reviewed publications originating from working conferences organized by the Canadian Association for Teacher Education (CATE). A CATE working conference is hosted at a Canadian university every 2 years with support from the Canadian Society for Studies in Education (CSSE). CATE working conferences are guided by a theme and several provocations that are presented to the CATE membership in advance of a call for proposals that is open to academics and graduate students in the field of teacher education. Prospective authors submit chapter proposals several months prior to the CATE Working Conference, which are reviewed by the CATE president and past president who then led the conference and served as editors for the book.

The CATE working conferences serve as communities of practice that bring academic writers together to collaborate on scholarship with a shared purpose and focus for inquiry. In July 2021, prospective authors were invited to consider *Online Learning and Teaching from Kindergarten to Graduate School* in positioning their initial chapter proposal and research in teacher education as a response to one or more of these questions:

1. What lessons can we draw upon from our rich history and experience with online education as we navigate our way forward in K-12? In pre-service education? In teacher professional learning? In graduate education?
2. What innovations and new possibilities open up in curriculum, pedagogies, learning designs, and assessments with the global shift to online education?

3. What are the many ways in which we create the conditions for meaningful, authentic, and respectful learning and teaching relationships and engagements when we connect, collaborate, and communicate online?

Authors of accepted proposals are the invited participants in the CATE Working Conference. The research presented by authors provides a focus for discussion in smaller working and academic writing groups during the conference, with each author or author team presenting their studies, and receiving both oral and written feedback to inform the ongoing writing and preparation of the final chapter. Following the conference, authors continue to engage with the editors and other chapter authors in an online community of practice as they write their chapters and before submitting their manuscripts for anonymous peer review. Editors manage the process of sustained engagement and peer review among the chapter authors and share editorial feedback to inform revisions to the chapters prior to copyediting and assembly of the final volume.

For the first time in CATE's history, and prescient given the 2021 theme, this Eleventh Working Conference for the Canadian Association for Teacher Education took place entirely online. A collaborative effort between CATE, the Taylor Institute for Teaching and Learning at the University of Calgary, the Canadian Society for Studies in Education (CSSE), and Mount Royal University supported the online working conference in October 2021. The working conference included over 60 teacher education researchers who hailed from eight different provinces in Canada. Editors and authors gathered via diverse online engagements over the 3 days of the conference to hear from two keynote speakers, engage with the editors, collaborate with other authors in rich conversations, and exchange feedback and ideas about their current research on *Online Learning and Teaching from Kindergarten to Graduate School*. The outcomes of the collaborative knowledge building work among Canadian researchers in teacher education culminated in this peer reviewed, open access edited book with an introduction and 22 chapters.

In this introductory chapter, the editors outline the knowledge engagement and writing support provided by the working conference, offer an overview of the significance of the theme, describe inquiry into online learning and teaching, and outline the organization of the book with short overviews of the research highlighted in these 22 chapters. Finally, the editors present a synthesis of the outcomes that emerged from the working conference conversations and ongoing engagements, before suggesting several recommendations for the future of teacher education in diverse online contexts.

Working Conference as Interdisciplinary Knowledge Engagement and Writing Support

Academic writing and peer review can be a challenge for both experienced and novice researchers (Belcher, 2019). Unlike conferences that include one-way sharing of research and practice ideas, the CATE Working Conference provides structured and sustained opportunities for researchers to share and receive peer support and formative feedback with their academic writing, to engage in sustained conversations about educational research and writing with peers across disciplines, and to collaborate with each other during a supported year of writing, knowledge building, peer review, and publishing.

Research on peer response to writing demonstrates that writing for an audience and receiving feedback on drafts of writing helps authors to improve the quality of their manuscripts (Rodas & Colombo, 2021). Given that writing for an expanded audience requires clarification and definition of terminology and additional explanations of the research, peer response groups offer opportunities for authors to discuss multiple drafts of their work. During and after the working conference, authors engaged in authentic literacy practices, such as peer response and review, associated with writing and publishing research. Multiple rounds of discussion, feedback, and peer review meant that “authors can consider and evaluate the usefulness of comments for improving their work” (Rodas & Colombo, 2021, p. 16).

Colombo and Rodas (2020) identified two main advantages of interdisciplinarity in academic writing groups. First, writers consider access to a wider audience as one of the key benefits because it helps them to make explicit what might be taken for granted in their manuscripts and unpack the obvious. Interdisciplinary group members can help authors to visualize or question that which passed unnoticed or was assumed to be understood. Interdisciplinary readers often do not accept the text as given; members of the different writing groups at the working conference functioned as a critical and interdisciplinary audience who required information from authors to be made more explicit.

Second, writing groups allow authors to access different rhetorical knowledge and literacy practices that serve to make them aware of their own disciplinary conventions as well as how to manage the writing process (Colombo & Rodas, 2020). Working Conference authors who hail from different specializations in teacher education worked collegially to provide useful feedback on the form, organization, and flow of each chapter given the diverse ways peers communicate research findings. The interdisciplinary writing groups at the Working Conference provide access to a more diverse audience than the one authors are accustomed to in their home faculties or departments. Colombo and Rodas (2020) found that when the distance between the disciplines/specializations is not too great, writing groups can increase the possibilities of situated learning (Lave & Wenger, 1991), including ‘legitimate peripheral participation’, a community of practice, and the use of authentic texts. In peripheral but legitimate ways, authors enact participation in writing-for-publication literacy practices, such as peer review and revision. That is, the writing “group offers a protected space” in which authors can engage in knowledge building and literary practices that extend “beyond their usual interactions” and academic writing practices (Colombo & Rodas, 2020, p. 10). Through knowledge engagement in structured cycles of collaborative writing, the CATE Working conference enlivens peer response to academic writing,

provides opportunities to engage in authentic literacy practices such as peer review, and leverages accountability to an interdisciplinary group of diverse and specialized peers for conversations about research and writing as teacher educators engage in academic writing.

Background and Context – Importance of this Book’s Theme

The significance of online learning and teaching in education became clear in 2020 when billions of learners around the world were struck by school and campus closures (OECD, 2020). Along with other educators in over 190 countries around the world, Canadian educators in K-12 schools and on campus had to pivot to emergency remote teaching (ERT) mediated by computer technology and digital networks. In general, online teaching and learning experiences prior to COVID-19 were intentionally and purposefully designed well in advance of the instructional year, term, or semester. However, in March 2020, teachers and professors lacked the luxury of time and often found themselves operating in a state of “pedagogical triage” (Sawyer, 2022). Given the COVID-19 health crisis and the ensuing school and campus closures, educators rose to the challenge of rapidly utilizing available technologies and networks for online teaching to connect, communicate, and collaborate with learners, colleagues, leaders, parents, and the larger community to support the continuation of education systems from kindergarten to graduate school.

A significant challenge with emergency remote teaching (ERT) was that many educators had little or no experience with online learning prior to COVID-19. For many, initial ERT efforts using available technological solutions necessarily amplified content delivery, instead of benefitting from the necessary time to carefully plan and design online learning environments and experiences that are reflected in decades of research and practice (Veletsianos, 2021). A type of ERT that was widespread during the pandemic’s initial stages was “a transmission model, relying on video lectures, recommended readings and staged assessment” (Sharples et al, 2013, p. 3).

Thus, any comparisons between ERT and pre-pandemic online learning and teaching designs and research must be made with empathy, humility, and caution (Veletsianos, 2021).

When educators were required to shift their own work and teaching practice online during the pandemic, while also dealing with their own grief and uncertainty, they also had to confront that “looking into the near and mid-future, this generation’s facility and comfort with various technologies is essential. They will face a world of work increasingly shaped by technology” (McDiarmid & Zhao, 2022, p. 3). The global and rapid shift from learning and teaching in physical classrooms on campus and in K-12 schools to emergency remote teaching made more visible several challenges and gaps, from inequitable access to robust networks and technological devices, to low student engagement and growing teacher unwellness, to reliance on instruction and content delivery in online environments (Greenhow et al., 2022). Unfairly, the effectiveness of online learning was criticized based on early ERT practices and lack of equitable access and experience with technology, rather than drawing upon decades of research demonstrating the value of well-planned and purposefully enacted online learning designs (Veletsianos, 2022).

Diverse approaches to emergency remote teaching along with the subsequent shifts and expansion to well-planned and intentional strategies for online learning in kindergarten to graduate school warrant investigation and inquiry by teacher educators and researchers across Canada. Researchers in teacher education aim to glean insights and evidence to inform ongoing learning designs, scaffolds, and supports for optimal online learning environments that incorporate contemporary pedagogies, technologies, and networks. It is uncertain how the shift to and from widespread online teaching and learning will continue to impact education as the nature and threat of the pandemic continues to change; however, the insights and research findings offered by chapter authors in this volume provide a guide for future research and practice. Expanding our knowledge and practice with online learning is imperative, given that “our schools and universities

are going to face new crises for which they will need online learning” (Veletsianos, 2022) to ensure continuity in education.

Darling-Hammond (2006) and Darling-Hammond and Oakes (2019) have been champions for teacher education programs that prepare teachers to design rich learning experiences. Chapter authors in this volume describe diverse and expanded online learning and teaching practices, processes, and pedagogies from diverse Canadian contexts. Authors in the book draw upon a variety of instructional frameworks and curricular goals to inform research on online learning and teaching in kindergarten to high school contexts. High quality teacher education programs are characterized by a focus on the cultivation of teacher candidates who hold a deep understanding of how students learn, including learner diversity, rich knowledge of subject matter and curriculum goals, and knowledge of effective pedagogies. Many chapter authors align with Darling-Hammond’s recommendations, whether explicitly or implicitly.

Book Overview and Organization

The chapters in this book are organized into four sections. Section 1 includes eight chapters that present findings from diverse educational research on online learning and teaching in K-12 contexts. The first four chapters in section 1 focus on various online *learning* connections in K-12, with the second set of four chapters emphasizing online *teaching* connections in K-12.

The four chapters in section 2 highlight relationships and relationality in online learning and teaching in higher education, including cultivating online teacher education pedagogies across programs and in courses to foster effective online doctoral supervisor-student relationships.

Section 3 includes five chapters in which authors have investigated various aspects of online learning and teaching in higher education such as course and program design, the use of open educational practices in graduate school, faculty development for practicum supervisors, wellness programs in teacher education, and teaching mathematics using online modules. Section

4 comprises four chapters on learner-centred models in higher education and a preamble in which the authors describe results of their collaborative work on conceptualizing a learner-centred model for designing digital instruction.

The book chapters represent a range of educational research methods and methodologies reflecting the authors' specific approaches to their research problems, questions, and contexts. Several authors adopted an action or design-based research approach to assess and inform the practice of teachers in schools, online graduate supervisors, or faculty in teacher education programs, while others used community-based action research and case study research. Studies have included a range of participants in diverse educational contexts, from faculty, pre-service teachers, and in-service teachers to students, teachers, school leaders, and parents involved in Kindergarten to High School education. Findings from some studies are based upon surveys and interviews with student, teacher, community, and faculty participants while others include written and dialogic reflections, assessments for learning, and data from learning management systems. In the section that follows, we provide a summary of the chapters in each sub-section.

Section 1, Part 1:

Online Learning & Teaching in K-12 – Emphasis on Learning Connections

The chapters in section 1, part 1, highlight research on the learning connections in K-12 online learning and teaching. Using an action research approach, Smith and Moura (Chapter 2) engaged with students, teachers, parents, curriculum consultants, and home school principals to identify and synthesize beliefs, practices, and strategies critical to rural remote learning in Western Manitoba. Drawing upon conceptual and theoretical frameworks, this chapter makes a valuable contribution to increasing understanding of considerations that are critical to rural remote learning. Based on their research, the authors forward a Rural Remote Learning Framework that can

provoke further dialogue about innovation in rural spaces, remote learning programs for school-age youth, and the supports required for diverse stakeholders to ensure success.

Riedel, Moll, Taplay, and Fischer (Chapter 3) enacted a community-based participatory action research approach to understand the experience of transitioning to remote learning in K-12 during COVID-19 and how that learning can inform content and delivery in teacher education. Their chapter captures the lived experiences of teachers, families, and EAs during the pandemic. The literature is effectively linked with findings and the discussion. Several recommendations are identified that move the field forward in terms of equity, relationality and preparing educators to engage in online pedagogy.

In chapter 4, Kokorudz employed rhizoanalysis to map the affective schooling experiences of three students with learning difficulties and their families during COVID-19. Questions that arise from Kokorudz's analysis open possibilities for teacher education programs, including the contemplation of different ways to think about and deliver education in a post-COVID world. This chapter makes a valuable contribution, both from a unique methodological approach and the careful analysis of three students' affective school experiences during COVID-19. The inquiry poses new ways of thinking about schooling, and provocative questions and possibilities for schooling, or *multi-schooling*, in this call to re-imagine and re-territorialize schooling to *something* else.

Lin and Locher-Lo (Chapter 5) explored the experiences of special education teachers in Saskatchewan in communicating with families, and the factors that influenced these communications when schools closed due to COVID-19. In discussing both the challenges and the positive outcomes experienced by teachers, the authors interpret the policy and practice implications for the province-wide supplementary education plan in addressing social disparities. Parents, students, and teachers developed new technological skills during remote learning along

with new ways to engage social skills. This chapter makes a valuable contribution to expanding understanding of teacher-parent communication, teacher concerns and challenges, and benefits of changed relationships for Saskatchewan students with special needs during COVID-19.

Section 1, Part 2:

Online Learning & Teaching in K-12 – Emphasis on Teaching Connections

Part 2 of section 1 highlights research on the teaching connections in K-12 online learning and teaching. Watson and Sokugawa (Chapter 6) engaged in hermeneutic inquiry to understand K-12 educators' sense-making during the pandemic. They investigated how social-emotional learning, lifelong learning, and a learning community contributed to student development with the shift to online environments. The authors, who captured and interpreted the voices of teachers, question whether important aspects of education were lost during the mass migration to online environments. The authors contend that educators developed a more holistic perspective and better understanding of students in the context of home, family, and community during remote teaching.

Using an action research approach, Hamilton and Braunberger (Chapter 7) examined perceptions and practices of teachers who supported student development of executive functioning skills, first in school-based and then in online learning environments. The authors aimed to understand how a comprehensive approach to designing learning environments impacted the executive functioning skills of junior high school students. Teachers appreciated the opportunity to share their experiences and observations of students' executive functioning skill development in online learning contexts. Important insights are shared about how teachers can be supported in teaching, monitoring, and assessing executive functioning skills in online learning contexts.

In chapter 8, Morrison, Becker, Hughes, Jacobsen, and Schira-Hagerman offer a conceptual model for teachers' online professional learning that considers human-centred design and Nel Nodding's relational practice in the context of the Ontario College of Teachers' four-part

conception of professional ethics. The key implications of this research are that teachers' online professional learning can be enhanced by highlighting connections between making and empathy, perspective-taking, and techno-pedagogical competence. Recommendations for online professional learning sessions include: supporting early success and transfer by focusing on common tools and transferable activities and curriculum; targeting supports and scaffolds for teacher professional learning; increasing awareness of needed resources; and providing appropriate instructional guidance and expertise.

Engaging in a phenomenological case study approach, Kirk, Osiname, Svistovski, and Ofwono (Chapter 9) explored the outcomes of online teacher grade group meetings that were established in a rural Manitoba school division to support teachers during the pandemic. Outcomes of this case study make a valuable contribution to the book by highlighting how the stressful circumstances of pandemic teaching were found to have initiated high levels of teacher collaboration, reflective practice, and professional growth.

Section 2: Relationships & Relationality in Online Learning & Teaching

The second section includes four chapters that emphasize relationships and relationality in diverse online learning and teaching contexts in pre-service teacher education and graduate education. In chapter 10, Schnellert, Miller, Brandt, and Macmillan make a valuable contribution to the growing body of research related to online teacher education with a collaborative self-study of reimagined teacher education practice online. The authors present an argument supported by evidence that a relational, synchronous, and equity-oriented pedagogy is central to the success of teacher candidates' learning in online environments. Equity- and identity-oriented middle years teacher education can be taken up online as an interactive practice that decentres the role of the teacher and requires reflexivity, co-construction, and responsive practice (for both teacher educators and teacher candidates).

Friesen, Becker, and Jacobsen (Chapter 11) undertook case study research to explore how relational trust is cultivated by supervisors in online doctoral programs. Graduate supervisors have a responsibility to establish nurturing relationships, maintain frequent reliable contact with doctoral students, and provide authentic online learning experiences. Findings demonstrate the importance of supervisors taking the lead in establishing and maintaining relational trust in online supervisory relationships. Implications for institutions, to create the human and technological conditions for meaningful, authentic, and respectful online supervision, are clear, along with the need to provide ready access to online faculty development, to expand capacity in high-calibre online supervision for graduate students.

Cho and Corkett (Chapter 12) studied their own experiences with transitioning a required course on diversity and inclusion to an online learning environment in a teacher education program. This chapter makes a valuable contribution with an in-depth description and analysis of the remaking and revisioning process during the transition from face-to-face to asynchronous online course design, along with a description of how the authors adapted and modified the pedagogy to complement content knowledge and leverage technology. Furthermore, Cho and Corkett provide an evaluation of the course and student experience, in addition to ideas for further design.

In chapter 13, Nolan and Raisinghani engaged in a duo ethnographic inquiry to reflect on and with(in) their moments of teaching, (un)learning, and (re)learning to interrogate the interplay of their engagement with self and other(s) in maintaining culturally responsive pedagogy. The authors describe how their dialogic relationship strengthened as they shifted their math and science courses for pre-service educators from face-to-face to online delivery. Through the trusting relationship established between the two researchers, they provide thoughtful analysis of their individual experiences and search for shared insights and identification of important questions.

Section 3: Online Learning & Teaching in Higher Education

The third section of the book includes five chapters in which authors have investigated online learning and teaching in higher education. Boschman, Gust, McDowall, McLester, Whidden, and Andjelic (Chapter 14) identified and examined pedagogical, content, and connection strategies in a 4-year BEd program. Survey feedback from students was used to design and assess the impact of changes implemented by faculty members. The chapter provides helpful guidance into recommended practice and the benefits of action research as a strategy for program improvement. This chapter makes a valuable contribution to the book by capturing the experiences of faculty members in field testing new pedagogical approaches during the pandemic.

In chapter 15, Holm analyzed the use of video as an instructional strategy for teaching mathematics concepts to pre-service teachers. This chapter makes a valuable contribution by focusing on video as an augmentative tool to build pre-service teachers' understanding of mathematical conceptual and pedagogical knowledge, and by identifying challenges of the technological aspects of the TPCK framework.

MacMath, DeGagne, and Ferris (chapter 16) engaged in participatory action research to address an understudied area of faculty development by investigating the learning needs and goals of newer to more seasoned practicum supervisors who work with pre-service teachers. The authors assessed practicum supervisors' experience during a professional learning day that focused on mentoring versus moulding, difficult conversations, and mentoring pre-service teachers with technology use. This chapter makes a valuable contribution by offering a three-pronged approach to professional development that is both well aligned with the goals of the teacher education program and tailored to support practicum supervisors' diverse learning needs and expectations.

Handlarski (Chapter 17) contributes an autoethnographical account of the lived experiences of faculty and TCs at a time of unprecedented stress, with a well-being program that fostered a

space for reflection and connection. Further, and perhaps paradoxically, the use of this online space, while creating stress for other kinds of work, was found to be effective and even preferable for well-being work and community connections. The online format Handlarski describes for well-being sessions and program, originally only used to comply with social distancing and university closures, became the preferred mode for teacher candidates, faculty, and staff.

Brown, Jacobsen, Roberts, Hurrell, Neutzling, and Travers-Hayward (Chapter 18) conducted design-based research to understand how open educational practices (OEPs) can be used, in an online graduate program, to teach research-based skills in authentic and engaging ways. Authors found that layered and renewable assignments, formative feedback, and peer learning experiences contributed to students' knowledge building and engagement. The authentic open learning experiences provided students with opportunities to receive feedback from multiple sources while developing research-based skills. Study findings contribute to the growing field of open educational practices and inform instructors and institutions on OEPs and how to create high quality, online learning experiences and design conditions that support graduate students in research skill development in post-secondary programs.

Section 4: Conceptualizing Learner-Centred Models in Higher Education

The four chapters in this section, with their focus on learner-centred models in higher education, are introduced by a preamble in which six authors describe results of their collaborative work on conceptualizing a learner-centred model for designing digital instruction. Khirwadkar, Welbourn, MacLeod, Manners, Mueller, and Yennemadi (Chapter 19) share the results of a small group collaboration at the working conference that generated a framework for a learner-centred model for designing digital instruction. The framework incorporates aspects of design thinking, technical pedagogical content knowledge, and learner-centred instruction that are also reflected in the chapters of section 4.

Khirwadkar, Welbourn, Figg, and Pelchat (Chapter 20) drew upon multiple data sources to capture student feedback on the experience participating in solo asynchronous and group synchronous virtual maker space learning activities. This chapter contributes to this book by offering a specific focus on the experiences of pre-service mathematics students who participate in maker space activities adapted for virtual learning.

Macleod, Kraglund-Gauthier, and Griffiths (Chapter 21) describe qualitative research on how three specific serious online games were introduced to teach ocean literacy to pre-service teachers enrolled in a Nova Scotia-based BEd program. The authors collected feedback on the effectiveness of ocean literacy resources that were field tested by pre-service teachers during their practicums. With respect to the Salmon Cycle game, they found that the use of serious online games in school contexts increases engagement, stimulates learning, and develops culturally-relevant pedagogy. This chapter makes an important contribution with a multi-tiered exploration of the use of serious online games for teaching ocean literacy.

In chapter 22, Manners presents her case study research on the use of a five-step design-thinking process to (a) identify student learning needs during the pandemic, (b) develop a delivery model to meet those needs, and (c) create a professional development session to support faculty in implementing the identified practices. This chapter makes a valuable contribution with application of a case study of design thinking used to develop three distinct but related learning and teaching projects in higher education.

Finally, Mueller, and Yennemadi (Chapter 23) carried out a descriptive case study of five faculty members' experiences designing and teaching undergraduate and graduate courses in education during the COVID-19 pandemic. The authors found that, to address challenges posed by the pandemic, faculty members appeared to unknowingly follow a design thinking (DT) process in the design of courses. The authors conclude that DT, characterized by empathy and iterations, was

unintentionally relevant to the immediate redesign of courses for remote learning, and may be suitable as a model for a more intentional design of online courses.

Implications and Educational Importance

From diverse educational research contexts and employing a broad range of methodological approaches, Canadian authors in this volume provide evidence of how learning designs in courses and classrooms can be shifted for online learning by using different pedagogies and technologies to support the range of activities, experiences, and engagements that make up teaching and learning.

Many authors have carefully documented how educators created effective — and sometimes even optimal — conditions for learning by focusing on “what will the students DO” in each learning experience, rather than just “what they need to KNOW.” Educators who experienced success with their students resisted the urge to replicate a “lecture, textbook, assignments and test” approach in online learning and teaching contexts, given their knowledge this is an ineffective approach to creating the conditions for learning in person, and therefore, even less so online. Many authors describe how educators resisted the impulse to post a mountain of content and call it a course. Instead, educators investigated how to re-create the conditions for learning and community online with recognition that teacher presence is essential to get learners’ attention and hold it, by providing opportunities for sharing and discussing lived experiences, thus amplifying human connections, creating and communicating shared expectations and understandings of wellness and engagement, and enacting multiple forms of communication in learning. Educators in post-secondary school contexts focused on creating online learning communities versus becoming hosts of broadcasted content, while engaging learners with ideas, rich materials, and curated resources. Most importantly, they prioritized learners interacting with each other and voicing their experiences.

The sudden shift to online teaching and learning from kindergarten to graduate school in 2020 was a tremendous undertaking that continues to reverberate across shifting educational contexts. Some challenging aspects are how to revise designs, engage in culturally responsive pedagogies, enact authentic assessments, and document evidence of learning. Educators want to develop assessment strategies that are accessible and appropriate for online learning environments, effective in assessing student learning, fair and equitable to students, and conducive to academic integrity. The shift to remote and online, to blended and hybrid learning environments is a complex undertaking that is ongoing.

Throughout the shifts between online to back to schools and campuses, and as we continue to deal with the aftermath of the pandemic, it is important to remember that all educators and learners still need care, support, and understanding in these new contexts, within which, it is imperative to presume, our students and educators are doing the very best they can.

Evidence Informed Practice in Teacher Education

According to the Accord on Teacher Education (ACDE, 2018), teacher education programs should have three primary goals: “to prepare professional educators who effectively and skillfully foster learning, ... to engage in responsive and responsible collaboration, ... and to foster social responsibility” (p. 2–3). Teacher education is required to be forward focused in planning for teaching, learning, and researching while also glancing in the rear-view mirror to leverage the important lessons learned during the rapid pivot to emergency remote teaching, and from the diverse designs for online learning that were developed in the ongoing response to the worldwide pandemic. It is essential to remember how the internet became alive with collaborative design and generous sharing, pop-up webinars, synchronous and asynchronous professional learning experiences, instructional videos, and a plethora of open access resources developed by educators for educators, learners for learners as well as for parents and students. The many calls for a return

to some mythical normal in physical classrooms run the risk that the many lessons learned during the pandemic are ignored. Indeed, these lessons revealed the gaps in what was considered “normal” and a status quo that served to exclude many learners from full participation in education, such as: Canadians in rural and remote communities and those among Indigenous communities, racialized and underrepresented groups, and financially or socially disadvantaged groups.

As schools and universities across Canada are quickly shelving online learning in a fervent quest to return to some imagined normal in-person learning, Veletsianos (2022) reminds us that there is peril in this abandonment of what we have come to know about crisis. He argues that there are circumstances, many of which highlighted by the authors of this book, when the flexibility, increased access, and democratizing effect of online learning make it a better solution than in-person learning. Veletsianos (2022) laments that any rejection of online learning is short-sighted given that many current and future students, such as those with disabilities, in rural and remote communities, in the military, working part-time or full-time, caring for seniors or young children, will be excluded again if we limit access to education to in-person only. Veletsianos (2022) invites us to consider “what students need more than access to education is access to well-planned and purposefully designed education” (Veletsianos, 2022, para. 11) and contends that design makes or breaks online learning.

The scholarship presented in this volume responds to a pressing need for Canadian research in teacher education on innovations and promising practices in online learning and teaching from kindergarten to graduate school, given the rapid shift to emergency remote teaching (ERT), followed by more developed and considered approaches to online learning in primary, secondary, and post-secondary contexts. As a result of the COVID-19 pandemic and requirements for remote teaching, post-secondary and classroom

teachers had to both learn how to teach effectively online, and also how to improve their own teaching through online learning methods instead of traditional face-to-face forms of professional development. As similar challenges continue to emerge in the future, these new contexts and challenges will require renewed focus and innovation, and teachers and teacher educators will need more than ever to ground their efforts in research even as we continue to build our understanding of teacher learning (Fishman et al. 2022, p. 630).

Canada is unique in that education is a provincial responsibility (Friesen & Jacobsen, 2020); this book reflects diverse and varied scholarly insights on online learning from across regions and provinces. For some authors in this book, the pandemic caused massive disruption in their accustomed educational contexts and conditions, but from which they gleaned valuable insights and new designs to inform ongoing planning and leadership. For others, the pandemic involved continuation and expansion of long-standing and well-developed online learning practices, processes, and systems along with new ideas about improving access and flexibility for all learners and teachers. To chart our ways forward, it is critical that researchers and practitioners in teacher education continue to evaluate, document, and learn from the experiences that revealed gaps and opportunities in online education in response to disruptions caused by the pandemic. As a pan-Canadian academic community, authors in this volume explored and explained the many conditions that must be in place for engaged online learning and effective teaching to ensure that accessible, equitable, healthy, and safe places to work and learn are prioritized, and to explore how schools, school jurisdictions, faculties of education, academic faculty and graduate supervisors, and ministries of education must adapt and collaborate to support these essential conditions.

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Section 1: Online Learning & Teaching in K-12
Part 1 Learning Connections

Chapter 2

Developing a Kindergarten to Grade 8 Rural Remote Learning Framework: Innovation in Western Manitoba

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Abstract

When Canadian schools moved to online learning in March 2020, the shift to deliver emergency pedagogy challenged teachers, students, families, and educational systems. While most Manitoba students returned to face-to-face learning that fall, the risk was too high for those with immunocompromised family members. The Westman Consortia Partnership (WCP), a coalition of southwestern Manitoba school divisions, developed the Rural Remote Learning Program to facilitate learning for over 180 students from Kindergarten to Grade 8 during the 2020–2021 school year. Through our research, we sought to discover what beliefs, practices, and strategies are critical to rural remote learning. Action research methodology was employed to study the emergent program using two cycles of data collection: digital questionnaires and semi-structured interviews. Participants included students, teachers, parents, curriculum consultants, and home school principals. Three themes emerged from the data: (a) beliefs, perspectives, and tensions in communication; (b) practices in technology, learning, and pedagogy; and (c) strategies that support teachers, parents, students, and their mental health. Drawing from the Novel Remote Learning Framework (Almutairi et al., 2021) and considering White and Downey's (2021) theoretical framework for understanding rural educational innovation, the authors propose a rural remote learning framework that synthesises the findings.

Résumé

Lorsque les écoles canadiennes sont passées à l'apprentissage en ligne en mars 2020, le recours à une pédagogie d'urgence a mis au défi les enseignants, les élèves, les familles et les systèmes éducatifs. Alors que la plupart des élèves manitobains sont retournés à l'apprentissage en présentiel cet automne-là, le risque était trop élevé pour ceux dont les membres de la famille étaient immunodéprimés. Le *Westman Consortia Partnership* (WCP), une coalition de divisions scolaires du sud-ouest du Manitoba, a mis sur pied le *Rural Remote Learning Program* afin de faciliter l'apprentissage de plus de 180 élèves de la maternelle à la 8e année pendant l'année scolaire 2020-2021. L'objectif de cette recherche était de découvrir quelles croyances, pratiques et stratégies sont essentielles à l'apprentissage à distance en milieu rural. C'est par l'entremise d'une méthodologie de recherche-action et de deux cycles de collecte de données, soit des questionnaires numériques et des entretiens semi-dirigés menés auprès d'étudiants, d'enseignants, de parents, de consultants en programmes scolaires et de directeurs d'écoles à domicile, que nous avons étudié le nouveau programme. Trois thèmes ont émergé des données : (a) les croyances, les perspectives et les tensions en matière de communication ; (b) les pratiques en matière de technologie, d'apprentissage et de pédagogie ; et (c) les stratégies pour soutenir les enseignants, les parents, les élèves et leur santé mentale. S'inspirant du *Novel Remote Learning Framework* (Almutairi et al., 2021) et considérant le cadre théorique de White et Downey (2021) pour comprendre l'innovation éducative en milieu rural, les auteurs proposent un cadre d'apprentissage à distance en milieu rural, qui représente une synthèse de leurs résultats.

Developing a Kindergarten to Grade 8 Rural Remote Learning Framework: Innovation in Western Manitoba

When Manitoba schools closed due to the COVID-19 pandemic in March 2020, students and teachers moved to remote learning until the end of June. Although the directive to move classroom learning communities to online platforms was unprecedented in the province, innovative teachers learned quickly how to navigate platforms such as Zoom and Microsoft Teams. Parents learned to work from home while supervising online learning and sharing their devices and Wi-Fi signal with their children. When the province announced a return to in-person classes in the fall of 2020, students, teachers, and parents were ecstatic and eagerly embraced social distancing, cohorts, and face masks as necessary pre-requisites for being back in school. However, for some medically fragile students and families, a return to the bricks-and-mortar school environment was too risky and alternative arrangements needed to be made. This chapter tells the story of a responsive program developed by seven rural school divisions in southwestern Manitoba to meet the needs of this population.

Research Context

Southwestern Manitoba, stretching from the Saskatchewan border east to Brandon, consists of prairie and pasture, with Riding Mountain National Park and farmland extending the area further to the north. In this region, low student numbers result in small or multi-grade classes, limited high school course options, and teachers with responsibility for many different courses. The small size of each division makes it practical and feasible to combine resources and create programs to serve students in the overall area who are unable to access required classes. Having worked together previously as a group of southwestern Manitoba superintendents to deliver joint professional learning and specialized education programs, the southwestern Manitoba school divisions leveraged their established working relationships to form the Western Consortia

Partnership (WCP) in response to COVID-19. The WCP decided that the most effective response to their shared challenge was to create a steering committee to oversee the development of the Remote Learning Program, to provide in-home education for those students who were unable to attend school in person. The seven school divisions involved were urban Brandon School Division and six smaller rural divisions: Park West School Division, Southwest Horizon School Division, Rolling River School Division, Mountain View School Division, Swan Valley School Division, and Fort La Bosse School Division.

The WCP Remote Learning Guidelines document was developed by the steering committee in the summer of 2020 to define the program and outline the responsibilities of the various stakeholders (M. Gustafson, Personal communication, October 16, 2020). Despite in-person classes resuming in Manitoba in the fall of 2020) these students needed an in-home learning option due to their own or a family member's medical condition (e.g., asthma, cancer, immune-compromised family members, etc.). Although the WCP steering committee members were experienced school administrators, their limited experience with remote learning prior to COVID-19 kept them unaware of the “careful instructional design and planning” (Barbour et al., 2020, p. 4) required for online pedagogy. Multiple leadership concepts informed the design and direction of the program, including open communication, growth mindset (Dweck, 2006), appreciative inquiry (Cooperrider & Whitney, 2005), and building the capacity of the adults in the system (Fullan, 2016; Goodlad Institute for Educational Renewal; Sergiovanni, 1982). Knowing the program would evolve as necessary, the WCP acknowledged that they were “building the ship as it sails” (Leaders & Learners, 2020, p. 4). Teacher efficacy, student engagement, and strong relationships were seen as critical pillars that would impact student learning (M. Gustafson, Personal communication, October 16, 2020).

Families required medical documentation to register their children for the rural remote program and students needed to be in a mainstream (no individualized plan) Kindergarten to Grade 8 program in either the English or French immersion stream. Over 180 students from 39 schools were organized into classes taught by eleven teachers. Factors such as fluctuating case numbers and increased vaccination rates changed the needs and scope of the program over time, so long-range planning was difficult, if not impossible.

The dynamics of a brick-and-mortar school were closely replicated. For example, classes ran on a Monday to Friday schedule, children had a teacher and a classroom of peers, a daily and weekly schedule, and direct instruction in all core subjects through a range of pedagogical approaches. Instruction included a combination of synchronous meetings on Microsoft Teams and independent or partner work offline. The length of contact time for each class varied according to the teacher's assignment, the make-up of the class (multi-grade vs single grade), and the language of instruction. For the majority of the classes, synchronous sessions lasted from 9–12:00 and 1:00–2:30, with a break for recess mid-morning.

A group of WCP consultants (technology, literacy, curriculum, and logistics experts) drawn from the sponsoring divisions provided technological and logistical support to both teachers and families in various stages of the remote learning program. Teachers benefited from weekly Friday meetings with the consultants to exchange pedagogical ideas, resolve logistical challenges, and reflect on day-to-day teaching tasks (e.g., attendance, assignments, assessment). The province of Manitoba issued initial guidelines to schools in the spring of 2020 that stipulated minimum contact hours per day at each grade level. Following WCP's initial foray into remote teaching in the fall of 2020 and building on WCP's experience, the province of Manitoba developed a more comprehensive plan called Safe Schools COVID-19 (Manitoba Remote Learning Support Centre,

2021). Although the Safe Schools framework provided useful guidance for remote learning contexts, it was not in place at the time when WCP was established.

Literature Review

During the COVID-19 pandemic, scholars (Carpenter & Dunn, 2020; North et al., 2020; Reicher, 2020), teachers (Adair-Gagnon, 2020; Thompson & Coleman, 2021; Thompson & Thompson, 2021), and the province of Manitoba (Manitoba Remote Learning Support, 2021) explored remote teaching philosophies, approaches, and pedagogies. To understand the field of rural remote learning, this review considers emergency remote learning practices, strategies in the Novel Remote Learning framework, and beliefs about rural education innovation.

Practices in Emergency Remote Learning

Veletsianos (2021) identifies two categories of online learning: emergency remote learning and pre-planned and intentional remote learning. In an emergency such as a global pandemic, educators do not necessarily have time to explore the existing digital pedagogy literature (Barbour et al., 2020; Hodges et al., 2020). Teachers did not change teaching goals or methods when courses migrated online (Bates, 2021), and often they needed to relearn how to engage their students in their online classroom settings (Adair-Gagnon, 2020; Thompson & Thompson, 2021).

With the benefit of time to pre-plan, intentional remote learning is different because practitioners can build on the solid foundation of experienced educators and scholars in the field of digital pedagogy. According to Barbour et al., (2020), there were four phases of online instruction during the COVID-19 pandemic. Phase 1, Rapid Transition to Remote Teaching and Learning, reflected the period of the spring of 2020 when schools switched over night to online synchronous delivery of classes via video platforms such as Zoom or Microsoft Teams. Phase 2 of emergency remote teaching, titled (Re) Adding Basics, described approaches that began in the fall of 2020, when issues of equitable access and course design were addressed, contingency planning emerged,

and questions were raised about the quality of online delivery instruction. This is the phase that best describes the focus of WCP's remote learning program. Phase 3's Extended Transition During Continued Turmoil, and phase 4's Emerging New Normal, addressed the need for flexible movement between face-to-face and remote delivery modes in response to changing pandemic conditions, options that were not possible for learners in WCP's remote learning program.

Different emotions arose with the COVID-19 pandemic and teachers needed to learn how to manage and develop coping skills with their students (Carpenter & Dunn, 2020; North et al., 2020; Reicher, 2020). When provincial governments did not have a plan yet, teachers and students who moved to online learning found ways to work collaboratively with other teachers (e.g., through social media) and develop new strengths to support one another and their students (Adair-Gagnon, 2020; Thompson & Thompson, 2021). The Novel Remote Learning Framework provides a lens through which components of remote instruction can be examined more closely.

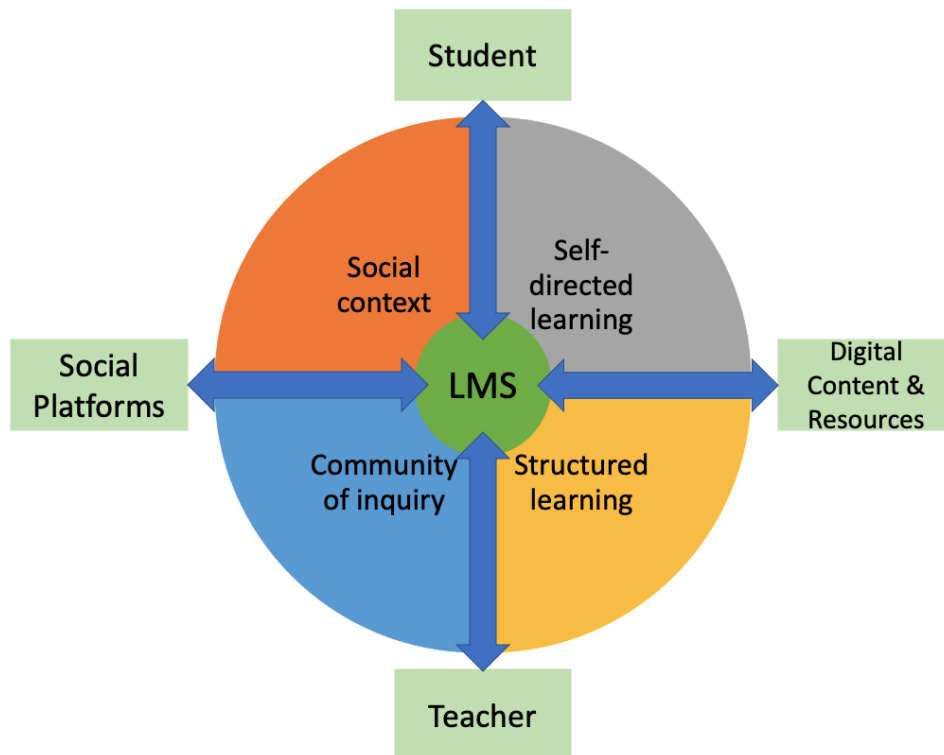
Strategies in the Novel Remote Learning Framework

The Novel Remote Learning Framework (Figure 1) considers the results of a study on emergency remote learning in higher education and integrates theories of distance learning and e-learning (e.g., philosophies, pedagogies, use of technologies). Some examples of challenges faced by participants in the study are the unpreparedness of teachers and students in remote contexts (e.g., tech skills), setting up boundaries (e.g., work and personal lives), motivation, digital assessment, and resources. The framework reflects the interactions through learning management systems (LMS) of digital content and resources, social platforms, the students, and the teachers. These five aspects are interconnected through four distinct categories: social context, self-directed learning, structured learning, and community of inquiry. Though this framework is based on higher education in Kuwait, each of these aspects, nevertheless, contributes to the understanding of situated practices (e.g., K-12 Rural Remote Learning Program in Western Manitoba) and the

(un)intentional outcomes from such practices. Educational programs develop in response to their local contexts, WCP is no exception, and it is a product of rural innovation.

Figure 1

Central Components of Remote Learning Pedagogy



Note. Adapted from the Novel Remote Learning Framework, by Almutairi et al (2021, p. 134).

Beliefs About Rural Educational Innovation

White and Downey’s (2021) three-part framework for rural educational innovation consists of place, people, and power. Place-attentiveness “encompasses a valuing of the physical space, the diversity of people in and connected to that place, and an understanding of how the place affords an agentic tool for educators” (White & Downey, p. 13). Place-attentive strategies guide rural innovation by highlighting the strength of local knowledges and diverse perspectives. Through reciprocal relationships, people in rural communities create opportunities and form alliances that are based on equality and partnership (White & Downey, 2021).

The coalition of rural school divisions that created WCP is an example of an alliance formed on the principles of ally-ship, equality, and partnership. In rural contexts, power grows out of a shared rural identity and the knowledge to enact policy and practice in alignment with the values of local stakeholders (White & Downey, 2021). Rural communities demonstrate their power when they create innovative programs that respond to local needs, reflect rural realities, and “design a course of action to reduce inequity” (White & Downey p. 16). Considerations of people, place, and power require participatory research methods that invite the perspectives of different stakeholders.

Methodology

The WCP approached the researchers to study their remote learning program, designed for students in medically fragile families, with the hope of capturing emergent and effective pedagogical practices in rural remote contexts. When asked to study a pilot program, it is important to select a methodology that will allow for multiple cycles of inquiry, analysis, and reflection and capture different stakeholders’ perspectives. Action research (Stringer, 2014) is an effective methodology for studying developing programs because early cycles of data collection and analysis can generate recommendations which can alter subsequent cycles of inquiry. Data collection and analysis occur throughout the research period, and it is common to go through multiple action cycles. While in some situations the research question may evolve from one cycle to the next, in this study, the research question remained consistent: What beliefs, practices and strategies are critical to remote rural learning?

Cycle One Data Collection and Analysis

Qualitative research captures peoples’ lived experiences and privileges the voices and perspectives of program participants. This qualitative research study consisted of two action research cycles. As part of the approval process by Brandon University Research Ethics

Committee (BUREC), each school division representative agreed to secure and confirm ethical approval in their respective division prior to the distribution of research requests. In cycle one, eight different questionnaires were developed to be appropriate for the different stakeholder groups: parents, teachers, curriculum consultants, home school principals, and students. Within the student group, four separate instruments were necessary to pose age-appropriate questions and gather responses from students in Kindergarten to Grade 4, and Grades 5 to 8, in both English and French immersion streams. Potential adult respondents were emailed a letter of invitation containing a link to the online questionnaire, with parents asked to provide the link to their children. Students could decide to opt out even if their parents gave permission, by closing the link, not answering questions, or not submitting their responses. The questions were a mixture of multiple choice and open-response questions, and asked about demographics, and the participants' strategies and experiences during the remote learning program. Multiple choice questions were analyzed quantitatively, taking advantage of the graphic presentation options in Survey Monkey. To analyze the open-response questions, the researchers together read each individual response in a participant group, identified themes that ran across the responses, and made note of topics requiring further clarification. Once participant group themes were summarized, the different summaries were compared and used to generate three overall themes that ran across the participant groups (Saldaña, 2013).

Cycle Two Data Collection and Analysis

Cycle two of the study consisted of semi-structured interviews with volunteer participants; interviews were recorded and transcribed verbatim. Focus groups were offered as an option, but the response was insufficient to run group interviews. Topics and questions for cycle two interviews emerged purposefully from cycle one data analysis, including the notations we had made regarding necessary elaboration or clarification.

Participants

Table 1 summarizes the participation from each stakeholder group in both cycles of the study. While it is not possible to see this from the combined total presented, it is important to note that we had only six questionnaires returned from students in the grades 5 to 8 English stream; meanwhile no questionnaires were returned from students in the Grades 5 to 8 French immersion, despite multiple reminders and re-sending of the invitation to participate and link to the questionnaire over a period of 6 weeks. In cycle two, individual transcripts within a participant group were analyzed collaboratively in sequence, with themes identified, described, and summarized. However, due to the low participation rate, our analysis focused on illuminating perspectives, as opposed to generalizing.

Table 1

Participants per Stakeholder Group and Cycle

Participants	In the study		In the program
	Cycle 1	Cycle 2	
Students (K-8)	21	1	181
Parents	38	3	Minimum 1 per student
Teachers	6	4	11
Curriculum consultants	3	1	5
Principals	20	1	39
Total	88	10	236+
Participation (%)	≈ 37.3%	≈4.3%	

Research Findings

Cycle one data analysis generated three overall themes in the data from the questionnaires: beliefs, perspectives, and tensions in communication; practices in technology, learning, and pedagogy; and strategies that support teachers, parents, students, and their mental health. Such themes were drawn from participants' (students, parents, teachers, principals, and curriculum

consultants) views and experiences on various aspects of the program, including their individual roles, Friday meetings, communication, the learning environment, and pedagogy. Based on cycle one of data collection and analysis, we presented an interim report to the WCP Steering Committee in May 2021 (Smith & Moura, 2021b).

Cycle two data analysis generated summaries from the interviews conducted with representatives of each participant group. Following the completion of cycle two data collection and analysis, the final report (Smith & Moura, 2021a) was submitted in December 2021. Findings from both cycles will be presented together in the following section, using the three overall research question themes as an organizational structure.

Beliefs, Perspectives, and Tensions in Communication

Stakeholders in the Rural Remote Learning Program expressed a range of opinions and beliefs in their questionnaire and interview responses. Of the different issues raised by participants in the rural remote learning program, communication was the one most emphasized. Individuals from all participant groups found that the expectations were not clearly communicated and that there was no designated lead contact for the program, which made it harder for them to understand their roles during the program. A curriculum consultant, for example, felt their role lacked clarity:

I think the problem with that was that there was no direction, so people didn't know what they were supposed to be working towards. ... If we had some kind of general alignment of practices, then we could have taken turns delivering the PD. (Interview)

From a principal's perspective, communication issues arose around the expectations for pedagogical approaches used by the teachers: "remote learning does not mean 100% online learning" (interview). This principal advocated for quality instruction and student engagement to take priority over an extended period of time online, particularly for younger learners, but felt the guidelines made teachers unsure about the expectations. Communication obstacles impeded

teachers' ability to assist their students with daily remote learning routines, particularly when teachers noticed parents were not as engaged with their children's learning. One teacher reported, "communication challenges make it difficult to get students set up with technology at the outset, and to stay in touch when parents are disengaged" (questionnaire).

Positive experiences with communication were also expressed by different stakeholders. Those closely involved in the daily online interactions observed that although face-to-face environments would have been it easier for them to interact, engage in activities, and help someone out when needed, new forms of communication were incorporated into daily school routines as students and teachers used text messaging and a group chat function to interact. Differing beliefs around communication illuminate how different perspectives on what should happen or needed to happen flourished in an environment of unclear expectations and guidelines.

Practices in Technology, Learning, and Pedagogy

Participants reported that the Rural Remote Learning Program required them to expand their technological skills and digital access. Technology was fundamental in all the participants' new routines and its role can be seen under three main streams: access, skills, and benefits. In their questionnaire responses, several participants mentioned unreliable access to Wi-Fi, sporadically functioning software, and the need to borrow equipment from their school division. In rural Manitoba equitable access to the internet was the biggest concern among principals, for example. On the positive side, technology provided interactive and hands-on activities, flexibility, and quick access to resources/files (see more on Figure 2 below).

Parents, students, and teachers reported that they developed new skills during remote learning and found new ways to improve their social skills. Technology allowed the WCP Remote Learning Program to have a reliable system in place (Microsoft Teams) to store information and to give more autonomy to students participating in the learning process.

Figure 2

Access Issues in Remote Learning According to Parents who Responded to Cycle 1 Questionnaire

What kinds of issues have you encountered accessing remote learning?	
ANSWER CHOICES	RESPONSES
No challenges	40.50%
Video freezing	29.70%
Lost connections	27%
Sound lags	24.30%
Weak internet connection	21.60%
Difficulty logging onto the internet (connection issues)	16.20%
Trouble accessing specific programs	16.20%
Difficulty logging onto programs (password issues)	10.80%
What do you do when the internet goes down and you and your child are unable to connect with online support?	
ANSWER CHOICES	RESPONSES
Work independently on tasks assigned by the teacher	62.10%
Send an email to inform the teacher and wait	62.10%
Switch to using data on a phone	37.80%
Do something not school related until the internet comes back on	16.20%
* Parents also pointed out specific issues with Microsoft Teams	

For the learning aspect, studying remotely made it easy for student participants to reach out to teachers as they were “a click away” and could quickly support students. Autonomy was another key outcome of remote learning as students grew and became more independent throughout the rural remote learning program. A few students still faced more distractions at home than they would at school, and for other students, not seeing their teacher all the time affected their learning negatively. In French immersion, the challenge was to engage students and family in meaningful language activities. Families relied on technology to perform and understand tasks and assignments. As one teacher shared in their questionnaire response “students are afraid to take risks when learning French and will often rely on Google Translate instead of trying on their

own.” In remote learning delivery, parental expectations of more synchronous virtual learning times were challenging for teachers who had to accommodate multiple grades.

Pedagogically, participants’ shared experiences suggested a need to focus on the quality of program delivery. It was essential to have well trained teachers, students, and even parents to be able to deal confidently with remote learning. The weekly meetings between curriculum consultants and teachers were another streamlined online pedagogical strategy, which offered those participant groups opportunities to share views and troubleshoot. New activities were implemented, and creative digital/online content helped teachers and students reshape learning routines for the online environment. One aspect to consider is that autonomy, from an online pedagogy perspective, worked better for students who were more independent (e.g., Grades 5 to 8 students) than for the younger children who naturally required more assistance. The lack of a particular instructional design framework for online learning meant that teachers improvised with the resources they had available and operated autonomously. Issues of digital access and equity impacted the ability of individual learners to access the full breadth of learning opportunities teachers were offering in the online environment.

Strategies that Supported Teachers, Parents, Students, and their Mental Health

The intensive participation of teachers, parents, and students in the WCP Remote Learning Program made it critical to consider these participant groups’ specific needs and concerns about mental health. For teachers, supports would have been helpful in learning to deliver remote learning as well as in resolving logistical issues (e.g., access to Microsoft Teams). One other supportive strategy highlighted in the study showed the importance of collaboration (through Friday meetings mostly), where teachers and curriculum consultants shared resources to be used in classes, had professional conversations, and counted on peers’ reflections to reassure and validate their own practices. One key aspect that could have enhanced online learning delivery and

pedagogy would have been the provision of guidelines for remote learning to help streamline the supports offered by curriculum consultants, provide focus for the Friday afternoon sessions, and ensure consistency across the different grades.

Parents reported that they were challenged by multi-tasking, having more than one child in remote learning, and dealing with unmotivated teenagers and/or pre-schoolers who did not yet attend school. Support for parents, included for some and requested by others, was access to information about their child's schedules and assignments. Other parental suggestions mentioned posting a digital schedule and a list of assignments in order to provide clear written instructions for independent work, with model examples of what completed work should look like and English instructions for parents of children in French immersion. One more strategy that was deemed beneficial for parents was to have regular meetings with teachers to get insights on how to contribute more effectively to their children's learning.

For student participants, the lack of opportunities to socialize was the most emphasized concern. In general, children received more attention at home from relatives, while some students developed a more personal relationship with their teacher. There was a noticeable increase in confidence of some students when they were able to make their own choices (e.g., when and how to interact online, when to do their tasks). Strategies for engaging with content, specifically for French immersion students, were still lacking, as one student offered the following suggestion: "perhaps having/encouraging more lecture/class time for discussion as a way to further enhance our usage of the language" (questionnaire). However, all student participants from both survey and interviews still missed being in the physical spaces of their schools, which would facilitate social encounters with other friends and teachers during recess, gym, and lunch hours, for example.

Overall, mental health surfaced in comments by all participant groups. Mental health of the remote learning teachers was a concern expressed by parents, as they detected the potential for

teacher burn-out. Among students, children who were isolated from their peers could develop some mental health struggles. However, for some student participants, being alone at home increased their mental health as they could work at their own speed, move freely, and engage with teachers or classmates without fear of criticism. Knowing about the challenges of social isolation, a principal took the initiative to check in with families and make sure they were being assisted: “I’ve called families to see how it’s been going. They like the communication” (questionnaire).

Discussion

The three themes discussed here serve to summarize the findings from the WCP Remote Learning Program. The Novel Online Learning Framework (Almutairi et al., 2021) and the foundation for Rural Education Innovation (White & Downey, 2021) provide effective tools to identify new insights arising from this study. In this section of the chapter, we provide a detailed comparison and articulation of how study findings align with the two frameworks; we offer a few minor alterations to adapt the post-secondary Novel Learning Framework to the Kindergarten to Grade 8 students involved in the WCP Remote Learning Program; and, finally, we propose a synthesized framework for Rural Remote Learning that draws upon and integrates elements of both frameworks and our findings.

Layer One: The Core of Rural Remote Learning

In the original Novel Online Learning Framework diagram, each of the four components includes a detailed articulation of how it was manifest in the post-secondary online learning context. Although in our figures, LMS is replaced by “Rural Remote Learning,” the same four components are retained as they accurately capture elements of the WCP Remote Learning Program. The detailed articulation of how each component was manifest in the school-age remote learning context is different and unique to this study. Figure 3 presents the four-part core of the

Novel framework with the detailed articulation of how each component was manifest in WCP's Remote Learning context.

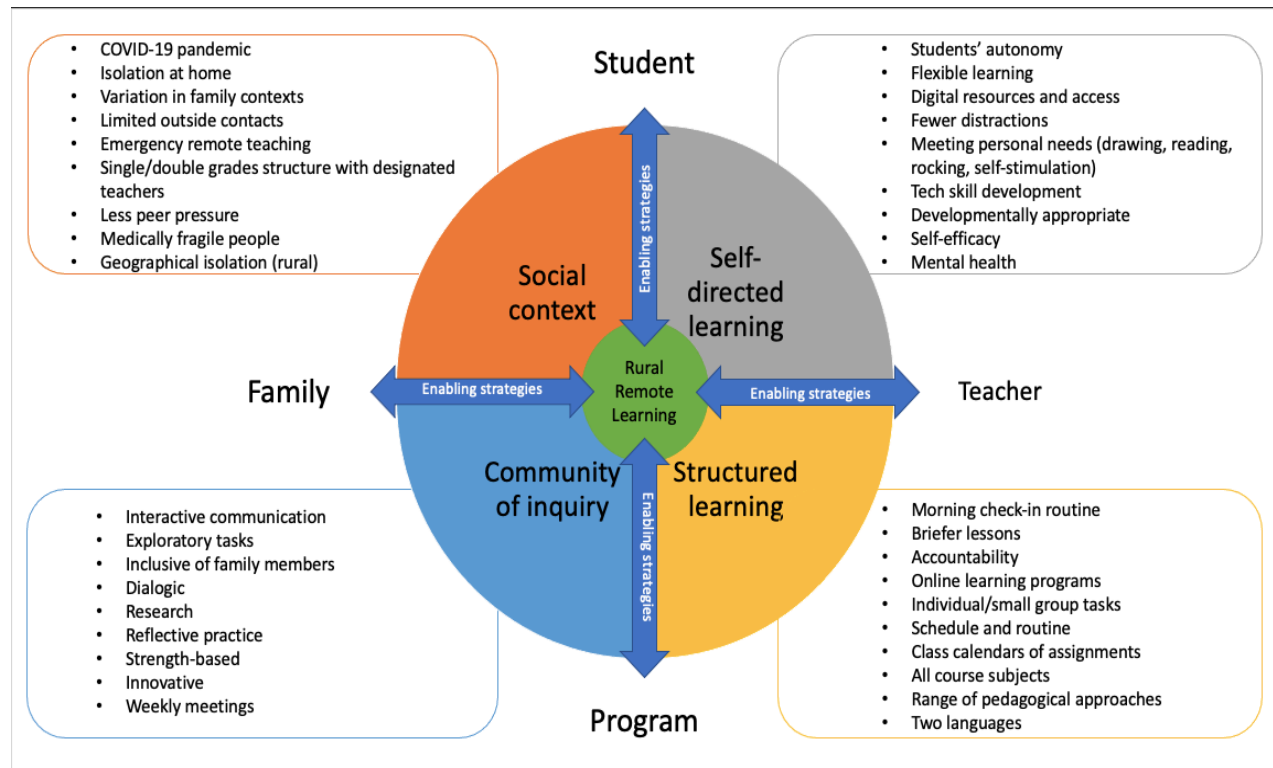
The *Social context* reflected the presence of the pandemic-related emergency program design, students' isolation in family homes with medically fragile individuals, social groupings facilitated through class groupings, and both the benefits and challenges of geographic isolation. *Self-directed learning* captured the need for developmentally appropriate independence by the learners, which included autonomy, choice and flexibility, access to digital resources, and freedom of movement. Having fewer distractions enabled students to focus, develop their technological skills, increase their self-efficacy, and attend to their mental health needs (Thompson, 2010). *Structured learning* ensured that remote learning participants benefitted from routines such as a daily schedule, frequent check-ins, shorter lessons, and class calendars. A variety of subjects, language of instruction, tasks, group sizes, and pedagogical approaches including online learning programs supported student learning. The *Community of inquiry* for the WCP Remote Learning Program included interactive communication and exploration of ideas between students, their family members, and their teacher(s). Remote learning teachers also benefitted from a community of colleagues who met weekly to reflect on their practice, explore research, share experiences, and engage in strength-based dialogue and innovation.

Layer Two: Enabling Strategies for Different Stakeholders in Rural Remote Learning

The second layer of the Novel Framework introduced in the literature review (Figure 1) includes the student, digital content and resources, the teacher, and social platforms, plus two-way arrows that connect each descriptor to the centre of the figure. While both the teacher and student stakeholders were relevant for the WCP Remote Learning Program context, in our adapted figure of layer two we have replaced “digital content and resources” and “social platforms” with “family” and “program” to reflect the prominence of these two enablers in the data.

Figure 3

Layer One: The Core of the Rural Remote Learning Framework Including the Novel Online Learning Framework Components and Detailed Articulation From the WCP Rural Remote Learning Program



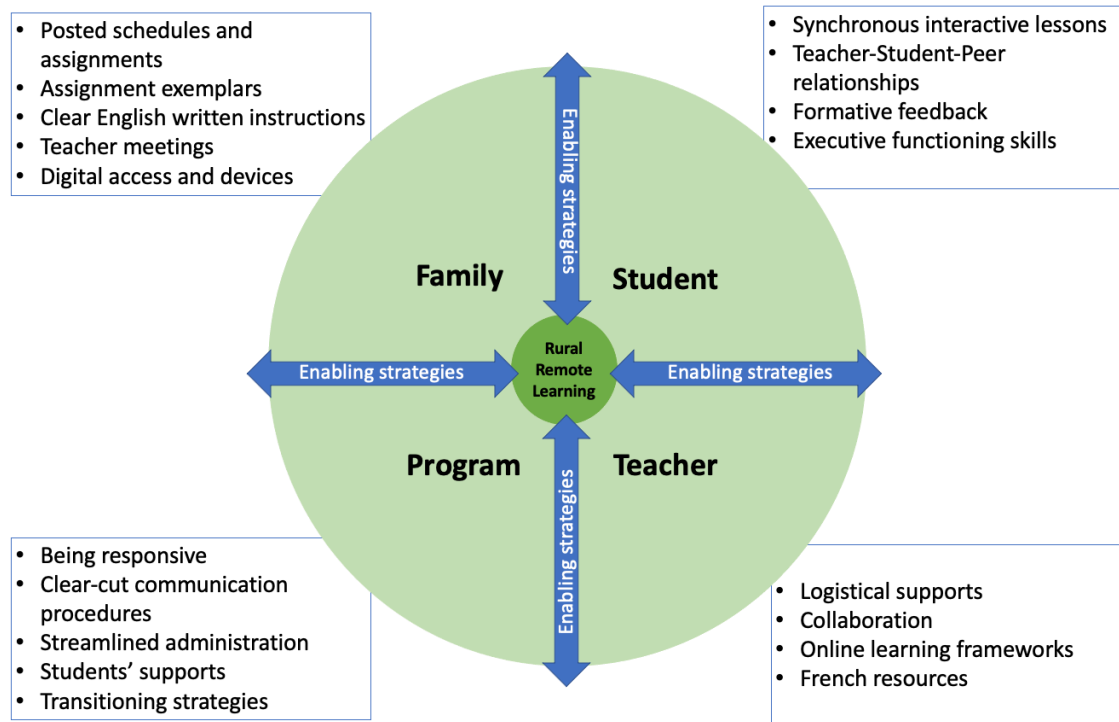
When thinking of the different stakeholders (e.g., families, students, teachers, and program administrators), many enabling strategies (Figure 4) were useful in the development, efficacy, and innovation of the program and would inform similar future remote learning programs.

When observing families during remote learning, Sosa Díaz (2021) argued that the contexts of different family households varied a lot. For instance, matters of economic situation, working hours, availability and access to digital devices, and parents' participation in their children's education were some factors that could contribute to unequal educational outcomes for students. In their study of adolescent online learning, Borup et al. found that parental engagement in online

environments involved: “facilitating interaction, organizing students’ environments, and instructing students” (2014, p. 15).

Figure 4

Layer Two: Enabling Strategies for Different Stakeholders in Rural Remote Learning



Parents helped facilitate interaction through nurturing (providing physical care and required materials), monitoring (keeping an eye on student activities online), and motivating (providing positive reinforcement and encouragement). In the Rural Remote Learning Program, the role of parents, while supporting their children in day-to-day activities, indicated that some families required more time to become comfortable with remote learning (Karasel et al., 2020; Sosa Díaz, 2021). Moreover, because parents were usually the point person to help children with school assignments and tasks, we recommend that guidelines “should be “prepared and families should be trained on how to benefit their children from [remote] education” (Karasel et al., 2020, p. 7).

Because teachers depended on parents to help students in the learning process (Borup et al., 2014; Karasel et al., 2020; Sosa Díaz, 2021), our suggested enabling strategies for families included parents having access to posted schedules, assignments, and assignment exemplars to provide further clarification, such as instructions written in English for French immersion families.

During the rural remote learning program, flexibility and autonomy were key components in students' learning processes. As Chiu (2021) suggests, "teachers should consider student perspectives, allow for choices around learning, and reduce unnecessary stress and demands on students" (p. 3). Though teachers in the WCP Remote Learning Program touched upon those features, students (mainly French immersion students) requested that more synchronous time be scheduled with their teachers and classmates.

From the teacher-student relationship point of view, teachers are relationship builders in a classroom, even in an online setting (Miller, 2021). When students feel they belong to a class and have a powerful sense of relationship with their teachers and peers, they tend to be willing to learn more and succeed academically (Chiu, 2021; Miller, 2021). While some students thrived academically by being at home where they felt safe and free from social pressure and bullying, others struggled more. Teachers in rural remote learning did demonstrate "authentic care by using positive and respectful communication, fostering peer discussions and interactions, and using a familial approach to maximize each student's potential" (Miller, 2021, p. 116); however, the physical spaces of schools and in-person interactions were still missed.

These considerations have implications for students' awareness of monitoring learning (Chiu, 2021). When we examine learning assessment, students who had limited digital access, who attended classes irregularly attendance, and who came from different socialization experiences could have been negatively impacted in their learning processes. Therefore, thinking of ways to

implement more formative feedback and develop students' executive functioning may have enhanced their participation, engagement, and motivation during remote learning.

In addition to supports for families and students, teachers and program administrators also needed some resources to effectively deliver the remote learning program. Hamilton et al., (2020) unpacked the supports (e.g., training, curriculum, relationships) teachers need for a remote learning setting. An online learning framework would have made it easier for schools to monitor students' progress. Given the lack of a streamlined online pedagogy, teaching practices in remote learning during COVID-19 displayed a range of curriculum coverage and teaching approaches (Hamilton et al., 2020).

Overall, the program administrators were responsive to the ongoing needs of families, students, and teachers. Similarly, Hamilton et al. (2020) discuss that priorities will always be emergent and dependent on the current contexts. The COVID-19 pandemic challenged long-term administrative planning and required short-term independent responses by stakeholders to address emergent remote learning issues.

Layer Three: Rural Innovation

The third layer of the Rural Remote Learning Framework consists of place, people, and power, the foundation for Rural Education Innovation proposed by White and Downey (2021) in their recent publication. Figure 5 considers features of our research through the lens of the three-part framework.

When considering place-attentive strategies, the shared geography of southwestern Manitoba, together with the affordances and challenges of rural living, was understood by the organizers and was reflected in the design of the program (Camillo & Longo, 2020). Teacher efficacy is a rural issue given the cost and difficulty of accessing professional learning and higher education.

Figure 5

Layer Three: Rural Education Innovation in the WCP Rural Remote Learning Program



It is difficult to recruit specialists such as social workers, occupational therapists, and psychologists to work in remote areas; nevertheless, there was a shared desire to enact high quality programming, including French immersion, and ensure students receive an education that opens doors to future opportunities. Adopting an attitude of self-sufficiency and building on insider knowledge derived from being immersed in the place, the organizers leveraged their local knowledge and diverse perspectives into action (White & Downey, 2021).

White and Downey (2021) consider rural education innovation to include forming alliances, creating new visions of the future, and accessing the necessary resources. Access to

hardware was a real issue, for example, given the distances individuals needed to travel to purchase equipment and the fragility of participants who were largely confined to their homes. Strong relationships based on “shared understandings, commitments and responsibilities” (p. 14) between the superintendents in southwestern Manitoba provided the foundation of trust required for the program’s development. The local schools knew the families well and were able to articulate student, family, and curricular needs; for example, they were aware that most parents were multi-tasking while supervising their children and learning about the educational system and online learning. School division senior administrators brought their knowledge of human, physical, and financial resources to the table, in addition to the political acumen and authority to make decisions and allocate resources.

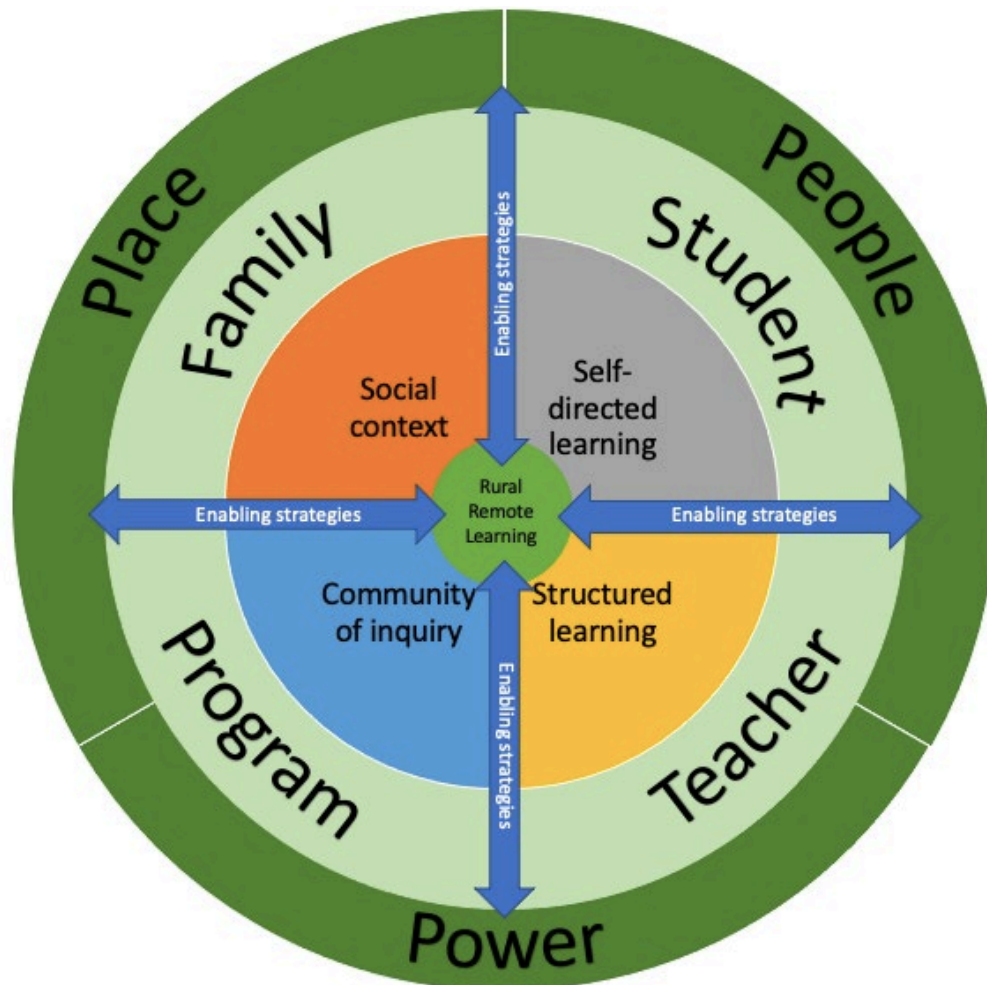
When rural educators combine their resources, they innovate and activate the “power to influence policy and practice” (White & Downey, 2021, p. 12). The organizers assumed an empowering stance and reframed the typical deficit rural narrative to one of strength and innovation. By working together to design the WCP Remote Learning Program, superintendents were able to support students and families in need, using a local solution that was strength-based and action oriented. The WCP steering committee responded to their shared urgent need for remote learning programming by drafting a shared vision that was both comprehensive and emergent.

Rural Remote Learning Framework

The Rural Remote Learning Framework we propose incorporates the previous discussion of layers one, two, and three into one framework. While the details identified in Figures 3, 4, and 5 cannot be seen in the final framework, their content is implied. The proposed framework, visible in Figure 6, synthesizes our findings and articulates the essential features of the WCP Remote Learning Program.

Figure 6

Proposed Rural Remote Learning Framework as a Result of This Study



Layer one presents the features of the instructional elements of the remote learning program, layer two synthesizes the enabling strategies identified through our research that would provide additional support for families, students, teachers, and the program. Layer three situates the WCP within the context of rural educational innovation, where considerations of place, people, and power influence outcomes. When all three layers are combined, the proposed Rural Remote Learning Framework can provoke further dialogue about innovation in rural spaces, remote learning programs for school-age youth, and the supports required for diverse stakeholders to ensure success.

Considerations for Teacher Educators and Researchers

Teacher educators, including university faculty and school-based mentors, encourage future teachers' autonomy, self-direction, agency, and confidence in their professional identity and decision-making. Preparing teachers for classrooms should be a result of collaborative, interdisciplinary, and informative work (Adair-Gagnon, 2020; Thomson, 2010). For years, education faculty have prepared pre-service teachers for the types of classroom environments they have personally experienced. COVID-19, however, has taught us to work with the unexpected and that means acknowledging teachers' voices and concerns, well-being, mental health, and motivation to teach. The pandemic has been a lesson for us to see that school curriculum is not fixed, and also that it needs to be re-examined and readapted to address current local needs and contexts (Hamilton et al., 2020).

To contribute to an online learning framework, we argue that developing teacher education programs that consider hybrid/online/remote learning can benefit future teachers and administrators (Nantais et al., 2021). Ideally, such programs will discuss and broaden concepts of innovative and online pedagogies and provide tools that explore (dis)advantages of learning styles, learning apps, and digital software. Under the umbrella of digital teaching and learning, there also needs to be an investigation about alternative remote offline teaching/learning. Apps that do not require internet access should be part of an online learning framework to include those families and students who have limited access. Finally, teacher education programs that choose to include this type of learning in their curriculums will enhance future teachers' and administrators' formative feedback strategies, short-term troubleshooting, and digital skills. For that, "it is essential to help teachers, staff and students continue levelling up their digital skills to enable the adoption of appropriate digital technologies" (Nantais et al., 2021, p. 35).

This study addressed the French immersion online teaching realities and although French is an official language of Canada, resources in this language are still scarce. Therefore, fostering strategies for online or remote French language teaching and learning can include exploring different learning modalities such as computer-assisted learning for language learners. Courses, which are already in place in several programs, that focus on English as an Additional Language (EAL) and offer pre-service teachers additional language teaching strategies should be also used to advance resources for French language teaching and learning.

There is a need for scholarship to be published on innovative rural program design in response to local conditions and innovative pedagogies in K-12 online learning environments. There may also be value in exploring the notion of what constitutes culturally responsive pedagogy in rural communities. The Rural Remote Learning Framework introduced in this chapter could be a catalyst for such discussions.

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Chapter 3

Fostering K-12 Student-Teacher and Collegial Relationships during the COVID-19 Pandemic: Implications for Teacher Education

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Abstract:

This community-based participatory action research project was prompted by the rapid shift to emergency remote learning in March-June 2020 as a result of the COVID-19 pandemic. A team of researchers at a regional teaching-focused university in BC initiated the research based on their shared belief that new understandings about the relational character of teaching and learning would come from an examination of the lived experience of educators during this difficult time. The study involved six community partners who collaborated with the researchers to co-develop the research questions and co-design data collection tools. The study was intended to be mutually beneficial for the teacher education program and the school districts/schools involved. It engaged 413 participants (teachers, administrators, educational assistants [EAs], and non-enrolling teachers) who answered survey questions about relationships, communication, equity and inclusion, shifts in practice, and leadership. This chapter is focused on data specific to the role of relationships in education and how relationships were impacted during the pandemic. Three themes emerged from the data analysis relevant to online learning environments, yet applicable across all modalities: relationality as a core value of BC K-12 educators, affordances and challenges for relationships, and affordances and challenges for equity. Recommendations specific to teacher education aim to advise teacher education programs to expand their focus on relationship building; to re-envision the work of teaching as a collaborative and not a solitary act; and to advocate for the inclusion of online teaching and learning pedagogies into teacher education programs.

Résumé

Ce projet de recherche-action participative et communautaire a été propulsé par le passage rapide à l'apprentissage à distance d'urgence en mars-juin 2020, à la suite de la pandémie de COVID-19. Il fut lancé par une équipe de chercheurs partageant la conviction que de nouvelles conceptions de l'enseignement et de l'apprentissage découleraient d'un examen de l'expérience vécue par les éducateurs pendant cette période difficile. Les chercheurs ont sollicité le concours de six partenaires communautaires afin de co-développer les questions de recherche et co-concevoir les outils de collecte de données. Conçue à dessein d'être mutuellement avantageuse, l'étude repose sur la collaboration de 413 participants (enseignants, administrateurs, aides-enseignants [EAs] et enseignants non inscrits) ayant répondu aux questions du sondage sur les relations, la communication, l'équité et l'inclusion, les transformations de la pratique et le leadership. Ce chapitre se concentre sur les données spécifiques au rôle que jouent les relations dans l'enseignement et sur l'impact que la pandémie a eu sur ces dernières. Trois thèmes se dégagent ainsi de l'analyse : le concept de relation comme valeur fondamentale, les affordances et les défis liés aux relations et les affordances et les défis qui se rapportent à l'équité. Des recommandations précises visent à conseiller aux programmes de formation des enseignants d'élargir leur champ de préoccupation à la création de relations durables, à la conception du travail d'enseignement comme un acte collaboratif et non solitaire, ainsi qu'à l'inclusion de pédagogies d'enseignement et d'apprentissage en ligne.

Fostering K-12 Student-Teacher and Collegial Relationships during the COVID-19 Pandemic: Implications for Teacher Education

At the start of the COVID-19 pandemic (March 2020) the rapid shift to emergency remote learning presented the opportunity to explore ways in which meaningful, authentic, and respectful teaching and learning relationships are created when connecting and collaborating online. Quickly, K-12 schools in British Columbia (BC) moved to remote learning. Situated within an understanding that K-12 schooling is embedded in the “values, beliefs, and deep convictions enacted in practice, in the social context that encloses such practice, and in the social relationships that enliven the teaching and learning encounter” (Britzman, 2003, p. 64), it was believed that new understandings about the relational character of teaching and learning would come from an examination of the lived experience of educators during this time. Therefore, the study’s purpose was to capture that experience, to inform the future content and delivery of our teacher education programs, and to provide timely data to participating schools and school districts to assist future planning. For this chapter, data collected about relationships and collaboration while working in online environments were examined to gain insights into the role of relationships in education, how relationships were impacted, and how learning and teaching relationships were fostered.

This study was undertaken jointly by six BC coastal community partners and Vancouver Island University’s (VIU) Faculty of Education and the Faculty of Health and Human Services, using community-based participatory action research (CBPAR). Funding came from internal institutional awards, and ethical approval was granted by VIU and community partners.

Theoretical Framework

In this study, the theoretical framing of understanding and experience is informed by two key fields of thought: philosophical hermeneutics and relational being. In philosophical hermeneutics, the *hermeneutic circle* frames the confrontation and interruption of general

understandings. New or different understandings gained from the experience of emergency remote learning are interpreted as shifts in *horizons of understanding* as articulated by Hans-Georg Gadamer (2004), where understanding is viewed as “an interpretive practice that occurs in a shifting in-between, in the middle of relationships, contexts, and particularities” (Moules et al., 2011, p. 2).

The notion of relational being draws on a wide range of relational philosophies that challenge an individualistic conception of self. This study relies on the description posited by Gergen (2011), who asserts, “if the origin of all meaning lies within collaborative action (co-action), then not only does the individual self but, indeed, all intelligible action find its origins in relationship” (p. 281). He extended this line of thought to constructionist theory and the concept of relational education by noting that “constructionist theory and practice locate the source of meaning, value, and action in communicative relations among people” (Gergen, 2021, p. 3) and, thereby, provide a framework for relational education across modalities. Gergen believes that the goal of education is to prepare students for engaged citizenship and so asserts that the emphasis must be on “relational processes for sustaining and creating flourishing forms of life” (2021, p. 46). Gergen further describes that such an education process requires a shift toward partnerships between teachers, students, and families, in which relationships are reciprocal, strength-based, and built on appreciative practices and collaborative learning.

BC’s curriculum lends itself to a relational approach to education emphasizing core competencies of communication, collaboration, creative and critical thinking, and personal and social awareness (BC Government, 2021a). Equity and inclusion are inherent within relational education because the process is “sensitive to students’ needs, aspirations, skills, and values, along with the conditions, and opportunities of the time” (Gergen, 2021, p. 50).

The rapid shift to remote learning due to the pandemic was an unprecedented event. We examined the experience of teaching and learning through the lens of relational ways of being. The rapid shift could be viewed as an interruption to understanding which “serve[d] to negate [and change] our previous views” (Warnke, 1987, p. 26) and provided the opportunity to engage as reflective practitioners in generating new understandings (Gadamer, 2004, p. 347).

Background Literature

The COVID-19 response by schools has been researched both nationally and globally from a variety of perspectives. This background is contextualized within a synopsis of what is known about relational practice and equity and inclusion in online teaching and learning. Literature about teacher preparation for online teaching and learning is also provided. Collectively, this background literature provides context to interpret the results of our study.

Relational Aspects of Online Teaching and Learning

Online teaching and learning have been extensively studied in post-secondary contexts (Carrillo & Flores, 2020), and arguably some of this knowledge has application for K-12 learning environments (Crippen, Bokor, & Evans, 2018). However, the field of K-12 online learning is just now maturing (Lokey-Vega, 2018). Despite a growing body of evidence about effective online teaching and learning pedagogy, many K-12 educators have not accessed this information, so online learning experiences are often misaligned with available knowledge about how to design and facilitate online learning environments (Friedhoff, 2018). The experience of emergency remote learning provided educators with little preparation time; therefore, comparisons to online teaching and learning literature must be made cautiously (Veletsianos, 2021). However, this body of knowledge provides insight into relationships in online environments, and thereby informs the interpretation of educators’ experiences during emergency remote learning and subsequent recommendations for teacher education.

Links have been established between quality student-teacher relationships in face-to-face teaching contexts and academic performance (Muller et al., 1999), intellectual development (Goldstein, 1999), and emotional engagement (Wang & Eccles, 2013). Yet, evidence about the role relationships play in online teaching and learning and how these relationships can be fostered has provided mixed results. Bedenlier et al. (2020) attest that it is more challenging for students to feel connected and develop relationships in online settings. However, several studies conducted both before and during the pandemic saw that online teaching led to the creation of caring relationships (e.g., Borup et al., 2013; Miller, 2021).

In 2008, DiPietro et al. studied best practices in K-12 online teaching and learning. At the time, little work had been done to understand the unique skills needed and the experience of teaching in this context. Their study identified typical classroom management and pedagogical strategies for effectiveness. Fostering relationships figured prominently in strategies for engaging students, making content meaningful, and building community. Specific strategies included teacher/student dialogue on and off topic, encouraging communication among students, and personalizing course elements to reflect student interests (DiPietro et al., 2008). When Borup et al. (2013) used Noddings' (2005) model of moral education to examine whether online instruction could facilitate caring, they identified similar pedagogies that facilitate "all aspects of Noddings' model of moral education in ways unique to online contexts, and at times with more depth than experiences in face-to-face contexts" (p.1).

Zeigler's (2016) meta-analysis of the relative effectiveness of synchronous online communications and face-to-face communications in second-language acquisition learning contexts revealed a small advantage for online interactions. Yan and Batako (2020) found student descriptions of the quality of their online interactions were based on course content, structure, and the quality of online discussions. These findings may be consistent with knowledge about blended

learning in post-secondary environments where the process to develop relationships online is distinguished from face-to-face processes. Specifically, Garrison and Vaughan (2008) said collaboration and social engagement come first in face-to-face modalities, thus teachers must strive to generate reflective inquiry, which can be challenging. In online modalities, reflection is embedded in learning activities and scaffolded more easily. Collaboration and a sense of community then arise from engagement in these learning experiences. Likewise, Drexler (2018) explained effective online pedagogy occurs in “student-constructed personal learning environments” (p. 151) thus broadening thinking about relationships as tied to the intention of those social interactions, which is to engage in dialogue, collaboration, and reflection toward learning.

Relationships During Emergency Remote Learning

Relationships between educators and students, as well as among colleagues, were an important theme in many studies about the impact of COVID-19 on K-12 education. Results emerged in the context of mental health and well-being and quality of instruction.

Miller (2021) asked teachers about their practices for building student relationships. Invited to reflect on their practice before and after emergency remote teaching and learning, teachers noted an increased emphasis on socio-emotional well-being and fostering of relationships with students. In this study, some teachers, particularly those less experienced, had not emphasized relationship building since the start of the school year, thus, the transition to emergency remote learning “unveiled a need to repair and (re)prioritize teacher-student relationships” (Miller, 2021, p. 121). Strategies used included maintaining positivity to create student connections and a sense of care, keeping expectations high, encouraging peer interactions, and attending to students’ non-academic needs. However, Chiu (2021) found Hong Kong teachers struggled to simultaneously promote autonomy for cognitive engagement and an environment for emotional engagement. He

concluded that teachers (and students) must have resources such as self-regulated learning abilities and digital literacy skills in order to successfully engage in online interactions.

The Canadian Teachers' Federation (CTF, 2020) conducted a study of teachers' responses to the pandemic in June 2020 and found that most respondents (75%) were concerned or had questions about the impact of isolation on student mental health. Similarly, parents and students in the Yukon felt that isolation and boredom experienced during remote learning negatively impacted social and emotional well-being (Yukon Department of Education [YDE], 2020). Large scale American studies have provided quantitative evidence of the negative impact on teachers' mental well-being. Pressley (2021) found that increased rates of anxiety caused by COVID-19 health risks, the teaching methods these necessitated, and the effort to communicate with parents contributed to teacher burnout. Gordon and Bauman (2021) observed that remote learning amplified isolation and loss of connection for leaders and teachers, and "reaffirmed the importance of connections, relationships and professional collaboration" (p. 2).

Among Canadian teachers, 85% of respondents were concerned about the impact of emergency remote learning on teaching quality (CTF, 2020), with no qualitative data offered to understand these results better. Teachers in the Yukon said informal collaboration with colleagues was their most useful resource for designing quality instruction during the rapid shift to online environments (YDE, 2020). Kraft et al. (2021) found a strong connection between working conditions and teachers' sense of success during remote learning; when meaningful collaboration, recognition of effort, and fair expectations occurred in schools, teachers' sense of success was less likely to decline.

In *Lessons for Education from COVID-19* (2020), the Organisation for Economic Co-operation and Development (OECD) proposed new understandings drawn from the experience of teachers and school systems during the rapid shift to remote learning, many of which focused on

relationships and collaboration. Additionally, the OECD recommended specific policy levers like “Foster collaborative relationships among educators for triple impact” (p. 52) to help systems become more resilient in the future. In sum, relationships are a central theme emerging from studies of the pandemic experience of educators and students.

Equity and Inclusion and Online Teaching and Learning

The structural inequities that exist in K-12 education appear to be replicated in online learning environments (e.g., Rice & Skelcher, 2018). Freidhoff (2018) says, “the pass rate for online students in poverty trails the rate of those who are not in poverty, and students who are more successful in their face-to-face courses tend to also be successful in their online courses” (p. xvii). This reality requires educators to utilize the best of what online learning has to offer in support of vulnerable learners such as “flexible scheduling, individual mentoring, safe learning communities, and varied methods of teaching” (Repetto et al., 2018, p. 163). Incorporating such learning opportunities shows promise for at-risk learners to graduate K-12 and experience the proven positive results on their adult quality of life. Chew and Cerbin (2021) note that the importance of teacher effectiveness rises with student vulnerability across modalities. Repetto et al. (2010) assert the five Cs — connection, climate, caring community, curriculum, and control — are key for online student engagement. Black and Thompson (2018) contribute to how one might provide effective online learning for students with complex health needs. They assert that a caring community is established just as effectively as when teaching in person, by modelling appropriate interactions, working to reduce negative perceptions and bias, respecting privacy, providing timely feedback, ensuring frequent check-ins, and using multiple methods for interactions. Harvey et al. (2014) found that students with disabilities perceive themselves as successful in online environments despite less social engagement. Some saw less engagement as a benefit rather than a weakness. Surprisingly, most participants in the Harvey et al. (2014) study indicated two to three

teacher interactions per week were sufficient, but that facilitating high quality online peer interactions was critical to their engagement and success.

Currie-Rubin and Smith (2014) noted the increased need for teacher-parent collaboration when students with disabilities are in online learning environments, as the parents provide essential student supports. Effective collaborative relationships occur when teachers are welcoming, appreciate the parent, involve and connect parents with their child's learning and with the professional supports in place, maintain a positive, individualized view of their child and family, and empower parents as valued contributors (Currie-Rubin & Smith, 2014).

Black and Thompson (2018) agree with Greer et al. (2016), who reviewed research specific to online learning and students with disabilities and found that despite steadily rising enrolments and evidence that students can thrive in online environments, there remains insufficient research about outcomes, accommodations and services, and educator preparation and support. Greer et al. (2016) indicate that teachers felt unprepared to design inclusive online courses and that course packs frequently did not adhere to inclusive design principles. Overall, they note "practitioners at all levels (teaching and administrative) are aware that they are presently unable to optimize the learning experiences of students with disabilities, but they indicate willingness to learn to do so" (p. 195).

Equity and Inclusion in Emergency Remote Learning

Research indicates that during the emergency remote learning precipitated by the pandemic, online learning did not offer the best experiences to teachers and students with respect to equity and inclusion. For example, Hamilton et al. (2020) found that teachers (59%) were not able to contact all students, with higher rates for schools serving more low-income students. Kaufman and Diliberti (2021) also demonstrated that schools with higher percentages of low-

income students and students of colour were less likely to have resources available, such as counsellors, to support students' social and emotional well-being.

Australian teachers interviewed about their disabled students who were learning at home reported that the students were falling behind when they were isolated or could not work alongside their peers. Lack of motivation was also noted for disabled students learning at home (Page et al., 2021). Strong relationship building between home and school was recommended (Page et al., 2021). Whitley et al. (2020) concluded that relationships were key to supporting the learning of students with special needs and found that effective in-home learning always required an alliance between parents and school staff.

Teacher Education and Online Teaching and Learning

Teacher education programs vary across Canada, but all are embedded in a complex framework of regulatory bodies including provincial governments, accreditation organizations, and universities (Gambhir et al., 2008). In BC, nine institutions offer approved programs by the Ministry of Education (BC Government, 2021b). Revised in August 2019, the *Teacher Education Program Approval Standards* (BC Teachers' Council [BCTC]) outlines requisite elements for teacher education in the province. In respect to the "Required Content" (p. 3–4), there exists no specific requirement in relation to online teaching and learning. Additionally, the *Professional Standards for BC Educators* (BCTC, June 2019) makes no explicit mention of online teaching and learning. In both instances, however, the inclusion or connection to online teaching and learning could be inferred.

Although teacher education programs can, and do, offer additional course work and/or experience (e.g., field placements) in relation to online teaching and learning, the literature concurs that there "is a significant disconnect between the growing expectations for online education and the training of teachers expected to teach in this uniquely different environment"

(Archambault & Kennedy, 2018, p. 221). In 2016, only 4.1% of teacher education programs surveyed offered field experience opportunities in online teaching and learning contexts (Kennedy & Archambault, 2012). Archambault and Kennedy (2018) recommend that stakeholders collaborate to develop and implement standards for online teaching which can guide the professional development of educators.

During the pandemic, teacher education programs shifted to remote learning just as K-12 systems did (Carrillo & Flores, 2020; Flores & Gago, 2020). Though potentially an ideal opportunity for innovative practices to emerge in teacher education, such changes may only be understood as “crisis measurers” (Ellis et al., 2020, p. 560). In their analysis, Ellis et al. concluded that innovation occurs as new practices become sustainable and improve historical practices. In their re-imagining of post-pandemic teacher education, Hill et al. (2020) advocated for the prioritization of inclusion, health and wellness, decolonization, and the fostering of reciprocal relationships. These priorities aligned with the results of the current study.

Methodology

Research Questions and Design

The study design was guided by these questions: (a) What was the experience of transitioning to remote learning in K-12?; (b) What learning can surface in order to plan for future shifts?; (c) How can learning inform content and delivery in teacher education? A CBPAR approach was selected because this methodology legitimizes experiential knowledge and allows power to be shared between researchers and community partners. We strived for a “collective, reflective, and systematic inquiry in which researchers and community stakeholders engage[d] as equal partners in all steps of the research process with the goals of educating [and] improving practice” (Tremblay et al., 2018, p. 2). Additionally, CBPAR brought a “focus on locally defined priorities and local perspectives” (Cornwall & Jewkes, 1995, p. 1667). This methodology aligned

with VIU's research strengths and community engagement objectives to respond to regional needs (VIU, 2017).

The researchers invited K-12 school districts and independent schools already partnered with VIU as placement sites for practice teaching experiences. Four public school districts and two independent schools agreed to participate. Each community partner (n=6) was paired with a researcher who became their primary contact. The researchers and community partners met collectively to discuss overarching research goals, focus areas, participant groups, and the data collection method. The agreed focus areas were: (a) relationships; (b) shifts in practice; (c) well-being and supports; (d) leadership; (e) equity and inclusion; (f) communication; and (g) greatest challenges and areas for improvement. Based on that discussion as well as individual conversations between community partners and their primary contacts, the researchers developed a draft survey. Then, each community partner, in consultation with their own leadership team, reviewed and amended the draft survey to ensure it aligned with their specific goals and interests, while being sensitive to the culture and language used in their settings. Simultaneously, as edits were received, each researcher communicated back and forth between their assigned community partner and the VIU team to ensure that the data collection tool was consistent where possible. After many iterations, the outcome yielded six individual mixed methods surveys utilizing the same focus areas, with predominantly consistent open-ended qualitative and close-ended quantitative questions, in addition to some distinct questions and many nuances in the use of language. Surveys ranged between 36 to 39 questions. In this way, we ensured that the design and the approach were “respectful, accessible, and socially relevant ... [while] ensure[ing] that research [was] scientifically sound and academically relevant” (Nicolaidis et al., 2011, p. 145).

Data Collection and Analysis

A link to an electronic version of their respective survey was disseminated to participants via an email from an administrative assistant identified by the community partner as appropriate. Data came from 413 participants. Participants were 67% teachers (n=276), 11.5% educational assistants (EA) or individuals in a child and youth care role capacity (n = 48), 14% administrators (n = 58) and 7.5% other participants with associated roles (n=31). Quantitative survey data were analyzed for mean and mode, while qualitative survey data were analyzed for emergent themes within each of the six study focus areas. Initially, data were analyzed for each community partner case study and summarized in a confidential report. However, data and findings were then compiled to identify results and recommendations that are broadly relevant to educators. The challenges that educators face in establishing educational relationships and creating equitable and inclusive learning spaces were amplified by the rapid shift to remote learning, and, therefore, emerged as predominant themes. We provide the results of our analysis that relates to these themes and what has been learned about how we might improve preservice training in these areas.

Results

Rich data about relationships and connections surfaced in survey data designed specifically to mine this aspect of our participants' experiences. Survey questions probed the impact on educators' relationships with students and their families, and the impact on educators' relationships with colleagues. When participants reflected on their shifts in practice in a variety of areas, the issue of relationships emerged as a significant overall shift, specifically regarding their connection with students. As one participant noted, "I pride myself on the positive relationships and connections I build with my students.... Shifting to online made it impossible to foster these relationships in the same way."

Impact on Educator Relationships with Students and Families

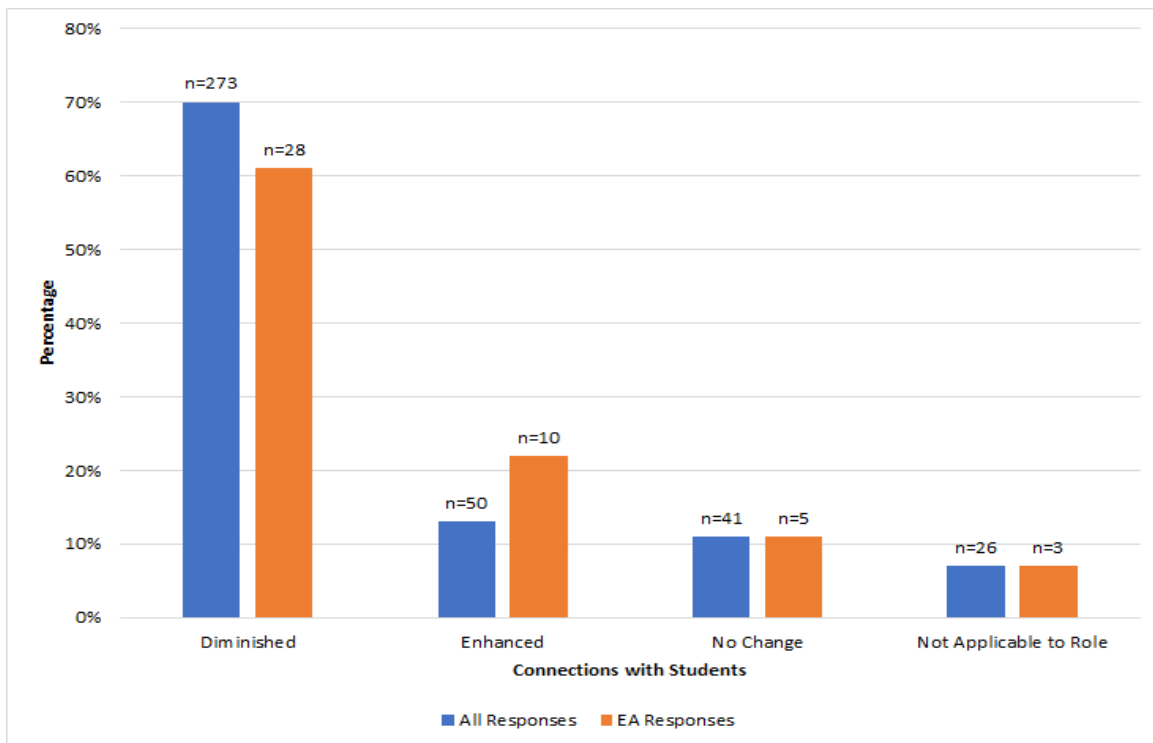
Over 60% of participants indicated that the core value guiding their decisions when shifting to emergency remote learning was student connection and support, while 6% noted family connection. The survey asked, “to what extent have you been able to maintain your connection with students?”. As illustrated in Figure 1 below, 70% (n= 273/81% response rate) reported a diminished connection with students. Qualitative data revealed some disparity in results — the quality of connection with students appeared to depend on the amount of student participation, not on the tools used for learning. With students who engaged in the online learning, there were opportunities to develop deeper connections. However, many participants had a group of students with whom they could not connect at all. An illustrative comment from one teacher related “...deepened relationships with a few students, maintained relationships with a dozen more and reduced or completely lost relationships with the vast majority.”

Other variables impacting relationships with students included (a) the participants’ role; (b) prior relationship with students and their families; (c) level of support available in the home, including access to technology; (d) the age of the student (connections were most challenging with the youngest children who had limited attention span for online engagement); and (e) the first language of the student (ESL students appear to be disproportionately affected). Educational assistants [EAs] reported enhanced connection to students more frequently than all participants (see Figure 1).

Many participants commented on changes in the quality of their relationships with students. While they appreciated the opportunities offered by web platforms, educators were less satisfied with their ability to maintain relationships. Those who elaborated on a diminished sense of connection noted decreased authenticity, a lack of spontaneity, and difficulty interacting with students who had cameras off during web conferencing sessions.

Figure 1

Changes in Maintaining Connections with Students



Note. All Responses, n=390; EA Responses, n=44.

In contrast, a minority of participants commented on the ways in which their relationships with students were enhanced by the crisis. They referred to specific learners who appeared to prefer the alternate format because of factors such as more flexible timing of instruction and a reduction in the stress created by face-to-face social interaction. It appears that online communication also offered opportunities to work with students in small groups and individually, thus enhancing differentiation of learning supports in some cases. One participant commented, “I do believe I got to know my students better and tailor an educational experience that meets their needs.”

Several participants reported an enhanced connection with families, noting more frequent personalized communication with parents or guardians. This was particularly evident among those

who worked with younger students who depended upon their families to be able to engage in online learning. Due to alternate delivery, some participants noted a valuable shift in their understanding of the family dynamics of their students, stating “I became more aware of the barriers that families are facing, not just during the pandemic but also during ‘normal’ times.”

Impact on Relationships with Colleagues

Participants were asked, “to what extent has alternate delivery afforded you opportunities to collaborate with colleagues?” Responses underscored enhanced or unchanged experiences of collaboration (see Figure 2). With a response rate of 96%, over half of the participants (n=210) described an increase in opportunities for collaboration (i.e., grade group meetings across the school district), and said they depended on this collaboration to learn technology, to co-plan for online teaching, and to navigate the rapid changes to their role. Comments indicated the sudden shift in the role of educators, which now served as a catalyst for a variety of new collaborations to emerge as teachers relied upon each other for ideas, strategies, and mutual support. As one participant noted, “collaboration became essential, rather than preferred. I relied on it for my day-to-day instructional design.”

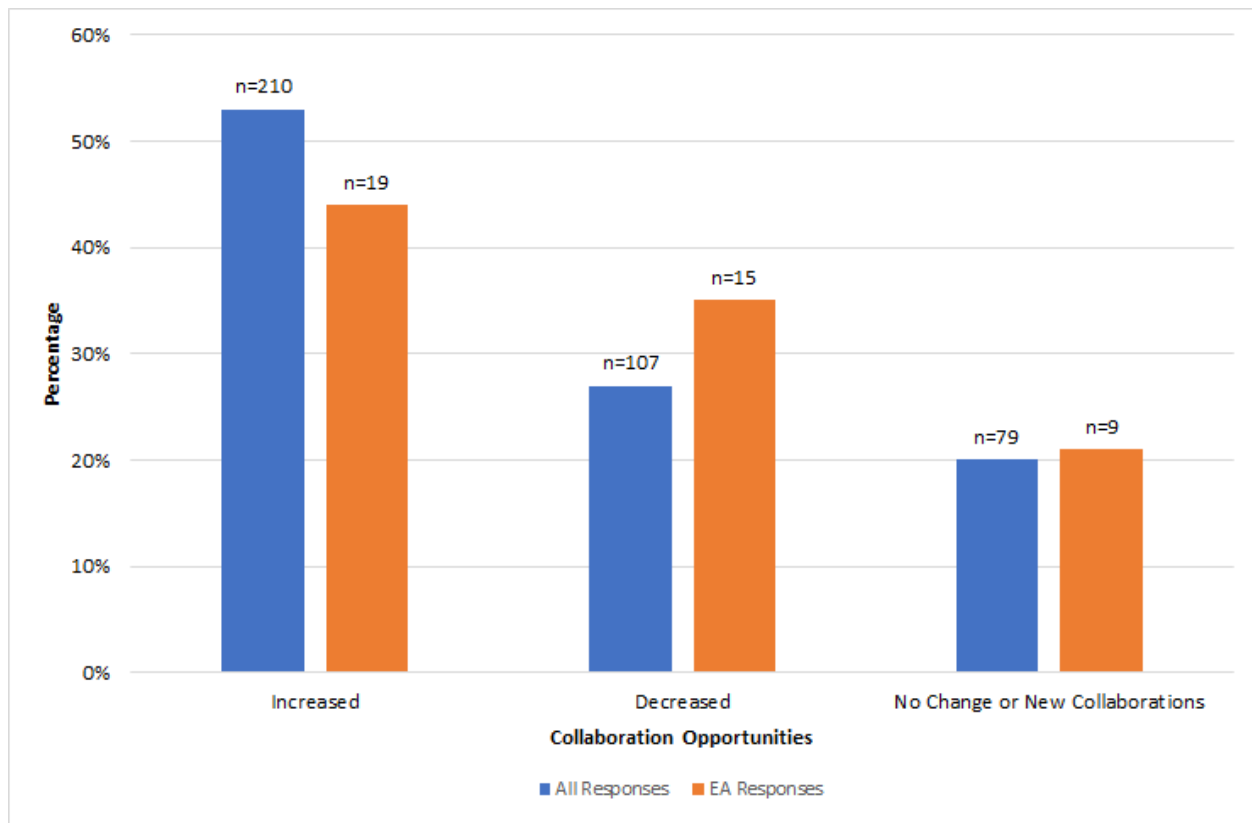
Many participants noted that “we were patient and kind with one another” and that in turn, this certainly helped to make facilitating remote learning easier. Some comments indicated that collegial relationships grew stronger due to these circumstances:

I feel very connected with colleagues who I have worked alongside previously, but did not know as well. I am proud of the way the team pulled together and moved forward on a challenging pathway in a respectful, productive, and supportive way.

Educators reporting strong connections with colleagues often noted a positive impact on their well-being.

Figure 2

Collaboration Opportunities During Alternate Delivery



Note. All Responses, n=396; EA Responses, n=43.

EAs also experienced increased opportunities for collaboration, but at a slightly lower rate (44%) when compared to all participants' (53%) (see Figure 2). Regular meetings and technology tools helped facilitate collaboration. However, some EAs were too busy to engage with the online community of colleagues but wished they could have, while others were scheduled in ways that frequently prohibited meeting attendance. They also noted that collaboration, as well as their effectiveness, depended on the teacher's orientation to the EA role and its value. The following participant quotes illustrate different ways in which EAs and teachers worked together: "With one teacher, our relationship has strengthened. With the other teacher, we have basically ... lost touch. Very sad about that"; "Feeling out of the loop because teachers were not considering EA help";

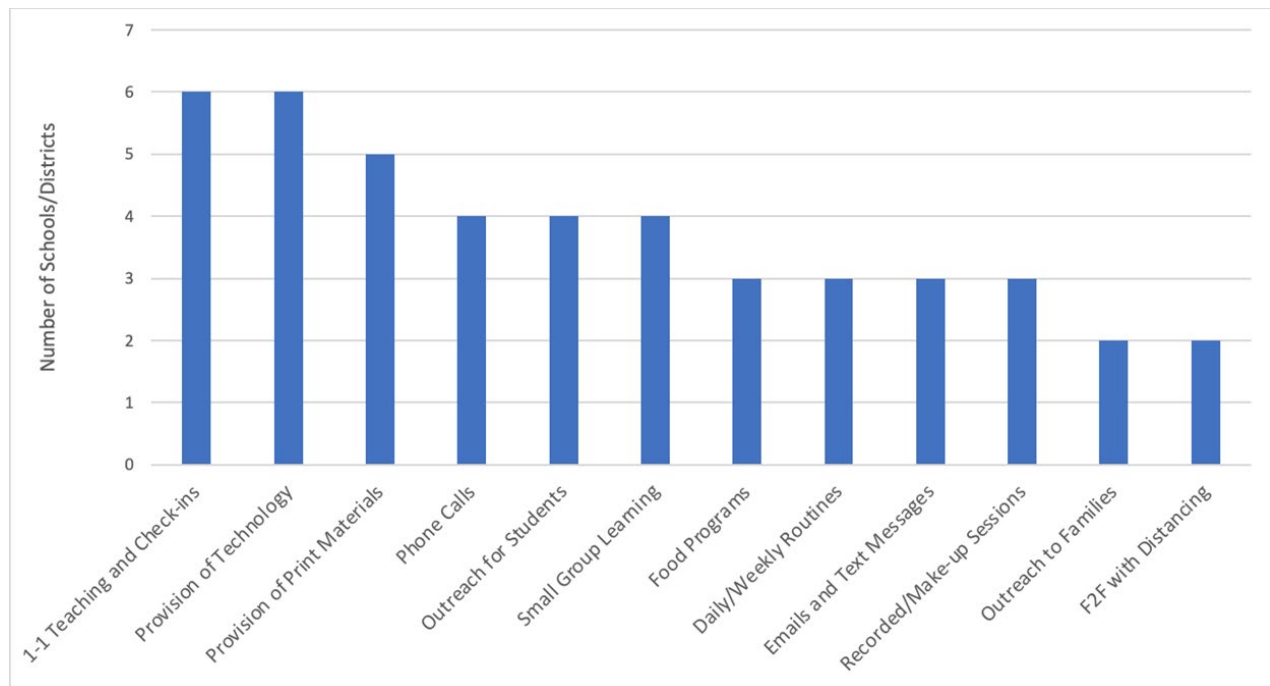
“There is a disconnect between teachers and EAs. EA’s have less opportunities to be part of the team in everyday planning and student supports. I don’t understand why teachers never accessed EA support for failing and struggling students.”

Relationships for Equity and Inclusion

The relationships between teachers and vulnerable students were most often the ones broken by the shift to emergency remote learning. Overall, educators (54%, n=149) said that it was challenging to meet their complex and varied needs and meeting them was dependent on support and involvement from families. Districts and schools tried several strategies to address equity and inclusion (see Figure 3); the effectiveness of these strategies was not assessed in our survey.

Figure 3

Strategies Utilized by Schools/Districts to Address Equity and Inclusion



Every community partner (n=6) identified regular one-on-one check-ins and direct teaching as a key element in supporting students; data suggest that this was done differently in each school/district. When asked to reflectively identify strategies they believed might have improved

access to learning in their school/district, participants' qualitative responses identified a variety of themes, most commonly: (a) a well-developed plan to provide reliable Wi-Fi access to students and families with connectivity issues; and (b) improved strategies to engage families in their children's learning at home. Other themes were about distribution of resources such as laptops and learning materials, specific supports for vulnerable groups of students such as food delivery, increased use of differentiated instruction, more effective utilization of support staff, recording of lessons for greater flexibility, enhanced focus on Indigenous learners, regular check-ins with students, and the need to use engaging lessons for students. A theme underlying many suggestions was to maintain mental health of students as a priority and access to supports to adequately address concerns and thereby facilitate learning. One participant said, "keep students/families' well-being at the forefront. Support everyone where they are at and work to create a plan that works for them."

Discussion and Implications

Discussion of findings fall into three themes: relationality as a core value of BC K-12 educators; the ways in which the shift to remote learning offered affordances and challenges for relationships; and affordances and challenges for equity and inclusion.

Relationality as a Core Value of BC K-12 Educators

Results from this study suggest that the principles of relational being and relational education are alive and well in the teaching profession, an assertion that became even more evident with the shift to emergency remote learning. Participants' reflections on their guiding values during times of uncertainty rest heavily on their commitment to maintain connections with their learners and to offer support however possible. Their determination echoed Miller's (2021) findings around teachers' concern for the socio-emotional well-being of students and the fostering of relationships with and among their students. Using Gadamer (2004) to conceptualize

understanding, we infer that the interrupting experience of shifting to emergency remote learning required teachers to reexamine deeply held beliefs, values, and assumptions which revealed new horizons of understanding of the relational aspect/element of education. As noted by a participant, “there were ups and downs throughout, but the successes have changed my perspective on how I may teach when things go back to normal.”

A relational way of being underscores intricately woven connections between educators’ enactment of their role and the learners they serve (Gergen, 2021). However, perhaps because of the immediacy of their situation and the need to learn basic technology skills first, study participants did not apply relational education strategies as further described by Gergen (2021). Where educators were able to maintain communication with their learners, these relationships were deepened and expanded, which is also observed by Borup et al. (2013) and Miller (2021). Many participants developed a more holistic sense of their students and the lives they lead outside of school. In the numerous cases where teachers “lost track” of their students, they felt a sense of isolation and loss of connectedness. A balm to these feelings of isolation was the enhanced sense of collegiality and collaboration reported by many participants. Educators across roles articulated a sense of pride and satisfaction about the ways they supported each other in a time of crisis, a finding echoed in Gordon and Bauman’s (2021) recommendations which offer a reaffirmation of “the importance of connections, relationships and professional collaboration” (p. 2).

Affordances and Challenges for Relationships

Relationships emerged as a core element of teaching that was significantly impacted by the shift to emergency remote learning. Many participants in this study noted that student success depended on relationships and connection. In the shift to emergency remote learning, anecdotal comments suggested that if there was no connection, there was no engagement or learning. Literature in the field of online teaching and learning indicates that with carefully designed online

environments it is possible, and advantageous, to foster strong relationships between instructors and students and among students (DiPietro et al., 2008). However, in the rapid shift, with many educators using online teaching tools for the first time, it was challenging to maintain existing connections, let alone create or strengthen them.

An affordance of the rapid shift to online teaching and learning was the enhanced opportunities for connections and, specifically, collaboration among colleagues. Studies that examine the impact of the pandemic also suggested that collegial relationships and collaboration were key to the confidence of educators in the quality of instruction while improving their mental health and well-being (Kraft et al., 2021; OECD, 2020).

Affordances and Challenges for Equity

Currie-Rubin and Smith (2014) emphasized the importance of teacher-parent collaboration. With respect to vulnerable students, our study confirmed Whitley et al.'s (2020) conclusion that during emergency remote learning, family relationships were essential. Also, when teachers had positive connections with students and their caregivers before the pandemic, relationships were better maintained. Educators' empathy for the experiences of families increased, as did awareness of the need for higher levels of direct support for students, not only within the school building, but also in their home and community.

When teachers were unable to connect with students and caregivers, EAs and other support staff were sometimes pivotal. Though many EAs reported being underutilized, when their direct support role was continued or elevated, many students flourished. As in Harvey et al. (2014), some EAs identified students with specific disabilities who thrived away from the demand for high levels of social interaction. In these ways, the shift to remote teaching and learning provided opportunities to recognize the importance of flexibility and the relational work of EAs in meeting the needs of vulnerable students.

Consistent with Black and Thompson (2018), Friedhoff (2018), and Greer et al. (2014), our study identified and raised awareness about insufficient educator preparation and support for online teaching and learning generally, and specifically for full inclusion.

Recommendations for Teacher Education

Too often, teacher education is understood as an application process in which the propositional and procedural knowledge acquired in academia is applied in K-12 classrooms. This theory-into-practice approach is “the fundamental framework . . . implicit in the pre-service teacher education programs throughout North America” (Russell et al., 2013, p. 10); and as Britzman (2003) concludes, this “monological process constitutes training, not education” (p. 46). Our study findings challenge such an understanding and offer insights into the capacity of teachers to rely upon their values to make intelligent decisions regarding their pedagogy in support of equity and inclusion. This capacity was fostered by greater agency and collaboration.

In a 21st century reality, the face of teaching and learning is transforming across multiple contexts and systems, including teacher education. Many institutions, particularly those with a focus on teaching, are committed to transform, not replicate, existing structures, pedagogies, and processes. The results from this study provide suggestions about how to contribute to that transformation, considering realities like the increased demand for online teaching and learning. The following recommendations are made for teacher education programs.

Recommendation 1: Expand Focus on Relationships in Teacher Education Programs

The fact that relationships are key to teaching and learning is not new in teacher education, but instruction related to relationships is often implicit rather than explicit. The intangible and immeasurable aspects of relationality make this challenging; yet we need to support our teacher candidates to develop empowered emotional intelligence, and to know their own biases and prejudices to inform their understandings of relationships in K-12 settings.

These findings compel us to deepen and expand our understanding of the role of relationships and to develop pedagogies to support the development and sustenance of effective relationships with students, families, and colleagues whether in online or face to face contexts. Modeling effective relationship building can be challenging in the coursework components of teacher education programs, because the practical component is often disconnected from “on campus” coursework (Zeichner, 2010). This disconnect can be ameliorated by more explicit attempts to weave theory and practice in teacher education through “in situ” or “embedded” teacher education models (Putnam & Polly, 2021; Schnellert et al., 2018). In such initiatives, university faculty engage with preservice teachers in ways that offer multiple opportunities to observe, reflect upon, model, and nurture effective relationship building. This approach provides chances for preservice teachers to develop their own resources, capacities, and abilities to critique their understandings of relationship building by engaging in and reflecting on these processes in supportive, iterative cycles.

The findings of this study also point to the need to expand the focus of relationships in teacher education to encompass the variety of relationships that teachers are required to nurture through their work. In addition to crucial interactions with students, effective pedagogy requires teachers to build relationships with families, teaching colleagues, educational assistants, school administrators, and others.

Recommendation 2: In Theory and Action, Faculty and Preservice Teachers Need to Experience Teaching as a Collaborative Act

This study indicates that teacher education most certainly needs to incorporate a greater reliance upon collegial relationships. Teaching is no longer a solitary act. We need to move beyond “group projects” towards true collaboration among colleagues as preparation for the new, collective nature of the teaching role. Teachers rely upon each other to develop pedagogical skills

to effectively meet the complex needs of learners and to sustain their own wellness. Collaboration among teachers, educational assistants, and families is also key to providing equitable and inclusive learning environments.

There are many ways that we can begin this work in teacher education. We can highlight collaborative relationships in classrooms and schools, we can model authentic collaboration among teacher educators, and we can create structures within our programs that require authentic and meaningful collaborations to take place. Community service projects and grouped, or paired, practicums are two examples of effective means of creating space for deeper collaboration (Zeichner, 2010).

Recommendation 3: Include Effective Online Pedagogies as Part of Coursework and Experience.

It is important to expand our pedagogical focus in teacher education to include effective online pedagogies. The body of evidence available to understand how to meet learners' needs in online environments is growing, offering teacher educators a foundation upon which to build an intentional body of coursework and practical experiences for preservice teachers. Graduates will be more knowledgeable about the uniqueness of the online learning environment, particularly the ways in which we develop effective relationships and inclusive spaces.

Conclusion

In reflecting on how educators from six schools/districts experienced a rapid shift to emergency remote learning, participants explained that there was a constant integration of new information (Kinsella, 2006) as educators related experiences such as building relationships in remote or online settings, with general understandings of educational practice such as the foundation of relational being. In looking to teacher education, it behooves us to take our collective experience of teaching in alternate ways during the global pandemic as an intellectual

journey where educators gained new understandings and reconstructed those understandings again and again. Understanding is historically affected, limited, and finite, but also open; “a fusion whereby our own horizon is enlarged and enriched” (Bernstein, 1983, p. 143). As such, we are presented with an opportunity to critique our own practices in teacher education programs: by challenging the applied theory of teacher education and status quo of acceptable content and practices related to K-12 education and professional credentialing, we can substantially modify ideas about pedagogy, relationships, and relationship building.

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Chapter 4

A Deleuzian Mapping of Experiences of Students With Learning Difficulties During COVID-19

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Abstract

This paper uses rhizoanalysis to map the affective schooling experiences of three students with learning difficulties and their families during COVID-19. In doing so, this inquiry poses new ways of thinking about schooling that could possibly emerge as the world moves forward from the pandemic. The effective moments brought forth in the discussions with participants enable a (re)consideration of the current education practices. Deleuze's (1997) ontological stance of productive *becoming* is used in this research to disrupt present territorialized ways of doing school. As such, possibilities for schooling, *multi-schooling*, are re-imagined and re-territorialized to *something* else. Since a Deleuzian concept of schooling is always mutating, and in consideration of the existence of numerous ontologies, Deleuze creates space for both researcher and reader to use their own subjectivity in response to the chosen discussion vignettes in this paper. New ways of thinking about education are inevitable and necessary if educators are to consider the continued *becoming* of learners over time. These considerations are documented in the discussion section of the chapter.

Résumé

Ce rapport utilise la rhizoanalyse pour analyser et documenter les expériences scolaires affectives de trois élèves avec difficultés d'apprentissage et leurs familles, au cours de la pandémie mondiale de COVID-19. Ainsi, il propose de nouvelles façons d'envisager la scolarisation susceptibles d'émerger au moment où l'on s'éloigne de plus en plus de la pandémie. Les moments forts des échanges avec les participants permettent une nouvelle réflexion des pratiques éducatives actuelles. La position ontologique du *devenir* productif de Deleuze (1997) dans cette recherche vise à remettre en question les façons territoriales actuelles de faire l'école. Ainsi, les possibilités de scolarisation, *la multi-scolarisation*, sont repensées et reterritorisées de manière d'engendrer quelque chose de nouveau. Puisqu'un concept Deleuzien de l'école est toujours en mutation et tient compte de l'existence de nombreuses positions ontologiques, Deleuze crée un espace permettant au chercheur et au lecteur d'utiliser leur propre subjectivité en réponse aux vignettes de discussion choisies dans cet article. De nouvelles façons d'envisager l'éducation deviennent inévitables et nécessaires dans la mesure où les éducateurs doivent considérer le *devenir* continu des apprenants au fil du temps. Ces considérations sont documentées dans la section du chapitre consacrée à la discussion.

A Deleuzian Mapping of Experiences of Students with Learning Difficulties During COVID-19

Parents drop their children at the sidewalk's edge that crosses directly in front of the big brick building that solidly sits in the boundaries of a six-foot-tall secure fence. A crossing guard with a blaze orange vest directs the children through the big steel doors situated in the middle of the concrete walls that form the existing structure. A bell is heard throughout the neighborhood, and very soon, the sidewalk is bare of children and only a few cars, void of people, remain parked in the street. The large space, on which the building sits, is quiet. The play structure, close to the building, is unoccupied, awaiting the children who will eventually sprawl its surfaces at scheduled times during the day. This description reflects most school spaces, but Bond (2007) explained that a Deleuzoguattarian view of a concept of a space, the school in this description, is never so simple as "representational thought may lead us to believe" (p. 3). Yet, it is in this space that children continue to arrive to do school ... except when they do not.

COVID-19 caused a multitude of disruptions to these school spaces. Many students became bound to their homes, unable to attend their regular classrooms safely. As educators scrambled to provide new learning options for their students, online classrooms emerged. Life became radically altered for families across the globe. Daily routines involving extracurricular activities, socialization with peers, visits with grandparents, and other regular social interactions were lost. Many parents faced adjustments as they began to do their jobs from home, while simultaneously becoming teachers of their own children as these remained home to complete school assignments, often using various online platforms (Saline, 2021).

The effects of COVID-19 extended to job insecurities, increased costs associated with foods and other general goods, housing insecurities, and various social injustice issues (Saline, 2021). Through all these difficulties and the persistence of variants during the pandemic, anxiety

levels among families increased and affected family relationships (Ghosh et al., 2020). The mental health of adults and children became a serious matter of concern. In a survey conducted by the Government of Canada (2021), 25% of Canadian adults screened positive for depression and anxiety, an increase of 4% from the fall of 2020 to the spring of 2021. Among this same group, 94% of survey respondents reported to be negatively impacted by the pandemic.

Although it may be too soon to fully understand the impacts of COVID-19 on children who experience learning difficulties, the United Nations Sustainable Development Group (UNSDG) (2020) ascertained that students with diverse learning needs and mental health concerns are least likely to benefit from remote learning. Coupled with the loss of supports, social interactions with peers, and daily routines, students with learning difficulties may have become under-supported during COVID-19. These children often rely on support services available in schools, and COVID-19 interrupted the regular supports and differentiated instruction that benefit these children in their regular classrooms. The UNSDG (2020) claimed, “it is likely that the current crisis has exacerbated their exclusion from education” (p. 6). Furthermore:

Students with disabilities are least likely to benefit from distance learning solutions. Lack of support, access to the internet, accessible software and learning materials is likely to deepen the gap for students with disabilities ... and have far reaching effects on youth with disabilities. (p. 6)

Not enough time has passed to understand all the impacts that might be experienced by students with diverse learning needs. This study focuses on three students who live with specific learning difficulties, and all experience some challenges. These students rely on regular school routines and specific supports. COVID-19 took hostage of their regular school routines, leaving them in the middle of a schooling abyss. This study provides some insight into the responses of

three students with diverse learning needs and an opportunity to (re)imagine alternative schooling options that might be more conducive to the learning preferences of some children.

Research Objectives

The objective of the research was to learn about the schooling experiences of students with a learning difficulty amidst the COVID-19 restrictions placed upon schools. The authentic inclusion of all students into general classrooms has been a goal and a mandate for schools in Manitoba:

Students with special needs should experience school as much as possible like their peers without special needs. To make inclusion applicable in Manitoba schools, educators will: foster school and communities where all students, including those with diverse needs and abilities, have a sense of personal belonging and achievement; engage in practices that allow students with a wide range of learning needs to be taught together effectively; enhance students' abilities to deal with diversity. (Government of Manitoba, n.d.)

The researcher was particularly interested in the concept of inclusion from the perspective of disabilities studies in education. The research questions included:

1. What can be learned from the schooling experiences of students with learning difficulties during COVID-19?
2. How might this project inform the re-imagining of the becoming of schooling as society moves forward from a pandemic?

Using Deleuze and Guattari Philosophy in the Undertaking of Rhizomatic Research

Deleuze and Guattari (1987) promote a relational research approach using the concept of a rhizome to undertake post qualitative research. A rhizome is a complex underground root stem or tuber that sends up shoots as it travels horizontally underground. Rhizomes grow differently than regular predictable vertical tree roots. A rhizome spreads and “flourishes in unforeseen and unpredictable directions” (Hagood, 2009, p. 39). The unpredictable nature of the rhizome appealed

to Deleuze and Guattari because it “holds potential for studying tendrils that creep in capricious directions and have multiple entries” (p. 39). Rhizomatic cartography employs rhizoanalysis to map the workings of a rhizome. Rhizoanalysis enables a researcher to consider the multiplicities and complexities of the concepts that emerge in research, because it does not trace patterns of similarity in examination of data, but maps the unforeseen directions that emerge (Deleuze & Guattari, 1987):

It fosters connections between fields.... The map is open and connectable in all of its dimensions; it is detachable, reversible, susceptible to constant modification.... A map has multiple entryways, as opposed to the tracing, which always comes back “to the same.” (p. 12)

However, the map and the tracing are not binaries. The tracings hold deep structures that serve to ground ideas; the map allows for the flow and movement of ideas in different directions that disrupt thinking and movement of ideas (Hagood, 2009). The rhizome navigates a diverse world and makes connections at varying points on its paths. Semetsky (2006) believed the rhizome “embedded in the perplexity of the situation, goes in diverse directions instead of a single path, multiplying its own lines and establishing the plurality of unpredictable connections in the open-minded smooth space of its growth” (p. 73). Rhizoanalysis enables new representations of living realities (Braidotti, 1994; Braidotti & Fuller, 2019).

Rhizome lifelines go deep into the ground and if severed at any point, they simply regenerate and continue their spread. It is impossible to find their origination, and their destination knows no end. Any disruption in the life cycle simply means a relocation of its path. It is ambulant, has many entryways, and it is not created in a linear fashion with one specific focus. It is messy and entangled. It does not remain hidden. Rhizomes also emerge above ground. They *become* known to the bodies that share the soil with them. Some parts of the plant emerge, while

other parts of it remain hidden under the ground; however, it is impossible to predict the plants' sprawling. Rhizomatic research *(dis)(re)tracts* in the same way. A researcher can never know what will emerge in the process of doing research. Something new will be revealed, but it remains hidden until the *(dis)(re)tractions* affect the researcher body to think something new (Kokorudz, 2020).

A Case Study Approach Using Rhizoanalysis

The research for this chapter began as a case study of three students with learning difficulties and their families to learn about their schooling experiences during COVID-19. The research participants came forward in the call for participants in an earlier research project highlighted in a local newspaper. The first research project did not cover extensive discussion with families creating the need for additional ethics approval for this research project. Once approval was granted, arrangements for discussions with the families were made. No data collection occurred until a certificate for ethics approval was received. The research participants included one Grade 2 student, one Grade 7 student, and one Grade 12 student who graduated one month prior to the interview. Mothers of the three students also participated in the discussions. The early years student lives with attention deficit hyperactivity disorder (ADHD), the middle years student has a disability in literacy and has also ADHD, while the senior years student was identified as a dyslexic learner at 8 years old. In-depth discussions with the students and their mothers occurred during the 2021 summer holidays. In addition to the interviews, school assessments, such as report cards, and various other school communications with the families, such as home notes or e-mails between parents and teachers, and some individual student creations were shared with the researcher. The discussions with the students and their mothers were recorded and transcribed by the researcher. The additional school correspondence, report cards, and student creations were carefully reviewed alongside the conversations.

Rhizoanalysis was used to create a cartography of the data. Rhizoanalysis is the term that Deleuze and Guattari (1980/1987) used to describe the mapping of data in the creation of a rhizome of the research being undertaken. Characterized as being void of essence and moving between things, a rhizome “ceaselessly establishes connections between semiotic chains, organizations of power, and circumstances relative to the arts, sciences, and social struggles” (p. 7). Rather than entrenching them in patterns of sameness, the tracings on the map involve a degree of “competence” (p. 13) to move concepts in new and different directions “in such a way as to form or extend a rhizome” (p. 22). In this case, rhizoanalysis enables educators to re-imagine ways that a rhizome of schooling children may produce manageable *off shoots* that are relevant to the multiple and diverse learning needs of children. These new ways of thinking continue to *become* through changes in current instructional practices and further research.

Moments of *Affect* in Rhizome Mapping

Human and non-human bodies change in capacities as they are in relation with one another (Deleuze & Guattari, 1987,1994). Affect (*affectus*) occurs within the relation, and it is different than emotion. Hickey-Moody (2013) further clarified, “while emotion is the psychological striation of affect, the way in which our experiences of change are captured by subjectivity, *affectus* is the virtuality and materiality of the increase or decrease effected in a body’s power of acting (p. 80).” Massumi (1987) described *affect* as power or *puissance* (“to affect and be affected”, p. xvi), because it is the driving force in the process of *becoming*. It is the thing that, for Deleuze, reveals what the body is capable of. Affects are not thought of as subjective feelings. They are “becomings that spill over beyond whoever lives through them thereby becoming someone else” (Deleuze, 1995, p. 127).

Rhizomatic thinking allows knowledge to be thought of as a complex process. Affect is really about the changing and re-making of the body in relation to the context in which it lives.

The force that is produced by affect can be retained by a person, and the person may be transformed (Deleuze, 1994). Sensation occurs “when it acquires a body through the organism, [and] is immediately conveyed in the flesh through the nervous wave or vital emotion” (Deleuze, 2004, p. 40). Moments of *affect* are mapped in the process of rhizoanalysis enabling the emergence of new concepts as “artistic creations, like sounds in music and colors in painting, or like cinematic creations — they are images in thought” (Semetsky, 2006, p. 73). New thought guides the creation of concepts in the seeking and mapping of *affect*. The intensities of the forces drive questions and work to *affect* researcher becoming, participant becoming, and possibly, reader becoming. The rhizome resists organizational structure and creates opportunity for nomadic creation of new concepts, rather than conclusions.

The process of rhizoanalysis is not simply explained. No specified method exists. It is not typical of traditional qualitative research that determines themes and patterns during analysis. It resists language of prescribed methodologies and conclusive results, often referred to as findings. In rhizoanalysis, the researcher spends much time seeking *affect* in the relational discussions with participants and brings these moments of raw discussions to the readers of the created rhizome. In this project, vignettes are used in the production of the rhizome. The intra-actions with participants provided intense affective moments in the mapping of a rhizome around the schooling experiences of students with learning difficulties during COVID-19.

Vignette: Early Years Student

Setting the Scene

The discussion with the youngest student in the study occurred one sunny afternoon on a park bench in a playground. Prior to the meeting, his mother told me that this park was a favourite of his, and it would provide a comfortable space where he would feel safe to talk and take movement

breaks, given his background of ADHD. We shared snacks and spent the afternoon talking and playing together.

Researcher: Thank you for meeting with me today. I appreciate the time that you are taking to talk to me about your school experiences over the past year or two.

Mother: We are happy to meet with you. I have told my son that you are here to listen to what school has been like for him and maybe he might tell you things that could make school a better place for people like him who have the wiggles...

Student: I am not sure who created school in the beginning, you know ... I don't like going there. If I could tell you one thing ... gym should be longer, there is too much sitting in school. I just get bored. I didn't like it before COVID, and I don't like it more after COVID came. My report card always has good marks on it, but it seems like my teacher does not like me anyways. I don't really want to talk about that though. I just get bored sitting at my desk all the time. Then I get in trouble.

Exit: *The student runs off to the climbing structure to chase his brother.*

Mother: After school shut down when COVID first hit, we had to do school from home. Once in a while the kids met on the computer with their teacher, but they basically had take-home packages to work on. It was a novelty at first, but it got old quick. It became a battle to get the homework done. We hoped after the summer, that things might get back to normal, but not so much. After a year, and the school gave kids like him a chance to go to school, it was up to parents, we sent him back because there were only a few kids in the class who decided to take the option to return and we thought it would be a good place for him to be with some of his friends. But, even with a few kids in the class, nothing really changed. The kids had yellow tapes around their desks where they had to stay. They wore masks. Most of their work was sitting work and work sheets. The teacher had to still meet with some kids on computer and then the ones in the class had to sit quiet and do busy work. Even when the weather was nice, they had to stay in their classrooms. I thought that

with only a small group, there could have been some real chances to do something different with the kids, go outside, play games, and stuff. But, that did not happen, and he was just finding trouble and frustrating the teacher. I feel bad. I want to support the teacher, and he needs to respect her when he is in school. But, I don't know if this is really all his fault. The thing is, he is really strong at reading and math and stuff, it is always the behaviour that we deal with.

Enter: The young student returns to where we sit.

Student: I have the wiggles. I need to move around lots. Math is my favourite subject. I find it easy. But gym is the best class. That is what I want to talk about. Mostly though, I am always in trouble at school. I don't want to talk about that. Why can't they make school more fun? Even when I kept going to school when there was only like six of us in class, my teacher just made us sit in desks and do work sheets. The weather was nice. I kept looking out the window and she kept telling me to pay attention and do my work. It was boring ... oh yea, they even took away my weighted lap lizard and my hokki stool cuz they didn't want me to spin on it. I thought that was what they gave it to me for.

Exit: And he runs off to play on the climbing structure.

Mother: It seems strange not having him go to school to deal with some kids, not his good friends but the other ones ... and the schedule at home is actually less distracting for him, but I am not sure how productive the academic side of things is. I worry about the skill development of these young kids.

Vignette: Middle Years Student

Setting the Scene

It is a bright summer afternoon. Researcher, mother, and student enjoy a cold drink outside a small bakery. This student is quietly reserved, but she speaks casually about her days at home during the summer holidays. In time, she speaks about her experiences with school. Her mother briefs the

researcher about her daughter's academic and social challenges at school. Psychological testing conclude that this student has ADHD and a learning disability in language.

Student: I just don't seem to get along at school. I don't have lots of friends, and it seems like I am always in trouble. I don't get a lot of the work they give me, so I am always behind. I am used to suspensions. During COVID, I just stay home. I don't really see too many people, but I don't have that many friends anyways. I am not that interested in school stuff. I really haven't done much with online learning. I get lost and don't really do the assignments.

Mother: I am not sure what to do or how to help her. The younger ones need help with their school too. I have more than one child at home. I hoped she, being older, could cope. The little ones need help too. I don't know. She will be in high school soon, but I worry she might not make it when she gets there...

Student: I have been spending time at my dad's house over the summer. I don't think about school too much when I am there. My dad has ADHD like me. He has difficulty reading too — like me. I had some help in school before COVID, but I did not after that. All my classes were recorded. Teachers were not even on the computer when I watched the classes. It was very difficult to stay interested. I am really behind now. I will probably quit when I get older.

Mother: The school isn't really doing much for her. Remote learning is awful for her, but she hated school before too, so ...

Exit: *The student takes one last sip from her drink. She looks down at the ground. Her mother checks her watch, and I sense the conversation is drawing to a close...*

Vignette: Senior Years Student

Setting the Scene

The aroma of coffee fills the restaurant as early morning customers gather for breakfast. A young man, recently graduated from high school, sits with the researcher and his mother around a dining

table in the far corner of the restaurant, eating and talking. This graduate was clinically diagnosed at the age of 8 as a learner with severe dyslexia. On this morning, mother and son speak of his schooling experiences during COVID-19. Mother begins...

Mother: I have always had to advocate for [son's name] since he first started Grade 1. None of our school experiences have been perfect, but most teachers and principals helped to make things work as well as we can expect I suppose. But, I stayed involved, as respectfully as I could, making sure that every year teachers understood what he needed and how he learns. Now he can start college, but I often had my doubts about how he could find success after school. I feel a sense of relief that at least we managed a Grade 12 diploma. Maybe COVID, as difficult as things have been, can be an opportunity to think about how we can make school better for kids with disabilities and different challenges. The system just doesn't seem to work for them. The expectations, the curriculum ... just don't work for these kids. The system tries to make them fit, but maybe it's time for the system to fit them, to fit all kids. I think that means some really radical new ways to think about education.

Student: Lots of times I felt like a student like me can never explain what I know or how I even know it.... It is very difficult for me to read and write, but I can understand things that are being taught. My biggest problem is always doing the long writing assignments and all the reading. It is hard for me to show what I know because I can't show things in the ways that work for me. It can be very frustrating. I like technology, and we used computers during COVID, but I did not have the kind of help that I needed before COVID.

Mother: We used TEAMS mostly. At school, they would use text to speech or people would scribe for him. In COVID, expectations are not as high, books get sent home, and we are on our own. Voices sound flat on the computer on the recorded lessons. It seems "brain work" is underestimated in a person who is dyslexic.

Researcher: Can you tell me more about what you mean when you talk about brain work?

Mother: The formal school structure doesn't accommodate how a student can explain what they know or how they know it. The system praises genius work and undervalues the success or hard work of a learner who is different, one who does not get the award for highest academic achievement. It does not value the resiliency of students who learn differently. Students with learning differences even had instructional time reduced, even online. They seemed to have forgotten that sometimes parents also have disabilities in their own learning. Our children lose learning time in school, and in COVID, it was only amplified.

Researcher: That is an interesting perspective. Perhaps many things have been amplified during this pandemic. Perhaps, it is times like these that people have time to reflect and think about the way we do things in the world.

Mother: COVID seems to have caused us to lose anything that we might have gained or learned when it comes to finding inclusive ways to educate kids that have learning differences. It was either come to school and stay socially distanced from everyone ... like stay in your square in the classroom or get online and learn through a screen. Pick up materials and figure out the homework on your own. This does not work for these kids. Does it work for other kids even? There has to be other ways ... do you think the province will ever consider other ways of doing school? It is like we have never made any advancements in school that work for all kids in the last century, even after all the things that we are learning about mental health and disabilities. Maybe it's time...

Exit: Two hours pass quickly. Mom has another appointment, and the student departs to his summer job. The researcher stays seated. There is much to think about.

Discussion

A rhizome of the experiences of students and families in this limited study shows the multiplicity of realities for three families during their pandemic schooling experience. The

students and their mothers first spoke about the experience of doing school from home, in their living rooms or kitchens, while schools were closed. They also spoke of the return to school that saw the mandated use of face masks and socially distanced placement of children in classrooms and playgrounds. Their descriptions of desks placed in taped off squares, hand-sanitizing stations, and their disengaged learning states suggest a static essence of schooling which COVID-19 has perhaps illuminated. Bond (2007) described schools as coded and predictable places. They remain so, even during a pandemic. In spaces where order is required, children who experience challenges in school are swept along in the “plane of consistency of myriad territorialities” (Bonta & Protev, 2004, p. 114). The rhizome allows for a disruption to the order.

Deleuze and Guattari used the metaphor of plateaus to explain the disruption. During the tectonic movement of numerous plateaus, various mountain ranges eventually emerge. The continuous production within a rhizome assemblage is the result of intensive encounters during research (Adkins, 2015). A rhizomatic production is likened to an assemblage of multiplicities within these plateaus. In this project, the plateau being disrupted is territorialized in education. As the territory is disrupted, it is de-territorialized and re-territorialized to something other, something different. The researcher’s original objectives are considered, but new questions and provocation emerge.

This chapter includes a sample of the vignettes which arose in the rhizome creation using the participation of only three families. Patterns of sameness are not derived. The original purpose of the study found in the initial questions was to learn more about the schooling experiences of students with learning difficulties during COVID-19 and to possibly re-imagine the *becoming* of schooling as society moves forward from a pandemic. Far-reaching conclusions are not sought through rhizomatic processes, only the possible production of new ideas and concepts that might inform future schooling.

For some children with learning difficulties, such as the ones in this study, doing school has not been an easy task. Perhaps the good news is that the pandemic leaves room for a chaotic disruption of the way that school can be experienced. Ordinary school practices that include an assemblage of desks, pencils, chalk boards, bells, books, computers, pens, calculators, timetables, and the annual provincial calendar become striated in the research assemblage. COVID-19 schooling practices that include coming to the screen + turning on your Zoom camera + muting your microphone + listening + raising your Zoom hand to ask a question, interrupt the face-to-face “normal” ways of doing school, but they also problematize something else. Are these practices useful for all students? After several years of doing COVID-19 school, what will happen? Student-nomads are not concerned with the normalizing of school practices. Some resist coming to the screen. They express their unhappiness. They do not merely want to turn on a computer. They are uncomfortable in their isolation. They do not understand the curriculum in front of them, and they are not engaging in their learning. Education leaders put down an option to do school, but these students are resistant. Their families react to what is not working. An alternative line of flight begins to emerge that “will allow us to re-imagine the classroom in enlightening and productive new ways” (Tally, 2010, p. 15). The student nomad does not propose to eliminate the known and familiar schooling patterns, rather the point is to renew, enrich, and foster a mutual becoming of the nomadic student and school milieu.

Possibilities, No Conclusions, and More Questions...

COVID-19 caused many eruptions within education. The assemblages that are created within this study are intertwined/intra-related with this intrusion, and education processes have been problematized in ways not necessarily experienced previously. The researcher began by trying to learn more about the schooling experiences of these students and families during the pandemic. Questions were formulated, but they were constantly being deterritorialized /

reterritorialized. To disengage from interpretation and engage in the creation of new concepts, the researcher problematized the assemblages being produced; new questions and problems emerged as responses, and so does the concept of multi-schooling. The problem now is to extend the possibilities of schooling that will enable the becoming student.

The concept of multi-schooling implies multiple approaches to delivering education. These approaches can extend beyond the options of face-to-face learning in traditional school milieus or on a computer screen through online instruction. What about outdoor nature-based learning approaches? What about adjusting annual academic school calendars to utilize summer months that are conducive to children being outdoors and experiencing education outside of a traditional classroom? What about re-thinking curriculum based on grades and think more about skill development of children in multi-aged settings? What about schooling that reflects the cultivation of interests of children instead of the imposition of prescribed generic curriculum content? What about the rethinking of the graduation requirements to reflect a diverse population of learners? What about encouraging the interests of educators in the becoming school milieus, whereby teachers can work in spaces that best reflect their own teacher becoming? What about inclusion in the face of multiple milieus/multi-schooling? The entanglement of students, teachers, families, and schools is not to be thought of as a space where we are incapable of being “freed”; rather, it is an assemblage for which mutual becoming is free to dwell. The questions that arise from the project open possibilities for teacher education programs. As readers consider the sample of vignettes in this chapter, perhaps educators will contemplate different ways to think about and deliver education in a post-COVID world that extend beyond the traditional brick-and-mortar classroom walls or the pedagogical choice associated with online learning.

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Chapter 5

Special Education Teachers' Experiences of Home-To-School Communication Amid COVID-19 in Saskatchewan

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Abstract

The present study explores how special education teachers communicated with families and what influenced their communications when schools closed due to COVID-19 in a prairie province. The current study was undertaken to better understand Saskatchewan teachers' experiences and concerns over teacher-parent communication and parental involvement. Throughout the online teacher interviews, teachers' concerns were scattered along a wide spectrum, including the varied level of parental participation, lack of technologies, skills and support, the impact of home environments on student outcomes, and safety issues. Many challenges were reported by teachers, while only a few positive comments emerged indicating that a few teachers were able to build and maintain strong relationships with families they worked with through different communication venues. We discuss the findings in relation to the province-wide supplementary education plan and social disparity, while considering implications for research, policies, and practices.

Résumé

La présente étude explore comment les enseignants en éducation spécialisée dans une province des Prairies canadiennes communiquent avec les familles, et les facteurs qui ont influencé ces échanges lorsque les écoles ont dû fermer en raison de la COVID-19. Notre recherche vise à mieux comprendre les expériences et les préoccupations des enseignants de la Saskatchewan eu égard à leur communication avec les parents, mais aussi la participation de ces derniers. Au cours de rencontres en ligne avec les parents, les enseignants ont relevé une panoplie de problèmes tel que le niveau variable de participation des parents, l'insuffisance de technologies, de compétences et de soutien, l'impact des environnements familiaux sur les résultats des élèves et les questions liées à la sécurité. De nombreux défis ont été signalés par les enseignants; seuls quelques commentaires positifs révèlent que certains enseignants ont réussi, grâce à différents moyens de communication, à construire et maintenir des relations solides avec les familles avec lesquelles ils ont travaillé. Nous discutons de ces résultats en relation, d'une part, avec le plan d'éducation supplémentaire à l'échelle de la province, et, d'autre part, avec la disparité sociale. Au terme de l'étude, nous proposons une réflexion sur les implications pour la recherche, les politiques et les pratiques.

Special Education Teachers' Experiences of Home-To-School Communication Amid COVID-19 in Saskatchewan

Beginning in mid-March 2020, Canadian schools implemented preventative measures against COVID-19 outbreaks and executed full school closures. During the months that followed, students' learning channels adapted and online teaching became the norm. With this sudden switch from in-person learning environments to virtual platforms, students with special needs encountered a myriad of challenges. The additional struggles these students faced have been explored by various scholars (Berasategi et al., 2021; Kong, & Thompson, 2020; Lobosco & Newman, 1992; Yazcayir & Gurgur, 2021). For example, many scholars have delved into students' psychological struggles and the deteriorating mental health conditions experienced during social isolation (Berasategi et al., 2021; Chen et al., 2020; Dhiman et al., 2020; Ren et al., 2020); furthermore, families and teachers had to deal with the technical and accessibility issues of virtual education, along with adaptations and coping strategies (Álvarez-Guerrero et al., 2021; Daniel, 2020; Kaur, 2020; Khlaif et al., 2020; Livari et al., 2020; König et al., 2020; Svalina & Ivić, 2020). In addition to students' mental well-being and solutions for technical difficulties — which the above research shows to be vital to successful and effective online education — we uncovered through interviews with 11 teachers three main aspects of parent-teacher communication that are critical to the educational success of students with special needs during school lockdowns: teacher-parent communications, special education teachers' concerns, and rewarding experiences.

Since relatively few studies have been conducted in this area in a Canadian context, the empirical data we provide can be used to inform special educators and policy makers as we prepare for future emergencies, and to provide adequate support for students, parents, and teachers in online settings. Research has yet to be conducted on the rewards and positive outcomes perceived by teachers amidst the pandemic. This empirical study partially addresses all the above

points, which highlight a research gap, by exploring the relationships and communication between the parents and teachers of special needs students, amidst COVID-19 school closures in Canada.

Specifically, our study investigated the following questions:

1. How did special education teachers remotely connect and communicate with parents, and what influenced their communications?
2. What were the most pressing causes for concern for special education teachers when communicating and engaging with parents?
3. What were special education teachers' most rewarding experiences with respect to teacher-parent communication and parental involvement?

Literature Review

To grapple with the importance of communication between teachers and parents prior to COVID-19, several studies on student with special needs are reviewed in the following section. To further understand the topic of teacher-parent communication practice during COVID-19, existing discourse is also elaborated upon in this section. While exploring the issues and struggles, we identify a concern in the literature, namely food security/supply, before examining coping strategies in the following section.

Communication Between Teachers and Parents of Students with Special Needs Prior to COVID-19

In a recent study, Leenders et al. (2019) conducted interviewed with 14 teachers at special education schools, 21 teachers at at-risk schools, and 20 teachers at mainstream schools in the Netherlands. The results illuminate multiple facets: mutual communication is used in the most in at-risk schools, and based on teachers' perception, it has been difficult to involve parents in the decision-making process concerning special care for their child. The authors suggest that when situations become difficult, teachers stand alongside the parents instead of addressing them from

their expert role. They also argue that this approach represents the best way to achieve the best educational outcome for students with special needs.

Researchers argue that some practices have been highly appreciated by these parents. Dubis and Bernadowski (2015) surveyed 104 parents of children with special needs and 157 special education teachers to seek their perceptions on using technology (e.g., emails) as a component of two-way communications in Saudi Arabia. The results showed that the majority of parents and teachers had a positive attitude toward using emails to engage with one another, even though the notion of using technology for parental communication and involvement is a rather new concept to many Saudi parents.

Leenders et al. (2018) surveyed parents at two different types of schools in the southern Netherlands, special education and mainstream, about perceptions on parent-teacher relationship practices with respect to children's special needs and their socio-economic status. Results illustrate that parents and teachers in special education and at-risk schools were accustomed to mutual communication since teachers were more familiar with interacting with parents, involving them in decision-making and assignment coordination, compared to mainstream schools.

Communications Between Teachers and Parents of Students with Special Needs During COVID-19

Recent evidence suggests that key stakeholders, including students with special needs, parents, and teachers, faced a wide range of challenges during the COVID-19 pandemic. Among the identified challenges, the importance of communication and rapport between teachers and parents was emphasized. In the contexts of the US, India, Australia, and Europe, Merello (2021) compiled six literature reviews on the topic of barriers and facilitators for special education during the pandemic. The soaring number of educational barriers included unsuitable learning environments, lack of technology or technological support, remote instruction for activities,

reduced engagement and virtual participation, financial struggles, disruption of routine and services available, and the strained mental states of students with special needs. An examination of these barriers provides a basic overview of these obstacles (Merello, 2021). The impediments are interrelated, and they fundamentally reshape the familiar educational practices we once knew, as school divisions across the country shifted to online instruction in response to COVID-19. The impediments affected not only children with special needs, but also special education teachers, education researchers, psychologists, and families. For instance, Yazcayir and Gurgur (2021) studied 15 parents of children with special needs between Grades 3 and 8 in Turkey. These children continued their learning through inclusive education. The findings illustrate that students with special needs struggled to follow the lessons on screen, and many of them did not attend online lessons. Worse still, teachers did not give feedback on students' learning activities, meaning that none of the students with special needs received additional support or educational services, and there was a lack of communication and cooperation between the teachers, families, and special needs students. In essence, children with special needs in this study were not able to successfully adapt to distance education in the absence of critical communication among teachers, students, and families in a virtual learning environment.

Critical Concerns of Socioeconomically Disadvantaged Families

Recent studies have identified that social inequality has added complexity to the remote learning of exceptional learners. Socioeconomically disadvantaged families were especially vulnerable to inadequate technology access as well as threats to food and student safety. A study undertaken in India (Narvekar, 2020) revealed that there were no provisions in place to ensure virtual, remote, or home-based education for children with special needs during COVID-19; technology tools there were not accessible to many learners with disabilities, especially those from socioeconomically disadvantaged households, with complex learning needs, and/or living in

remote areas. In addition, Marshall et al. (2020) explored the transitional challenges faced by 328 pre-K-12 teachers, including special education teachers, at the beginning of school closures in the spring of 2020. Aside from adjusting to remote teaching, many teachers also struggled to tend to their own children who required parental attention while learning from home. This research illuminates the struggle and role overload of many working parents who continued to work from home, while also needing to support their children who would normally be supported by their own teachers. These challenges were particularly overt in rural areas, where necessary electronic devices and reliable internet access were not available to all children.

Studies also reported that teachers were equally concerned about students' food security. A lack of nourishment can negatively affect students' academic priorities and is often perpetuated by the socioeconomic status of home and a lack of access to the resources normally available through school (Marshall et al., 2020). Due to the lack of daily in-person connections, teachers had difficulty checking in with their socioeconomically disadvantaged students. Particularly in rural areas, teachers worried about students' access to adequate food as well as their general safety. Due to school and other institutional closures, in many cases parents became the sole care providers for their children, a situation that did not necessarily provide enough support for all children. Similarly, Sahin and Shelley (2020) compiled a collection of articles on the implications of school closures for students with and without special needs during COVID-19. Disrupted by the COVID-19 pandemic, students' well-being was directly tied to their families' economic condition, hence food security and availability became a critical issue.

Other factors that affected students included the loss of family cohesion due to death, illness, and separation; the inaccessibility of support systems due to physical distancing; and the health risks posed by socioeconomically disadvantaged families' living conditions. Along this line, Asri et al. (2021) focused on the reading abilities of 72 students with special needs in 12 inclusive

primary schools in Indonesia. The results revealed that slow learning was the most common challenge faced by students with special needs in the inclusive elementary schools. During the COVID-19 outbreaks, early reading education was hindered by the limitations imposed by distance learning, such as mobile device scarcity due to the variable socioeconomic statuses of parents and their unawareness of the importance of constant two-way communication between families and schools. This highlights not only a lack of technological readiness for remote learning, but also a lack of teacher-parent communication.

Coping Strategies

Given the diverse barriers reported in recent educational studies on COVID-19, a range of promising strategies have been shared to address the pressing concerns. For example, Jariono et al. (2021) offer teaching strategies to assist students with special needs in virtual learning contexts. Their research reveals that web-based learning benefits greatly from parent participation, suggesting that parents play a key role in the success of online learning for children with special needs. To synergize learning, the authors advise that teachers and parents work as a team, as guides, motivators, and designers. This research highlights the communication efforts teachers and parents could collectively engage in to further the best interest of students with special needs.

Montanari et al. (2021) investigated Italian and Portuguese teachers' and parents' adaptations for special needs learners during COVID-19. The study revealed that a daily contact helped "empower [students] and give guidance" (p. 4), while working with student ability and parent availability. School and home not only communicated in preparation for lessons, but notably created schedules based on both parties' availability, so that at least one parent could accompany the student to encourage the best learning outcome. These findings suggest that frequent or even daily communication between teachers and parents may be vital to fruitful remote learning for special needs students. Tremmel et al. (2020) shared accommodation practices for

students with special needs in a private school following COVID-19 closure. This school, in the north Texas area, initiated contact to assess the needs of families during the closure. The school administration and teachers reached out to students' families over the phone, used social media, email, and web conferencing applications. These efforts suggest how essential it was to stay connected in order to closely monitor the communications between home and school, and to update all parties on important information simultaneously. In particular, the school district used ClassDojo, a free communication platform available on mobile devices and computers, to substitute for other correspondence means such as emails or newsletters. In addition, teachers and other school professionals such as counselors or speech language pathologists were required to create daily logs on Google Form to document their work activities and communications with caregivers. Keeping in frequent contact served not only the pragmatic need for knowledge transmission, it also allowed for an exchange of other valuable information, such as the psychological and physical wellbeing of students with emotional behavioural plans.

Methods

Participants

Based on the first author's geographic proximity, Saskatchewan is the site of our research. Once we received ethics clearance through the Research Ethics Board at the University of Saskatchewan, we recruited elementary and secondary special needs teachers from that prairie province as participants. The first author selected special education teachers by sharing study information with her teacher contacts from the past few years. None of the teacher participants who responded to the invitation had prior contact with the first author.

Table 1*Participating Teacher Characteristics and Backgrounds (School Year 2020–2021)*

Pseudonym	Years taught	Grade level taught	The highest level of education	School type	School size	# of students w/ special needs each teacher served
Lauren	8	Elementary	Master's	Urban	1–300 students	21–30 ^a
Diana	2	Pre-K & Elementary	Master's	Urban	301–600 students	40–50
Kaylee	13	Pre-K & Elementary	Bachelor's	Rural or remote	1–300 students	12
Kimberly	10	Pre-K & Elementary	Bachelor's	Rural or remote	301–600 students	10
Scarlett	10	Pre-K & Elementary	Bachelor's	Rural or remote	1–300 students	12
Abigail	7	Pre-K, Elementary, Secondary	Master's	Rural or remote	1–300 students	35
Catalina	9	Secondary	Master's	Urban	601–900 students	16
Liliana	26	Elementary & Secondary	Bachelor's	Urban	30 –600 students	23
Charlotte	16	Secondary	Master's	Urban	more than 1200 students	24 plus 6 online students
Isabelle	9.5	Elementary & Secondary	Master's	Urban	1–300 students	10
Natalie	15	Pre-K, Elementary, Secondary	Master's	Rural or remote	30–600 students	15

Note. ^a This teacher worked at three different schools, and so the number of students with special needs she served varied from school to school.

The second author, who was the interviewer, did not have either any prior relationship with the teacher participants before the interviews. We conducted 11 one-on-one confidential teacher interviews, using semi-structured questions that were aligned with the three research questions.

Online interviews were conducted on Zoom between January and March of 2021 and lasted between 50 minutes and 1 hour and 20 minutes. All interviews were recorded and transcribed. Through the teachers' lenses, we aimed to develop a deep understanding of communication efforts (or lack thereof), teachers' concerns for themselves and their students, and the positive outcomes that they perceived. In Table 1, we summarize information that participating teachers shared about individual characteristics and backgrounds.

Context of the Study

Special education teachers in the province (known as student services teachers, student support teachers, learning assistance teachers, or learning resource teachers in different school divisions) work with students on individualized education programs (IEP, also known as IIPs or eIIPs [electronic inclusion and intervention plans] in Saskatchewan). Some school divisions may provide student support plans (SSP) to tier-two students using a tiered approach (e.g., response to intervention [RTI]). RTI, a research-based multi-tier identification, instructional, and assessment model, typically consists of three tiers of instructional and assessment processes (Tiers 1, 2, and 3). It has been widely used in North America to gauge the extent to which students respond to continuous intensive interventions, and it is used by educators to determine the levels of support as well as special education placement and services the child needs. Overall, a high school student with special needs, depending on individualized learning needs and characteristics, may be placed in one of three main special education programs: (a) mainstream program where students access general curriculum, while their work can be modified up to 25% of capacity; (b) alternative education which offers alternative curriculum and diploma to students who are unable to benefit from the regular curriculum, even with appropriate adaptations and supports; and (3) functionally integrated program where students may attend some mainstream classes for no credit and have access to life skills curriculum until they are 22.

Schools across the province closed in mid-March after the outbreak of the pandemic in 2020. The province-wide policy mandated that remote learning was optional and teachers were not required to assess students' learning progress toward learning goals between mid-March and June of 2020. Most of the schools in Saskatchewan reopened in September of 2020. Some school divisions closed schools one week before and after the Christmas holidays in 2020.

Data Analysis

To address the research questions, we conducted thematic analysis with the semi-structured interview data. The narrative data we collected provided us with rich descriptions that authentically illustrated teacher experiences, challenges, and concerns in greater detail (Onwuegbuzie et al., 2007; Tracy, 2010). Thematic analysis is a commonly used approach for analyzing and synthesizing textual data, as well as describing and identifying the observable patterns in rich detail. More specifically, we followed the six phases of thematic data analysis recommended by Braun and Clarke (2006) and Rennie (2012). First, we transcribed the interview data, and then read and iteratively reviewed the data. Second, through our multiple reviews, we systematically coded the data and highlighted the interesting patterns we observed from it. The codes were derived inductively and were grouped into the themes in the next phase. For instance, some observed barriers to parental involvement in online settings were related to the fact that families did not have enough devices or internet bandwidth at home, or they did not have a printer to print out the learning materials for their children, or they struggled to use different online learning platforms with their children. Third, we further collapsed the codes into several sub-themes and mapped the data onto the most relevant sub-theme (e.g., a lack of access to technologies and support). Due to rich descriptions and the complexity of the data, sub-themes were categorized into the main themes to better delineate teachers' experiences and how they worked with families to respond to COVID-19. For example, because some teachers reported that

online learning and parental involvement were negatively impacted by technological difficulties families experienced, teachers' statements pertaining to this aspect were further grouped into one of the main themes — teachers' concerns about home-to-school relationships. Fourth, we reviewed the themes to make sure they faithfully reflected parts of the entire set of data. Fifth, these reviews allowed us to further refine and define the themes and sub-themes. Lastly, we related the themes and sub-themes back to research questions and current literature. The authenticity, trustworthiness or validity of interpretations, inferences drawn from the data can then be established through the lens of readers who read the rich textual data.

Positionality, Limitation, and Bias

Both authors have been involved in teacher education, albeit in different capacities. The first author has expertise on special education, whereas the second author has experience with teacher education. In the field of teacher education, both are interested in exploring the phenomenon of teaching practices and student learning experiences. When the pandemic hit, the authors' attention was directed to school closure adaptation and implications. However, neither of the authors have children with special needs, and neither are teachers or administrators at elementary or secondary schools. Both authors care deeply about equality, inclusion, and justice in the context of student learning experience and were anxious to grapple with the implications for students with special needs when the COVID-19 outbreak reached Canada. The authors decided to examine the teacher-parent relationship through the lens of teachers, instead of parents. This is a limitation of the study. However, to minimize teachers' biases, the interview questions were phrased carefully to mitigate potential bias and by using semi-structured interviews with open-ended questions. The interviewees were free to express and share their perceptions and perspectives, as it was made transparent to the interviewees that the interviewer held a neutral disposition.

Results

The participating teachers in this study contributed to our articulation of the main themes related to teacher engagement with parents of students with special needs. In the following section the themes are grouped to reflect the three main research questions. The first set of thematic analyses was performed to delineate the ways in which teachers engaged with parents in remote environments; the second set of analyses help us better understand teachers' rewarding experiences; the last set of analyses identifies special education teachers' concerns about the communications between home and classroom in remote settings.

Teachers' Engagement with Parents

During school closures, teachers touched base with families through phone calls, emails, or video conferencing. Teachers who contacted parents did so to assess the needs of families. Kaylee noted that "I did phone calls to families to let parents know what they needed." Further, Catalina shared the following:

We tried to do some supports through the school division as a whole. If they were able to contact you, we tried really hard to get into contact with every single student and every single family and find out if they needed things. Did they need technology? What kind of supports did they need?

Three teachers made phone or video calls to help children or parents use the online learning platforms where online classes were held. Diana commented that "I met with every child's parents twice a week because most of the children needed support on the technology." Scarlett also stated that "throughout April and May, I met a lot with families of my students. We discussed what they could do at home, and how I could support them through our online platform."

Some teachers contacted parents on a regular basis (e.g., twice a week), while others contacted parents less often or did not get a chance to reach out to some parents during the school

closures. Laurent noted that “for some of them, it was more touching base with their parents and just every once in a while.” Some teachers could get hold of some parents but not others. Kimberly said that “we maintained communication with their parents, so we did have updates and we had meetings with them. But for some students, virtually there was nothing we could do to support the family.” Interestingly, one teacher did not contact parents at all when school buildings closed. She pointed out that some parents did not assume their responsibility for the care of their children, because they were busy with work or even parties. Isabelle frankly said that:

I hate to say it ... my students tend to be so independent because they are all inner-city kids. All these kids have street smart ... mom and dad — who may be at two or three jobs because they need to be able to pay the bills and put food on the table and get clothing and there are other siblings. Or mom and dad are glorified teenagers who are out partying. So that Grade 8 kid might be getting the other two siblings ready for school every day because mom is still out partying I’ve always had the mentality that my kids don’t have parents. I know they do on paper, but my question is who’s always the one doing all that parenting stuff. Sometimes it’s the kids.

Consequently, she felt discouraged and didn’t reach out to parents during the school closures.

Rewarding Home-To-School Communications

While many teachers reported difficulties working with students and families online, two teachers shared that they were able to build stronger relationships with families through phone or video calls. Diana explained: “I met with every child’s parents twice a week because most of the children needed support on the technology. The one phenomenal thing through COVID was [that] I got to know families very, very well. And they got to know me.” She continued to comment that “I appreciated that. Because I got to see how they live their day-to-day life, and they got to see how I live mine. And it was just a beautiful way to build relationship.” Another teacher, Kaylee,

felt that she was able to involve parents in their children's education through online classes. She said that "a lot of times the parents were there and around and that's good because they could ask questions. They could hear everything if they wanted to learn too, what this new math or whatever was... it was great." Further, she also educated parents on how to teach their children. She noted that "just give them strategies ... they would tell me what they're doing and then I would give them information on how to use what they were doing to teach their child. That's real-life learning, right?". She also built stronger connections with families by delivering food hampers to their doorways. She said that:

they could phone me or email me and set up those ways of communicating that maybe I didn't before ... if they needed something, they could let me know ... it allowed me to have different relationships with families that I never would have had before ... go to kids' homes that I never got to before, delivering the food hampers.

The school-home relationship was maintained even after school reopened. Diana noted that "they understand that you're there for them to help them.... We're in this together, let's do this together, and it helps build those relationships. Even now that we're back because we've had that connection." When it comes to food security, Catalina indicated that "our community resource team was partnered with the community association to provide meals through White Buffalo."

Concerns About Home-To-School Relationships

While teachers felt excited and rewarded when their students thrived and succeeded, they also faced challenges working with students and families before the onset of COVID-19, during school closures, and after school reopened. During the school closures, six teachers indicated that the families they worked with encountered technical difficulties, including lack of technologies (e.g., computers, mobile devices, or internet), skills, or support. Although local school divisions had offered students laptops and learning resources if needed, students and parents still struggled

with the availability and the use of technology. Lauren commented that “because it was a rural division, I think one of the bigger challenges was the technology piece, for families ... even if people have enough technology to cover that, in the rural areas, do you have enough internet bandwidth to have two people using it?”. Diana noted that:

The students and teachers and families were not familiar with the platforms that we were using.... Learning how to Zoom and learning how to navigate the different things for students was definitely a challenge for them. Being online all day for students is very challenging.

Natalie also added that:

You gotta give parents a lot of credit ... some of the teachers use Google Classroom, some use SeeSaw, some use Zoom, some use Meets. We had no consistency in our staff ... a lot of the parents had two or three kids, those parents had to learn all these different platforms and I don’t blame them because the teachers were just learning too, but we should have had one thing that all the teachers were trained on and were going to use ... every teacher was different and I think it was just overwhelming for a lot of the parents to learn all these different methods.

Some teachers were concerned about students who experienced setbacks and struggled at home for six months. After shifting from virtual classroom to face-to-face class, Scarlett observed that, “when it comes to our reading goals where I’m working with more students, not necessarily the intensive needs students, we don’t see the gap narrow as much as we would like.”

Catalina noticed that the gaps between students’ learning progress had been widened after school reopened. She noted that “because we had to re-assess in the fall, students had progressed, and some students had experienced setbacks ... starting from a new IIP in the fall because you weren’t necessarily starting in the same place as you left in March.” Natalie also commented that:

I just updated them [IIPs] and a lot of them kind of regressed because if you are teaching safety skills about how to use knives and they haven't used a knife for six months, [t]hey don't know how to use a knife safely or carry scissors safely, so some regressed.... [T]hen I would change them, go back to where they were, and then start again.

Furthermore, she pointed out that parental support played a key role in student learning in the virtual classroom. Natalie stated that "if the parents could not be home and with their kids, we could not service them." Abigail pointed out that "they don't have the assistance at home, especially my spec-ed kids. My spec-ed kids can't sign onto a computer by themselves ... if their parent isn't technologically inclined, they can't get on." It was clear to teachers that students with special needs required parents' assistance with access to online learning platforms, especially those in primary grades. Diana commented that:

For anyone in Grade 4 or below, they needed a parent to support their learning, to do all of the things that they needed to do online, because their reading skills and computer literacy skills were not high enough to support it.

She further added that "if the students didn't have that support, they did not attend."

In addition to parents' availability and assistance, children's special needs and the levels of support they required appeared to affect their participation in online learning. When shifting from in-class teaching to online classroom, Isabelle frankly said that "I hated it, the kids didn't buy in." Kimberly also commented that "we heard a lot of feedback from parents that the kids don't want to do it, and that it was a fight to do it ... by June they were saying, "we're not fighting anymore. We just can't do it." Kimberly pointed out that:

Some of our non-verbal students, or students that need a lot of support in the classroom, I would say their needs were not met with online learning. They didn't have the attention

span to do it ... one student in particular, the mother had contacted us and said, “He can’t do this online learning. We’re not at the point where he can do pencil-paper activities.”

Importantly, five teachers pointed out that home environments appeared to contribute to a wider achievement gap between students. Natalie pointed out that “some kids with two strong parents are coming back stronger than they would have if they were at school because they had a parent that was stay-at-home ... gave them that one-on-one and followed curriculum ... the gap just gets wider and wider.” Diana added that “for students that don’t have as many disabilities or who have strong family support and a strong at-home learning environment, where they’ve got very engaged and involved parents, they may not have the same struggles.” Like other teachers, she also noted that “when they don’t have the adequate supports that they need in order to be successful. [i]t’s very challenging for them to meet the benchmark requirements that we expect them to.” She explicitly did a comparison between what she observed from affluent and from less affluent schools:

What we found was [that in] the urban centres we had a decent amount of participation from our families when you were living in a more affluent area, and where parents really had a strong understanding of how to support their children with online learning. But in some of our less affluent areas we did not have as much participation in the online learning, [w]hether that was due to lack of technology or lack of knowing how to use the technology.

In addition to the challenges that teachers identified, student safety added complexity to the school-home communication during school closures and it also added challenges to support student well-being during COVID-19. Abigail was concerned about her students: “it’s just something I’ve been thinking of because my students are often in traumatic homes.” Isabelle also added that:

We found out there were kids moving 2 and 3 days after the first school closure in March, because teachers were trying to phone and they got numbers that were out of service. Sometimes the kid coming to school was the real only confirmed communication we were having.

Kimberly also stated that “there w[ere] some families who I would say are our high-risk families that I’m concerned about home.” She continued to say that:

They kind of just dropped off the face of the Earth. We didn’t hear from them no matter how much we tried. It’s a small town, so I would even drive by their house just to make sure everything looked okay. Those were kids I was worried about. I did call social services a few times.

Natalie was also concerned about child safety and food security at home while children were learning in the virtual classroom. She said that:

There are kids in homes that are not good learning environments and ... they don’t even have the stability of coming to school. I worried about kids, because we feed quite a few kids, make sure they have food ... just abusive — you know there’s social services and stuff ... you can monitor them when you see them daily, but you can’t see and you worry about that stuff.

Based on teachers’ statements and perceptions, it appears that parental involvement and teacher-parent communication were negatively affected by several factors, including a lack of access to technology and support, as well as a lack of resources and support capacity at homes. These findings based on teacher perceptions are also coupled with the situation of the provincial supplementary education plan not requiring students to participate in online classes. Four teachers perceived that this provincial plan substantially influenced students’ and parents’ participation in online learning, and consequently, affected parents’ decisions about whether to communicate with teachers. Catalina pointed out that:

schooling was optional for students at home during the pandemic.... It was not a requirement that students log on or do any of the work.... I believe this was one of the most detrimental things that really impacted our teaching ... basically our students had a pass policy.

Another teacher, Kimberly, also reported that student participation in online learning was affected by the province-wide plan. She said that “because learning was optional in Saskatchewan at that time.... We have Seesaw for school, so that’s how we do our communication ... we were still sending things home, but I would say 40% of our students were still participating.” Lauren also commented that “in my role, I communicated with parents of students that I worked directly with, to see what supports they would like. Some parents chose supports. Some parents said, “no, thank you.” Such responses were likely due to provincial policy that the online class wasn’t mandatory. Liliana also stated that:

The remote learning that was happening was optional ... we have many students in our school who never signed on once from March till June. Their parents did not feel that it was necessary and so we are dealing with now, children that basically missed six months of school last year.

She continued to add that:

I don’t think they should ever make learning optional. That was the worst thing that they did. They made it optional, if you wanted to improve your grade, great. If you didn’t, who cares. So some of those kids ended up with the equivalent of six months of doing absolutely nothing. And you honestly — we spend — these six months trying to get these kids to learn how to sit in a desk again. Because that’s where they are at.

Discussion

The current study set out to better understand the experience of home-to-school communication during school closures through the eyes of special education teachers. Results

show that several factors appeared to come into play: province-wide non-mandatory educational plan, technology (a lack of access to technologies and support), socio-economic status, and teachers' perception of parental involvement. These factors appeared to interact in ways that influenced how teachers and parents engaged in communication and online learning.

The province had instituted school closures and social distancing measures to mitigate the impact of COVID-19 pandemic at the onset of the outbreak in mid-March 2020. Like other provinces, supplementary education plans were put in place for all school divisions in the province. In this province, the plan indicated that attending online classes was not mandatory for all students across grade levels. When it came to how teachers worked with parents and how parents worked with their children with special needs, our results suggest that this approach to online learning substantially affected student participation, teaching practices, and parental involvement during school closures. Several teachers pointed out that they couldn't get in touch with some families who chose not to attend online classes as it was not required for students. Teachers indicated that they couldn't provide supports and resources to families as they had trouble reaching them when school closed. Students with special needs who didn't have ready access to parental assistance and/or technology support at home were likely to experience setbacks as they were absent from online classes; teachers reported that many such students lost three months of schooling which they would have had if they had been at school in person. The findings of the current study are consistent with the results of several recent studies in the field of special education (Asri et al., 2021; Merello, 2021; Montanari et al., 2021; Parmigiani et al., 2020). Teachers found that many of their students regressed during virtual schooling and the gaps among students got wider and wider when school reopened. It is very concerning that some teachers expressed their concerns over student safety as they weren't able to have daily check-ins to make sure their students were safe at home. Our results echo a recent study of Page et al. (2021) who

explored Australian school closures and online learning that revealed that students with special needs were at much greater risk of losing grip, both academically and emotionally. Due to learners' socioeconomic disparity, the students, according to Page et al.'s (2021) research, experienced challenges in learning such as a lack of parental involvement. As for emotional challenges, Page et al. also found there was a lack of face-to-face teacher-student engagement as well as a disconnect from their physical learning environment and peers. According to teachers, the lack of these elements took a heavy toll on students with special needs. Due to the absence of connectedness or collaborative learning with their teacher, some students did not engage in online learning at all. Although teachers worked with parents to provide structure and curriculums, the former identified in some cases the lack of connections and relationships between home and school (Page et al., 2021).

Our findings highlight the importance of home-to-school communications among teachers and families of children with special needs in the online classroom. These results agree with recent studies on teaching practices during COVID-19 (Asri et al, 2021; Dias et al., 2020; Parmigiani et al., 2020; Yazcayir & Gurgur, 2021). Given that lack of technology, skills, and access to online learning platforms were common challenges, as reported by teachers and families in the present study and previous research, scholars such as Parmigiani et al. (2020) pointed out that reliable technologies and frequent teacher-parent communications were equally essential and critical for children with special needs who received remote teaching. In the current study, several participating teachers indicated that they were not always successful trying to touch base with parents to ask about what supports and/or resources they would like to have during the school closures. In addition, while devices such as laptops could be signed out by students at local schools, the families who didn't get a chance to communicate with the teachers were most vulnerable as they missed the resources and supports offered by schools. Children with special

needs can easily fall through the cracks without instruction, assistance, and resources from schools.

In the history of special education research, parental involvement has been thought of as a key contributor in student success (e.g., Byrd, 2011; Lo, 2012; Matuszny et al., 2007; Staples & Diliberto, 2010). Previous research has shown that students who have supportive families outperformed those raised in the less supportive home environments. This is, in part, because parental involvement is correlated with the academic achievements, social development, and well-being of children in the early childhood years (Ma et al., 2016; Macron, 1999; McWayne et al., 2004) and students at the elementary (Dearing et al., 2006; Keith et al., 1993; El Nokali et al., 2010; Sui-Chu & Willms, 1996), middle, and secondary schools (Gonzalez, 2002; Hawes & Plourde, 2005; Patall et al., 2008). The findings of the present study corroborate the results of previous work in the field of special education. Participating teachers indicated that engaged and involved parents were able to provide one-on-one support to their children and followed the curriculum. Students whose parents participated in their education actively continued to strive even if schools were closed due to COVID-19. In contrast, students, especially those with intensive learning needs who did not have parental assistance at home experienced setbacks. Participating teachers pointed out that some families turned down the supports or resources provided by schools due to a range of reasons (e.g., online classes were not mandatory, parents were not able to assist their child at home, children's disabilities prevented them from attending online classes, a lack of access to technology, a lack of time and/or resources). One of the teachers, Isabel, specifically pointed out that her students tended to be street smart and had busy working parents or teenage parents who went out partying (see the quote on pages 15 and 16). Consequently, she decided not to contact these parents. These findings suggest that teachers and parents of students with special needs responded to their children's education in COVID-19 very

differently. On the one hand, our findings also indicate that the ways in which parents worked with teachers during school closures may reflect their long-standing beliefs, parenting styles, and expectations of their children before the outbreak of the COVID-19 pandemic. On the other hand, teachers who had negative perceptions of parental involvement, like Isabel, might be influenced by such perception and decide not to communicate. Some teachers contacted parents less frequently or did not reach out to parents during school closures. It appears that how some teachers worked with parents may also reflect their long-standing beliefs about parental involvement.

The home-to-school communications revealed by the present study suggest that parental involvement interfaced with a broader societal issue — social inequality and disparity. Participating teachers commented that some families they worked with didn't have enough devices and/or stable internet connections at home for their children with special needs to attend online meetings or classes (Bruder et al., 2020; Crane et al., 2021; Marshall et al., 2020; Merello, 2021; Narvekar, 2020). Furthermore, we also found that food distribution services (e.g., food hampers or food banks) provided by special education teachers were welcomed by families during the school closures and helped strengthen home-to-school relationships (Bruder et al., 2020; Crane et al., 2021; Marshall et al., 2020; Sahin & Shelley, 2020; Tremmel et al., 2020). Nearly all participating teachers observed that social inequality contributed — negatively and positively — to student and family participation in remote learning. Teachers noted that students living in the affluent homes were more likely to participate in remote learning than those living in less affluent homes. Previous studies such as the report from the U.S. Department of Education (1994) suggest that parental involvement is a stronger indicator of student success than family incomes or parent education. However, our results showed that social inequality tremendously affected school-to-home communications and family involvement, and that it appeared to have widened the

achievement gaps between students raised in different home environments (Asri et al., 2021; Keith et al., 1993; Marshall et al., 2020; Narvekar, 2020; Sahin & Shelley, 2020).

Conclusion, Recommendations, and Future Directions

We conducted the study to better understand the communicative relationships between special education teachers and parents in the context of COVID-19. Through the interviews, we heard teachers' concerns that were scattered along a wide spectrum, from parental involvement to student safety. While a majority of teachers reported a number of challenges that they shared with the families with whom they worked, several of the teachers also reported they were able to build stronger relationships with families through online communication venues (e.g., online classes, phone/video calls, emails), or the delivery of food hampers to doorways during school closures. What is encouraging is that there was a longer-term positive impact on home-to-school communications for those families. This finding differs from the existing literature, because these positive and rewarding experiences are not well-reported in the existing literature. The empirical findings in this study provide a new understanding of home-to-school communications during COVID-19 and can serve as a basis for future studies. Future research might further investigate such phenomena and the interplay among well-reported difficulties, rewarding experiences, and parental involvement.

Implications for Educational Policy

Teachers indicated that some families of students with special needs decided not to attend online meetings or classes because remote learning was not required by the province-wide supplementary education plan. Our findings suggest that students with special needs didn't receive adequate instructions or supports from school when schools closed. It is also questionable whether these children received adequate assistance and attention at home. Consequently, teachers noted that children who didn't have sufficient supports at home experienced setbacks and regressed

significantly. This finding suggests that the supplementary education plan making online schooling optional may have resulted in some unintended consequences, both at school and at home, that took a toll on the vulnerable special education student populations. In contrast, the delivery of programs and services to special education student populations across the United States did not stop during the school closures (Jameson et al., 2020). Reich et al. (2020) reviewed remote learning guidance released by all American states and found that comprehensive guidance was provided to address varied issues, ranging from equity and access to time and schedule recommendations, and nearly all states published provisions of services to students with special needs. Taken together, robust practice elsewhere and the current findings strongly suggest the need to review the province-wide supplementary education plans and actions for online education for exceptional learners.

Recommendations for Teaching Practices

The importance of teacher and parental involvement is clearly supported by the current findings. Results confirm that the roles of parents and teachers have changed in the remote classroom setting (Dias et al., 2020; Parmigiani et al., 2020). Teachers indicated that parents who took on an active role and acted as team players substantially contributed to their children's success while school buildings were closed (Jariono et al., 2021; Nurhidayat et al., 2021). Parents became tutors or aids in the physical absence of teachers in the virtual classroom. Having said that, the present study confirms that parental involvement interfaced with a broader societal issue — social inequality and disparity. It is well acknowledged in the literature that social disparity and inequality should be properly addressed, especially during the unprecedented times of COVID-19 (Bruder et al., 2020; Crane et al., 2021; Marshall et al., 2020; Merello, 2021; Narvekar, 2020). Apart from these crucial societal issues, it is recommended that teachers make good use of a broad range of technologies and methods to reach out to exceptional learners and their families.

Successful remote learning models and coping strategies have been shared by special education professionals. For example, school districts in Texas have used a free communication platform — ClassDojo — to replace other correspondence approaches such as emails or newsletters (Tremmel et al. 2020). In addition, school professionals have used Google Form to document the frequency and approaches of home-to-school communications to provide timely and purposeful messages to families they served. In the proposed model of Frederick et al. (2020), the technology needs of families were surveyed and addressed at the early stage of parent preparation. They also developed training materials (e.g., remote learning structure supports, technology tips, videos) to support parents and held parent trainings on a weekly basis through an online platform. In recent studies, Crane et al. (2021), Montanari et al. (2021), and Tremmel et al. (2020), among other scholars, reported that offering training to parents resulted in good student outcomes. These practices echo Sawyer’s (2014) suggestion regarding home-to-school communications that “empowering parents means equipping them with knowledge and skills that will optimize parent-child interactions” (p. 176). This is a major step that should be taken to strengthen the connections between home and school. Taken together, it is urgent and critical to address the barriers to effective home-to-school communication for marginalized families as the achievement gap between privileged and disadvantaged students will continue to grow over time. We hope the present study findings prompt further investigation on both teachers’ and parents’ perspectives on how to address these barriers to healthy and positive home-to-school communication for marginalized families. Scholarship in teaching and learning should continue to use existing evidence-based practices; it should also discover and create new ways of strengthening the links between home and school, especially for those disadvantaged families.

Key Contributions and Significance

The contributions of this study encompass several aspects. First, our study addresses the gap in understanding students with special needs during school closures in Canada, particularly the scarcity of research in the prairie region. Our findings confirm some of the challenges faced by key stakeholders in the online classroom, such as teachers' beliefs in the strong influence of social inequality and disparity on parents' capacity to engage with their children's learning and to engage in communication with special education teachers. The disparity factor became more salient and important in online learning than in physical learning environments. Second, the present study illustrates these issues, and sheds some light on the rewards of online school-to-home communications. Third, our findings suggest the essential nature of communication between key stakeholders, including special education teachers and parents, in successfully achieving good learning outcomes. Finally, the research may shed light on future policies that aim to establish better connectedness and communication channels among all stakeholders, such as making online schooling mandatory versus optional. All these aspects contribute to the discourse on the topic of special education during school closures.

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Section 1: Online Learning & Teaching in K-12
Part 2 Teaching Connections

Chapter 6

Transitioning Learning Communities to Online Schooling: A Hermeneutic K-12 Study of Educator Lived Experiences During the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic impacted several elements of how society operates in the functioning of daily life. A central element was how K-12 schooling was impacted during the initial stage of the pandemic and the subsequent school year. This hermeneutic study investigated the lived experiences of twelve educators by exploring the synergy between how Lifelong Learning (LL), Social Emotional Learning (SEL), and Learning Community (LC) impacts the holistic development of students. The researchers specifically questioned how the twelve educators set-up their holistic-focused classroom through LL, SEL, and LC, and how these elements were affected when transitioning schooling from face-to-face to online/hybrid. In addition, this study explored how this transition to online/hybrid schooling influenced the pedagogy of the teacher through an Integration, Continuity, and Engagement framework (Watson, 2019). Semi-structured interviews were conducted using a hermeneutic philosophical lens. Interview data was examined using the hermeneutic interpretation-analysis cycle, showing individual implications of LL, SEL for each educator, and LC for students. Each educator's narrative from this study elucidated their sense-making process as they navigated a variety of strategies during the pandemic, including emergency remote teaching.

Résumé

La pandémie de COVID-19 a eu une incidence sur plusieurs aspects du fonctionnement de la société au quotidien. L'un de ces éléments est la manière dont l'enseignement de la maternelle à la 12e année a été affecté pendant la première étape de la pandémie et l'année scolaire suivante. Cette étude herméneutique s'est penchée sur les expériences vécues par douze éducateurs en explorant comment la synergie entre l'éducation permanente, l'apprentissage social et affectif et la communauté d'apprentissage a influé sur le développement holistique des étudiants. Les chercheurs se sont particulièrement interrogés/es sur la manière dont les éducateurs organisent leur classe à vocation holistique par le biais de l'éducation permanente, de l'apprentissage social et affectif et de la communauté d'apprentissage; ils se sont également penchés sur l'incidence de ces éléments sur la transition de l'enseignement en personne vers l'enseignement en ligne ou hybride. En outre, cette étude a exploré la façon dont cette transition vers une scolarité en ligne ou hybride a affecté la pédagogie de l'enseignant dans le cadre de l'intégration, de la continuité et de l'engagement (ICE) (Watson, 2019). Des entretiens semi-structurés, menés en fonction de l'analyse herméneutique interprétative, ont démontré les répercussions individuelles de chaque éducateur en matière d'éducation permanente, d'apprentissage social et affectif, de même que de communauté d'apprentissage pour les élèves. Le témoignage de chacun des éducateurs visés par cette étude permet de comprendre leur processus de création de sens devant la variété de stratégies auxquelles ils ont dû recourir pendant la pandémie, y compris l'enseignement à distance d'urgence.

Transitioning Learning Communities to Online Schooling: A Hermeneutic K-12 Study of Educator Lived Experiences During the COVID-19 Pandemic

COVID-19 changed the social and economic fabric of K-12 schooling by shifting towards an online model (Green et al., 2021; Khalifa et al., 2021). When the World Health Organization (WHO) declared COVID-19 a pandemic in March 2020, discussions regarding how to maintain K-12 schooling in Canada and the United States were front and centre (Green et al., 2021; Van Nuland et al., 2020). The role schooling plays in the economic (e.g., allowing parents to work) and social lives (e.g., community, friendships, mentorships) of all citizens is often overlooked. In fact, attending school is often taken for granted in everyday life. Children congregate in order to develop a social sense of self (e.g., belonging, identity), to foster social relationships, and to learn content (Green et al., 2021; Van Nuland et al., 2020). Therefore, schooling is critical to the holistic, social, emotional, and academic development of learners (Adams et al., 2021). We argue that the pandemic revealed inadequacies of schooling systems to cope with changes in modalities. It also highlighted the impact Lifelong Learning (LL), Social Emotional Learning (SEL), and Learning Communities (LC) can have on teachers, learners, and parents. We further argue that the essential elements to any humanistic pedagogy-focused curriculum (face-to-face or online) need to be firmly grounded in a reciprocal interplay between LL, SEL, and LC development and combined with academic content (definitions provided below in Table 1). The idea that mass online schooling could seamlessly replicate face-to-face LC with effective LL and SEL was ambitious.

K-12 Online Schooling has been on the rise since the early 1990s (Barbour, 2010; Martin et al., 2020; Watson, 2011). According to Rasmitadila et al. (2020), “changes in learning systems force schools to implement distance education or online learning, e-learning ... correspondence education, external studies, flexible learning, and massive open online courses (MOOCs)” (p. 91). In the midst of the pandemic, the most viable option to ensure continuity of education for learners

was accessibility through learner management systems and online communication platforms (Adams et al., 2021; Jackman et al., 2021; MacDonald & Hill, 2021). Since technology is commonplace in society as a daily form of communication (e.g., video conferencing, social media) and a source of information gathering (e.g., YouTube, Google), online schooling was identified as a significant option. Digital Technology (DT) had been increasingly infused into the K-12 classroom (e.g., tablets/ phones, laptop computers, programming languages, game apps) (Yates et al, 2021). Therefore, online schooling became the default choice to keep people connected when physical locations became restricted. Through DT – especially via online platforms - online schooling created continuity of experience while placing a significant emphasis on technology and its role in education. The necessity of technology in the online schooling experience showed how important it is to re-emphasise evidence-based pedagogy and learning with technology as a supportive mediation tool. Jackman et al. (2021) identify that the pandemic “accelerated the widespread digitalization of numerous sectors that were unprepared” (p. 542). The education sector was unprepared because the pre-pandemic DT model was based upon the transactional distance education model. This model was designed for small specialized populations and not entire school systems.

Since K-12 schooling systems were familiar with the pre-pandemic DT model, they may have assumed that implementation of widespread online schooling would be easy. Given the prevalence of DT in society (e.g., social media, email) and in schools (e.g., attendance, report cards, on-site printing, coding) technological usage was also presumed to be easy for administrators, teachers, staff and students. Dhawan (2020) states that “rapid developments in technology have made distance education easy” (p. 6). In the ERT pandemic model, school systems attempted to mirror the distance education methodology. Not surprisingly, many K-12 school systems were unprepared given they had minimal mass online schooling experience.

Schooling systems anticipated that based on the digital literacy skills needed in daily life (e.g., gaming, texting, email), learners and teachers would have the requisite skillsets to make a seamless transition (Green et al., 2021; Reimers & Schleicher, 2020). However, many unforeseen issues arose. This chapter depicts, through semi-structured interviews, the lived experiences of K-12 teachers during the pandemic and, specifically, examines on how these educators initially transitioned their LC from holistically-focused LL and SEL classrooms to online/hybrid methods of teaching and learning.

Distributed Learning: The Pandemic and Online Schooling

Distributed learning (DL) is an instructional model offering students opportunities to access teacher and course content in noncentralized locations, by providing instruction and learning as an independent process, regardless of time or place (Khan, 2000; Ng, 2019). This learning option has provided schooling experiences for non-mainstream students for decades (e.g., school-leavers and/or children with physical limitations) (Lankshear & Knobel, 2006; Watson, 2011). Several options exist under the umbrella of DL (e.g., online learning, blended learning, correspondence learning). In the initial phase of the pandemic, online schooling provided continuity of connections (i.e., opportunities to access teacher and course content) between teachers, students, and parents. The pandemic provided an opportunity to observe the effectiveness of mass online schooling while assessing the impact of the online format on LL, SEL, and LC.

The Shift: Face-to-face to Online Schooling

Online schooling at the K-12 level has only been operationalized with specific student populations prior to the pandemic (Cheung & Slavin, 2013; Watson, 2011). In the past, online schooling had intentional outcomes for identified populations (Yates et al., 2021). During the pandemic, decision makers used the DL model as a template to take face-to-face schooling and transfer it online. However, shifting to an online environment also requires the transfer of

humanistic learner development and all its requisite components and processes (see Figure 1). The pandemic online schooling experience was clearly not the same environment as a face-to-face context, a traditional DL context, or a traditional online context (Yates et al., 2021).

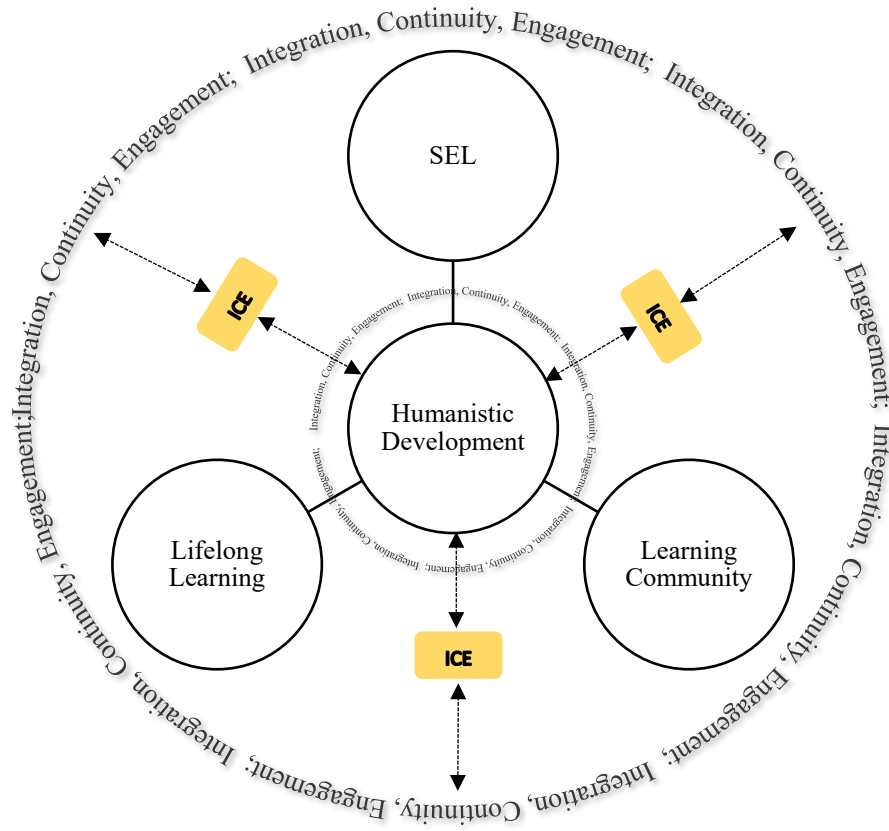
Substantial research at the post-secondary level, conducted several years before the pandemic, has been inconclusive as to the effectiveness of online learning, except to confirm that it is cost effective (Kauffman, 2015; Luckin et al., 2012; Martin & Bolliger, 2018; Means et al., 2010, 2013). Limited evidence can be found on the effectiveness/ineffectiveness of K-12 online schooling on a mass scale (See et al., 2021). Means (2010) states, “few rigorous research studies of the effectiveness of online learning for K-12 students have been published” (p. xiv). Referencing a report on 2012 data, the OECD (2015) stated students who are using “computers moderately at school tend to have somewhat better learning outcomes than students who use computers rarely. But students who use computers very frequently at school do much worse” (para 4). We interpret these studies as suggesting a need for technology to be used effectively as a mediation tool, placing integration, continuity, and engagement at the forefront in support of evidence-based pedagogy and learning.

Figure 1 illustrates the complexity of the learning environment and key elements needed to shift to different forms of DL (Ng, 2019). It shows the main components of humanistic learner development (e.g., LL, SEL, LC) and the critical processes (i.e., Integration, Continuity, Engagement) needed to transfer learning from face-to-face to online schooling. LL, SEL, and LC development are operationalized through integration, continuity, and engagement (ICE) in an educational setting. Figure 1 also shows the dual operationalization of ICE: first, ICE skills must be mentored to students to create the potential foundations of humanistic development (see Table 1 for definition of ICE); second, ICE must be mentored to include the micro-skills of LL, SEL, and

LC. In March 2020, as teachers adjusted, the difficulty was shifting the entire face-to-face context (Figure 1) to an online format, creating the need for Emergency Remote Teaching (ERT).

Figure 1

Humanistic Development with Classroom Components and Processes



We define ERT as triage teaching to support the continuation of previously established social networks between teacher-student, teacher-parent, student-student, and parent-parent. The transfer to online learning is not simply giving learners access to planned and structured content. The ERT phase was necessary at the beginning of the pandemic due to three factors: (a) the rush to initiate online schooling, shifting from an entirely face-to-face process to schooling based within online platforms; (b) the challenges teachers faced transitioning full humanistic learner development to online platforms; (c) the taken-for-granted manner in which online schooling was chosen without educators understanding its limitations (Jarvis et al., 2003; Lankshear & Knobel,

2006). The ERT phase included teachers learning to teach within a completely new realm. The teachers themselves could not have anticipated the impact online schooling would have socially, emotionally, and academically on themselves and/or their students.

Integration, Continuity, and Engagement (ICE)

Integration, Continuity, and Engagement (ICE) are foundational processes that support LL, SEL, and LC (Watson 2019). The ICE process serves two specific purposes for this study. First, ICE is an active experiential component to the humanistic development process (Boud et al., 1985; Jarvis, 1987; Kolb, 1984) (see Figure 1). This framework mentors micro-learning skills that are taught with the intent to prepare students to self-initiate and self-regulate learning experiences. For example, each element of LL and SEL must be taught intentionally to include progressions that empower learners to (I) integrate, (C) create continuity, and (E) engage each new experience (e.g., self, materials, situation, classmates, teachers) (Figure 1). Second, ICE served as the research framework within the hermeneutic research process. Through this lens, integration, continuity, and engagement were used within the double hermeneutic cycle or *making sense of sense making* (Dowling, 2007; Van Manen, 2007, 2017). ICE was used for the back-and-forth dialogic process during interviews and back-and-forth data interpretation-analysis process (see Table 4).

Framework Definitions

Hermeneutics scholars' stress everyday language within day-to-day experiences (Moules et al., 2015; Moules & Taylor, 2021). Thus, dictionary definitions were used to represent the foundational level of each element of the ICE process and framework (Table 1) and the components of humanistic development needed in a classroom environment (Table 2). From these definitions, humanistic development is the continual process of growth that requires LL micro-skills to be mentored through ICE and focused on the reciprocal relationships between SEL and

LC (see Figure 2). This humanistic development creates belonging and identity, empowering students to develop a commitment to their LL process.

Table 1

ICE Process Mentorship and Research Framework

ICE	Definition	Applications
Integration	“The act or process of combining two or more things so that they work together”	This definition aptly describes the process necessary for the successful application of learning within the classroom and forms the foundation of LC development. In the ICE framework, both the teacher and the learner co-create integration. The teacher integrates at the philosophical, theoretical, curricular, and teaching level. The student integrates both at the content level and the personal development level, promoting a LL growth mindset (Dweck, 2008; Haimovitz & Dweck, 2017; Yeager et al., 2019)
Continuity	“A logical connection between the parts of something, or between two things”	In the classroom, continuity is the continuation of connections created through levels of integration that teachers model and mentor to students. Continuity can occur: concept to concept, lesson to lesson, day to day, and/or year to year and is critical to LC development and overall student LL mindset and skillset development. Continuity is produced through a reciprocal synergy with integration and engagement.
Engagement	“Being involved with somebody/something in an attempt to understand them/it”	Engagement within the classroom is characterized by learners being immersed in any active combination of physical, social, cognitive, or emotional participation.

Note. Definitions taken from *Oxford Learner’s Online Dictionary*, 2022.

Table 2

Essential Interplay Components of Humanistic Development

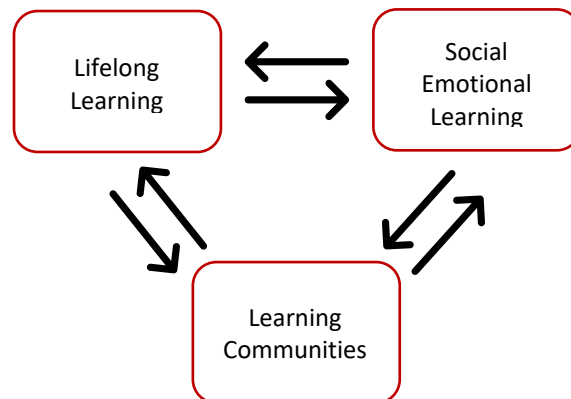
Component	Definition
Lifelong Learning (LL)	The development of human potential through a continuously supportive process, which stimulates and empowers individuals to acquire all of the knowledge, skills, attitudes, and values towards the understanding they will require throughout their lifetimes, and to apply them with confidence, creativity, and enjoyment in all roles, circumstances, and environments (adapted from Longworth, 2003 p. 62)
Social Emotional Learning (SEL)	SEL is defined as an integrated construct comprised of social cognition, emotions, and learning. Together they provide the foundation for learners to make sense of their social and emotional development (i.e., interpret, appraise, synthesize, and operationalize) in response to neural, physical, and social experiences (adapted from Bless & Greifeneder, 2017; CASEL, 2021; Herculano-Houzel, 2002; Jarvis et al., 2003; Moors et al., 2013; Owens & Tanner, 2017; Rolls, 2000; Scherer, 2009; Wenger, 1999)
Community	Community is defined according as “a unified group of individuals” (<i>Oxford Learner’s Online Dictionary</i> , 2022).
Learning Community (LC)	A LC is a <i>unified group</i> , focussing on experiential opportunities that strengthen individual identities while providing autonomy and agency for the whole group development. This allows learners to confidently participate within the LC while simultaneously focusing on their own development needs, producing learners who engage at their own pace and capability level as unique members of the LC. These needs include a sense of belonging and identity, the fostering of foundational neural pathways, schema development, and critical thinking skills for use throughout their lifespan (adapted from Dewey, 1933; Kilpatrick et al., 2013; Lave, 1991; Longworth, 2006; Wenger, 1998).

ICE Supported by Learning

Figure 2 shows LL, SEL, and LC as concepts independent of one another, yet requiring interdependent micro-skill mentorship. Micro-skill development is mentored independently in a linear progression, allowing students to have a full understanding of each component (e.g., LL, SEL and LC). Concomitantly, the components reciprocally interact through teacher designed back-and-forth experiential learning opportunities. These opportunities assist learners in developing the knowledge, skills, and attitudes to operationalize LL, SEL, and LC as part of their own humanistic development.

Figure 2

Reciprocal Independent-Interdependence of LL, SEL, Learning Community



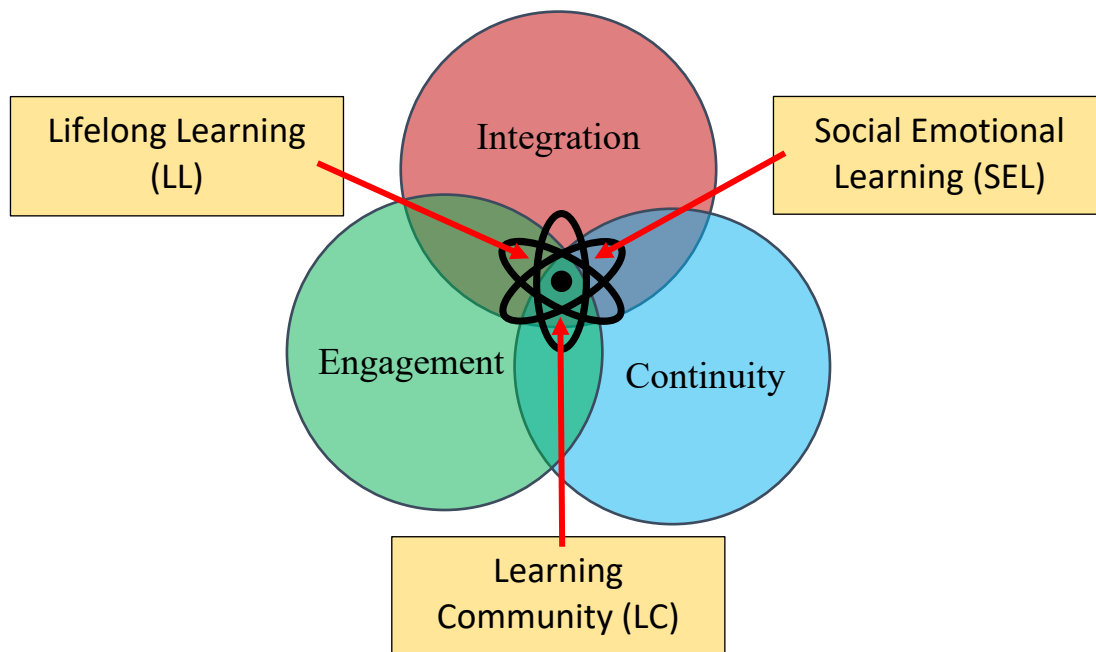
From a holistic learning perspective, Vygotsky (1978) considered learning to be a back-and-forth process that occurs on two levels: (a) the social world, and (b) the individual world. Each individual internalizes the experiences from their social world and processes them through their own individual lens in comparison to their schema (Sokugawa, 2022). As the individual learns, the community grows through “relationships between individuals” (Vygotsky 1978, p. 57), filtering social ways of knowing through their own lens.

In a classroom, where autonomy, agency, communication channels, and roles are set up, mentored, and facilitated by the teacher, the ICE process provides scaffolding to mentor learners to

use this back-and-forth process. The ICE process strengthens learners' abilities to recognize where, when, and how to utilize LL, SEL, and LC as a consolidated whole, empowering holistic development. Figure 3 shows the overlap and interplay between LL, SEL, and LC through immersion in ICE.

Figure 3

LL, SEL, and LC Immersed Within an ICE Interplay



Vygotsky's (1978) theory can be interpreted as supporting the foundation of humanistic development as a product of the back-and-forth between LL, SEL, and LC (see Figure 2) using ICE (see Figure 3). The back-and-forth between the social world and the world of the individual co-creates integration, continuity, and engagement by fostering the learner's sense of belonging and identity within the LC.

Digital Technology (DT) and Digital Literacy

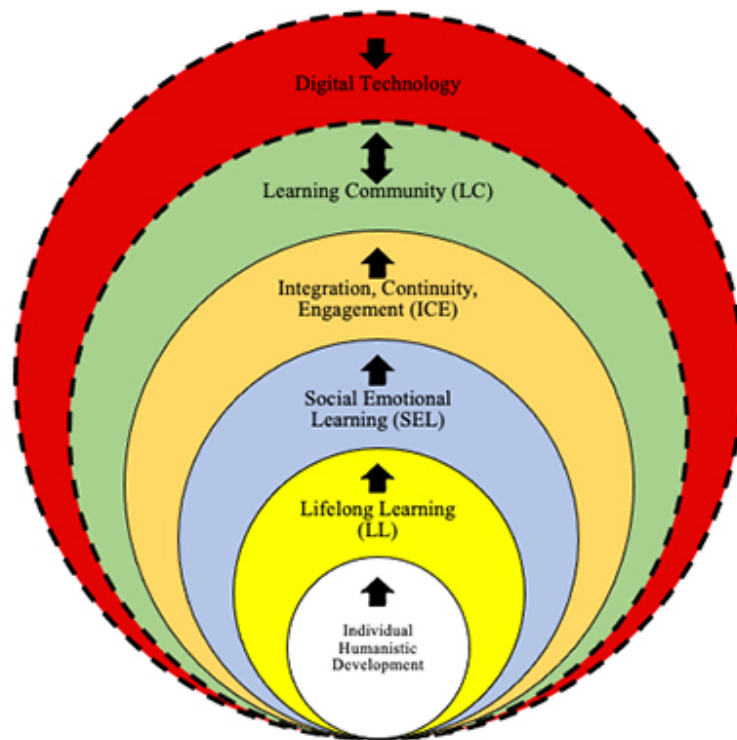
During the pandemic, DT was an essential consideration in every classroom. The zeal for DT in education was already present in modern schooling systems (Dhawan, 2020; McBrien et al.,

2009; Watson & Agawa, 2013). There is considerable enthusiasm surrounding technology and its potential to offer DL through online schooling (Ansari et al., 2017; Tokuhama-Espinosa, 2019, 2021). This enthusiasm was not only demonstrated but was brought to the forefront during the pandemic. However, the online schooling shift created a chaotic and abrupt transition that challenged teachers' digital literacy. Extending from Figures 2 and 3, Figure 4 shows the layers of scaffolded LL and SEL pedagogy necessary to build a functional LC that were impacted by the en masse addition of DT. These layers represent an immersed process of ICE that fosters individual humanistic development.

Figure 4

Layers of Classroom Immersion

- Solid Lines = Elements mentored by the teacher
- Dotted Lines = Elements that are co-created and shared amongst everyone in the classroom, or need to be co-negotiated by all class members



Increasingly, online formats tend to have a micro-focus on DT and digital literacy. Watson and Agawa (2013) contend that as new technologies become the “norm,” often the “promise of new technologies is mitigated by a lack of pedagogy” (p. 297). Similarly, Bowen and Watson (2017) state that “technology or equipment ... is only a tool, not an educational strategy” (p. xxi). During the rush to transfer to online teaching, DT became an intentional focus that in many contexts detracted from the pedagogy that supports LL, SEL, and LC.

Methodology

This study investigated the lived experiences of teachers during the pandemic. It focused on the transition of humanistic-based LL, SEL, and LC from traditional school settings to online/hybrid formats within the ICE framework. Purposive sampling was employed for recruitment. Twelve participants met the inclusion criteria. First, all participants were professionally licenced K-12 educators. Second, participants taught at the K- 12 level during the pandemic. Third, all participants used DT in their teaching.

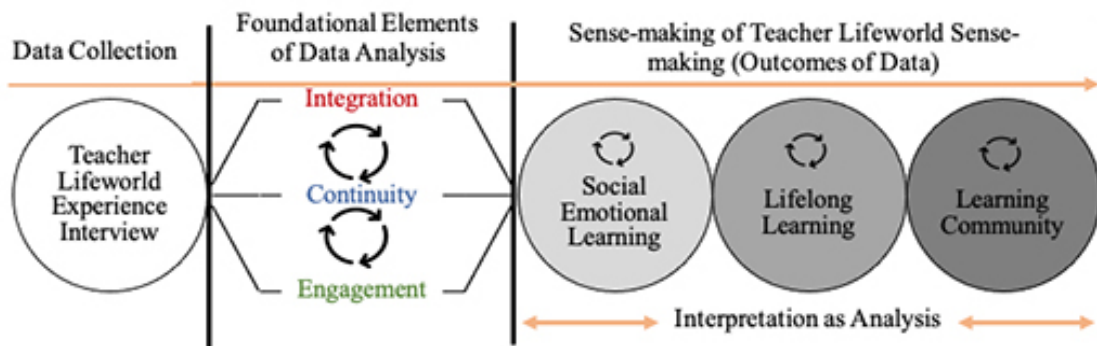
Individual semi-structured interviews ranging from 30 to 60 minutes were conducted, starting with 10 questions. In order to document authentic lived experiences in keeping with hermeneutic methods (Moules et al., 2015; Moules & Taylor, 2021) and to verify each educator’s story, participants were given the autonomy to direct the dialogue during the interviews. Interview dialogues began with open-ended questions in five areas: (a) Pedagogy, (b) Lifelong Learning, (c) Social Emotional Learning, (d) Learning Communities, and (e) Digital Technology.

Informed consent was obtained from the volunteer participants. Participants were given pseudonyms to ensure anonymity. Table 3 represents how the researchers considered each category within the teachers’ hermeneutic interview data. Hermeneutics’ scholars (Heidegger, 2010) advocate that “researchers interpret the data collected in terms of their own experiences and knowledge” (Mapp, 2008, p. 308). In line with hermeneutic research foundations (Heidegger,

2010), both researchers are licenced K-12 educators and taught through the pandemic. This is critical to hermeneutics as researchers do not bracket their experiential bias. On the contrary, the lens of the researcher as a professional educator is used during the data interpretation-analysis cycle.

Table 3

Hermeneutic Research Process from Interview to Data Analysis



In hermeneutics the world does not operate in a vacuum and is a contextually-based interpretation. Moules et al., (2015) states that hermeneutics does “not end up with themes but interpretations” (p. 119). She contends that hermeneutics is “guided by practical wisdom ... not by the logic of scientific method” (p. 68). Practical experience is essential to hermeneutic analysis, as is the contextually-based lens of the researcher. Moules et al., (2015 also notes that hermeneutics is “dialogical in its intent because it seeks not to have the last word but to keep the conversation going” (p.68).

Narrative-Based Interview Data with Hermeneutic Analysis-Interpretation

Each educator came with a unique context. In Table 4, we summarize participant profiles during ERT and online schooling during the pandemic. The first four profiles represent the participant data used, interpreted, and analysed here, given constraints on chapter length.

Narratives were selected based upon the combination of length compatibility and wide scope of teacher experiences.

Table 4

Interview Participant's Basic Profile

Participants	Mar 2020 - Jun 2020 (ERT)	Position	Sep 2020 – Jun 2021	Position	Teaching Context
Joan	Online / hybrid	Grade 6/7	Online / hybrid	Grade 6 / 7	Public; Urban School Multicultural Mixed socioeconomics
Janet	Online / hybrid	Grade 4/5	Online	At Home Learning Grade 4/5	Public; Suburban school Multicultural Mixed socioeconomics
Diana	Online / hybrid	Grade 3/4	Face-to Face	Grade 5	Public; Suburban school Multicultural Mixed socioeconomics
Sarah	Online / hybrid	Grades 9-12 Math and Social Studies	Online / hybrid	Grades 9-12 Math and Social Studies	Public; Urban (Inner-city) school Multicultural Mixed socioeconomics
Ellen	Online / hybrid	Grade 1/2	Online	Distance Learning Grade 3	Public; Suburban school Multicultural Mixed socioeconomics
Peter	Online / hybrid	Learning support	Online	Vice Principal	Public; Suburban school Multicultural Mixed socioeconomics
Cathy	Online / hybrid	Kindergarten	Online / hybrid	Kindergarten	Public; Urban-centre school; Multicultural Mixed socioeconomics
Crystal	Online / hybrid	Grade 8/9 French; Grade 12 Career Life Connections	Face-to-Face	Grade 8/9 French; Grade 12 Career Life Connections	Public; Urban school Multicultural; Affluent Socioeconomics
Susan	Online / hybrid	Kindergarten/1	Face-to-Face	Kindergarten/1	Public/with Indigenous Band leadership; Remote Indigenous community Indigenous students 70%; Low socioeconomics
Mary	Online	Grade 7	Face-to-Face	Grade 7	Public; Suburban school Multicultural Mixed socioeconomics
Paul	Online / hybrid	Principal	Face-to-Face	Principal	Public; Urban (Inner City); Multicultural Mixed socioeconomics
Billy	Online / hybrid	Grade 12 Psychology; Geography 12	Face-to-Face	Grade 12 Psychology; Geography 12	Public; Urban Multicultural Affluent socioeconomics

Joan

Joan is an experienced urban city elementary educator in a multicultural community. When online schooling initially occurred in March 2020, Joan felt a high level of stress, noting,

you had to learn to teach in a different way.... Trying to get them engaged was difficult....

I had to change the way I organised my lessons ... the way I had to assess students ...

[basically] everything I knew about teaching.

Joan's statement identifies the distinct disconnect between skills she acquired in her pre-service teacher preparation training and through her 15 years of face-to-face teaching experience, compared with the skills required during digitally based ERT and online/hybrid schooling. In other words, her statements highlight the distinct difference in skillsets needed to teach face-to-face versus teaching online.

Based on Joan's statement, it is logical to conclude that individual teacher digital literacy (i.e., how to use PowerPoint, Teams) represents the divide between these two modes of teaching; however, the issues are more complex. Joan indicated that how teachers interact and perceive students online requires a different set of skills. She states, "when you're teaching online, I think you definitely have a different field, in terms of how you read people." The ability to develop relationships in online/hybrid settings includes the need to identify and interpret student behaviours that are different than in face-to-face settings, affecting the overall SEL and the LC. This is predominantly because student social signals are limited to the visual and auditory senses offered through the DT platforms. The LL and SEL of the learners are hindered due to the one-dimensionality of online platforms. This limits organic immersive experiences because much of digital classroom social interaction is determined by transactional DT parameters. These parameters disrupt ICE by limiting communication channels. Building and nurturing an LC involves being socially aware of others and the ability to read people. However, if making

connections owing to physical, social, and emotional barriers is limited due to the DT, then building an LC becomes more challenging.

In a face-to-face classroom, students may randomly chat with others, interject organically into the LC, and provide sense-based signals that the teacher can interpret. The organic nature of a systematically created LC is where students apply the ICE process to learn and gain knowledge. However, when using DT to interact, a physical barrier exists, requiring a different set of skills to read others within the LC. Physical barriers limit the effectiveness of the ICE process. A number of protocols that teachers put in place (e.g., microphones muted, cameras off) to maintain control of the class and utilize technological transmission effectively, fundamentally change how we ultimately read people. This creates transactional processes that are based on a tennis-game style interaction. While teachers may intentionally create this back-and-forth process in a classroom to teach the intentional skill of turn-taking, in an online context it is the DT and the platform that create this limitation. Teachers and learners routinely rely on limited visual and auditory senses. As Joan pointed out, reading people requires a “different field.” This makes relationship building more challenging and requires more guess work on the part of the educator.

Joan emphasised the challenges of dealing with learners who can only provide a limited window into their learning experiences and personalities, creating difficulty in building an authentic LC. Reading learners online depends on non-authentic, non-humanistic interactions, reducing social interaction and impacting learners’ social emotional development. It also impacts teachers by forcing them into transactional fact-finding interactions with learners, stifling the overall development of the LC atmosphere. Joan highlights one learner’s interaction, stating that “I had to change the way I approached our conversations.” Joan further indicates that, “when I was online, I didn’t feel like I connected very well.” This demonstrates that the different mindsets and skillsets that ICE emphasizes, need to be carefully considered when teaching in an online setting.

Joan follows up by contending that in the face-to-face classroom “It’s the human way ... just to be able to go and have a conversation.” Joan’s statements demonstrate how difficult it is to replicate the organic nature of the face-to-face classroom. She believes that face-to-face is “so much more authentic” than the DT online schooling environment.

While technology allows us to educationally connect (i.e., participants in different places), the limitation it places on what Joan termed “the human way” is significant. Therefore, LL, SEL, and LC consideration is needed when planning online/hybrid schooling. Specifically, the difficulty in replicating the organic learning environment presents challenges that cannot only be addressed at the classroom level by the teacher but must also be addressed at the district and ministry level.

Effectively creating an LC to maximize student development and interaction requires an awareness of the skills necessary for teaching and learning. Applied to the online/hybrid schooling context, the development of learners is impacted by how teaching is framed. Educators, when constructing these frameworks, must consider the strengths and limitations of the DT environment and to effectively stream with teaching pedagogy. Joan emphasised that her teacher training did not prepare her for the online schooling scenario. Joan further notes that “I feel like I was just surviving ... in a pool treading water, getting my head up there ... it was an exhausting year, not physically, but mentally, mentally, I was really exhausted.” This statement indicates that Joan’s online schooling experience took a toll on her own social emotional well-being. Joan’s statements identify the importance of educators having their own SEL needs met before meeting the SEL needs of their learners. A taken-for-granted approach of “teachers can simply handle this” is inadequate as demonstrated by Joan’s statements. It is difficult to maximize the ICE process without addressing the humanistic development of learners first.

Janet

Janet was a hybrid educator at a multicultural suburban elementary school. She followed this experience with a district-based online position. For Janet online schooling was physically and emotionally strenuous. She states that online schooling “emotionally, was more of me playing detective ... making sure to pick up on very small cues.” Her statement identifies the time-consuming nature of interactions within an online classroom and the transactional nature of online teaching. It also demonstrates that Janet had SEL in mind in order to maximize learner development. In a face-to-face classroom, it is common to organically monitor and continually scan the class as a whole LC and to easily be able to identify challenges, concerns, or emotional needs. Janet questions: “in an online environment, how are you supposed to do that?” This question demonstrates her recognition that online schooling required a different set of skills and shows her commitment to maximizing effectiveness as a teacher in the online environment. She further explains the emotional complexity and time-consuming process required to replicate LC development that would normally take place in a face-to-face classroom. She states that, “in the beginning of the year, I had to get more monitors ... different monitors, which was a lifesaver.... One of my screens, my biggest screen was dedicated to seeing every student’s face.” Having a specific monitor to observe her learners’ facial cues speaks to how teaching involves more than merely delivering the intended content. Janet’s experience outlines the importance of the humanistic development needed for learning to take place and for ICE to work effectively.

For Janet, there was a synchronous need to conduct an ongoing assessment of the emotional tone (mood) of the class with respect to the amount of ICE that was needed for each learner. Janet’s insight into having more monitors, replicating what she would normally do and the skills she would normally use in a face-to-face classroom, shows the visible differences that exist in an online schooling LC. This is demonstrated by her statement, “I was still simulating what was

being done in a real-life classroom ... that was really helpful in terms of monitoring specific emotions.” Her statement shows her desire to monitor and develop SEL online. This required innovative measures that, although different from face-to-face, still placed pedagogy at the forefront.

In addition to having more monitors to assist her in the scanning and observing what her students were feeling in her “online classroom,” Janet identifies a further obstacle. She said, “but it was also so hard because online, while I’m teaching, all the students had to be muted ... we learned to keep our cameras on, keep our microphones off.” This forced her “detective work” to be more difficult as her auditory senses were inhibited by the muted microphones.

Janet also highlights the discrete ability to deal one-to-one with students who are in distress. For example, she identified “I’d be teaching, sharing my screen teaching, but then also noticing that someone’s crying.... In person, I can go up to a student and make it very discreet ... but in an online classroom, everyone hears me.” The ability to organically manage the classroom becomes less personal and less professional because in a face-to-face context you would not single out specific students. Given the limitations of the online platform, there are limited options available that would allow the teacher to deal with the specific student effectively, while maintaining a comparative level of supervision for the class. The teacher needs to either ignore the distress of the student or to highlight, expose, or compromise the personal nature of the student’s situation. While the chat window is a potential option, it still provides limited support for a distressed child. Overall, Janet believes that “all of my detective work was kind of done nonverbal” as she was challenged to balance teaching, content delivery, and SEL with distinct boundaries.

This highlights the complexity of being a reflective teaching practitioner and the challenges of setting up an effective LC that fosters the organic process of face-to-face teaching. As Janet

pointed out, there is so much more to consider when transferring the authentic teaching experience to an online schooling environment. She identified the need to be a detective in order to effectively understand the learners emotionally in an online schooling context. She believes that “it’s all up to observations, what you hear from other senses.” In a face-to-face context, immersion within all five senses enables teachers to organically appraise and monitor the classroom environment. Janet “felt that was really taken away,” which led to the complex process of detective work to simply understand her learners. This demonstrates her commitment to LC development and humanistic learner development that she would normally attempt in a face-to-face context. Further, this highlights the time-consuming nature of solid pedagogy combined with LL, SEL, and LC development in the online schooling environment. If a teacher simply transmits content online, online schooling becomes a simple transactional process; however, when humanistic learner development is considered, the online schooling model becomes a more complex LC. This highlights significant limitations to online schooling.

Diana

Diana is an experienced suburban elementary educator in a multicultural community. She felt her technological transition into online schooling, through ERT, was relatively smooth given her background in educational technology. However, her biggest challenge was time constraints. She stated that “the biggest challenge was just the number of hours that I was spending.” This demonstrates that even technologically proficient teachers encountered issues transitioning their practice to online schooling. While her educational technology skills provided her the acumen to teach learners the requisite technology skills, the focus of her classes revolved around the teaching of technology. She contends that the past year “helped me become more intentional with the technology that I use,” which influenced the general rationale for her pedagogy.

Diana notes that teaching her students to use Microsoft Teams “was just a different way for them to learn.” This shows that she equates technology as a form of learning that informs her pedagogy. Diana purposefully selected technology skills as the focus of her lessons rather than supporting learning through technology. This caused technology to dominate her pedagogical choices as opposed to using pedagogy to guide and select the most appropriate technology to use as a mediation tool for classroom lessons. In her planning, she emphasised the teaching of technology skills as content by intentionally planning Zoom lessons where technology was dominant. For example, rather than teaching research skills for content, she specifically targeted technology skills, such as how to *use* PowerPoint to present assignments. She intentionally placed the technology skills at the centre, taking precedence in her planning process, stating “that’s a Zoom lesson.” Technology-centric educators often mistake technology as a pedagogy as opposed to a supporting mediating tool (Bowen & Watson, 2017a). They tend to treat self-directed learning skills in a taken-for-granted manner and place the responsibility for learning on the student. In contrast, they intentionally focus curriculum planning and student contact time on the direct teaching of technology skills.

Diana emphasized technology as the foundation of her pedagogy. She refers to technology skill development by representing how much her students had developed over the year. She identified that “in terms of technology, they have grown so much more because they were forced into ... the learning platform through a screen and connecting with their device.” Her approach to LC development was also techno-centric because she believes that the future of communication will be DT dominant. Further, to meet these communication requirements, she advocates for teachers to consider teaching technology with the mindset of “the more we can offer them those kinds of opportunities, the more that they can use this tool or that tool to express what they really want to express.” This illustrates how Diana views technology as the driving force of LL skills as

opposed to foundational self-directed learning skills with technology as the mediation tool. Teaching DT as individual and independent tools steers away from the integrative nature of learning. Therefore, careful consideration of technology-based pedagogy that balances integrated learning with technology skills needs to be intentional when shifting to online schooling or any form of DL.

Diana felt that maintaining the LC was important. She notes that, “once a week, we had Zoom meetings always structured in the same way that I do my own classroom... we always did community circle.” This demonstrates that for consistency and continuity to maintaining the LC, she kept the same format as her face-to-face classroom. Philosophically, Diana appears to support the ICE process, yet online her emphasis was on the DT as opposed to the depth needed for ICE. In a time of uncertainty, the community circle was an example of how Diana attempted to maintain SEL. She also began “book club meetings ... the groups ranged from three to six kids every week.” Despite trying to maintain the social aspect through her community circle and book club, the difference in the way students perceived online classes is shown in Diana’s statement. She states that her students “shared how much they appreciate coming to school, because they know what it was like when they couldn’t ... how much they appreciate that they get to learn with their friends ... play with their friends.” Her statements show that students learned to appreciate the opportunity to come to school as opposed to feeling obligated to attend school. In terms of SEL, face-to-face schooling provides very different experiences for learners, requiring teachers to intentionally consider incorporating ICE in their classes.

Sarah

Sarah is an experienced secondary school Math educator, in a multicultural inner-city urban setting, who encountered challenges replicating her regular teaching process. She notes that “the first few months of the lockdown was very hard to adjust to ... it was very stressful ... the curve of

learning was dramatic.” Sarah shows that the skills she would normally rely on in face-to-face teaching were not transferable to the online platform. She follows up by stating that “we’ve never been taught properly how to do that.” Sarah demonstrates that the actual digital literacy requirements of teaching online need to be taught and that simply considering a seamless transition to online teaching is not feasible.

The expectations were that schooling would maintain the status quo with a simple shift to a new medium; however, Sarah demonstrates that there were several micro-skills (e.g., active listening, questioning techniques, organic discussions) needed in order to even consider the initial stages of online teaching. She states that “the amount of learning was crazy, like how to record videos, how to set up lessons, how to add students, it was not a smooth transition ... every single stage was an adjustment.” Teachers were on islands and were thrust into online schooling, forcing them to move towards ERT just to survive. This speaks to the chaos of the pandemic and the specific shifts that were needed to accommodate the LL, SEL, and LC. Sarah states that “the hybrid system changed multiple times over the year.” Sarah’s statement shows that without considering the stress placed on all parties involved and the disruption this stress places on the process of integration, creating continuity, and engaging (ICE), it is untenable to expect teachers to effectively flip-flop or switch pedagogy back-and-forth.

Sarah believes that “most teachers are trained to be teachers in person, I had no videos ... videos of myself teaching not looking online to take videos ... it’s you teaching the lesson that you would normally teach in person.” As in any generation, it is common for media to be used to support teaching and learning. In the current generation, internet-based resources are used often, but they must be used to support the teacher’s lesson and pedagogic foundations. Sarah shows the importance of not simply “taking videos” (e.g., YouTube, TikTok) from online without scaffolding or progression-based skills. These progression-based skills are the foundational steps

and are necessary to facilitate the ICE process while also keeping core competencies at the forefront. She believes teachers cannot just “throw content online but there wasn’t a lot of time for us to think pedagogically what we wanted to do, it was just survival and no consideration of pedagogy.” Sarah follows by stating “It was all about getting through as much as we could until we figured out what was going on.” Many teachers during ERT were pressured for time, resorting to internet-based DT media to simply get through the early days of the pandemic. Sarah’s statement demonstrates that the “survival mode” did not allow for ICE or the components of humanistic learner development to be considered (Figure 1).

Sarah spoke of reducing mathematics concepts due to time constraints. She states “I had to pare down on a lot of the concepts ... I took away the more challenging things.” Many of her learners completed their online Math schooling experience thinking they had learned a lot, but Sarah reinforced to students the difference between face-to-face versus online. She states, “I don’t know if you would have done as well ... you got an 80 or 90% because we only covered 70% of the topics ... 90% of 70%.” If Sarah had not reinforced the content reductions to her learners, they could have potentially had a false sense of their own online learning capabilities. Overall, Sarah highlights that face-to-face schooling and online schooling, “it’s not really the same.”

Sarah also focused on the importance of integrating LL, SEL, LC, and pedagogy with course content. As a secondary Mathematics teacher, she equated LL as a set of progressions towards competency. She paralleled LL to the skills of both swimming and mathematics, echoing that regardless of the content, skills need to be taught through integration, continuity, and engagement. Using the analogy of swimming skill development, Sarah states that when:

you ask somebody to jump off a diving board, those people are going to be scared, but the things you have to enforce into them before they jump off is ‘can you breathe properly underwater ... tread water ... keep yourself afloat?’

Her statement reinforces the importance of progressions as she extends her analogy to mathematics. Similarly, progressions are necessary to the ICE process. She believes that content skills must be taught “properly before you move on. The problem with that is [that] people try to move on without learning all their different skills, and try to jump off the deep end.” Overall, Sarah speaks to the importance of an LL mindset that prioritizes progression-based skills while balancing SEL and LC with pedagogy through ICE.

Discussion

Replicating the Classroom

During the pandemic, many teachers attempted to replicate the face-to-face student experience. The challenge was transferring humanistic learner development (e.g., LL, SEL, and LC) and trying to replicate the face-to-face classroom on an online platform. In this study, each teacher’s experience highlighted that their prior training and previous experiences in a face-to-face setting had not prepared them to transfer their classroom seamlessly to an online setting. Each teacher’s narrative was unique, as each person faced their own set of challenges when transferring to online schooling. Although DT was a factor and presented different complications, these complications were not based solely on individual teacher’s DT skills or digital literacy levels. The use of technology as a mediation tool in coordination with LL, SEL, and LC development was evident in each teacher’s narrative story. The issues that teachers faced transferring to online schooling were grounded by three processes: (a) how technology was or wasn’t integrated with pedagogy; (b) how continuity was or wasn’t created within a DT environment; and (c) how engagement was facilitated or not facilitated, and to what extent that this engagement could be operationalized. Attempting to replicate the face-to-face classroom in an online environment requires the consideration of ICE in combination with digital literacy and DT skills. It also

requires the consideration and implementation of LL, SEL, and LC, focusing on the humanistic developmental needs of each student online.

Online Schooling and Digital Technology

In our opinion, what happens in a face-to-face classroom with respect to LL, SEL, and LC development (e.g., classroom scanning, organic interjections and discussion, use of five senses) can never be replicated in an online school context. Online schooling can serve as an effective transmission-based learning environment connecting learners from several locations. This form of learning is transactional in nature (e.g., student mics turned off, assignments given and received, one way communication channels). Based upon the teacher narratives in this study, online schooling is transactional due to foundational structural limitations of the technology. Using tennis as analogy, the online classroom functions in a back-and-forth manner similar to the ball being struck back-and-forth. In a digital classroom context, microphones are turned off to limit distraction from background noise, but this also limits interaction with hands-up functions being relatively limited to a visual cue. The teacher may or may not see these, depending on the view function. As a result, teachers need to be aware of such limitations to the online schooling classroom and recognize that the teaching and learning process is different from face-to-face classrooms.

The New Digital Technology Realm

Online schooling during the pandemic gave continuity of education in a physically safe environment. It provided structure for learners and parents, accommodating sizable learner populations. However, educational institutions needed to be prepared to mitigate unforeseen social (e.g., anxiety, lack of social interaction) and economic inequities (e.g., technology availability, space, Wi-Fi access, technology skills) (Green et al., 2021; Reimers & Schleicher, 2020). These inequities placed significant stress on the whole educational system as noted in the teacher

narratives. Further, concerns exist over the long-term LL and SEL impacts that may linger because of these experiences (Bansak & Starr, 2021). Saqr and Wasson (2020) contend that for future mass changes to schooling, “complexity and uncertainty need to be embedded in our educational systems so that future generations can understand the world as it is complex, dynamic, and uncertain” (p. 5). This lends to the importance of humanistic development for learners in order to support the dynamic LL and SEL skills needed throughout life.

The pandemic demonstrated that a more robust focus on cognitive, social, and emotional competencies is needed, in addition to student well-being (Reimers & Schleicher, 2020). The pandemic further exposed a disconnect between academic content delivery, often stressed by institutions, and the need for the integration, continuity, and engagement of LL, SEL, and LC (Reimers & Schleicher, 2020; Watson, 2019). DT has exacerbated this gap. The issue is that pedagogy and academic success must be about more than “the ‘killer app’ or ‘disruptive’ business model” (Reimers & Schleicher, 2020, p. 8). Therefore, pedagogy needs to encourage humanistic development (Bansak & Starr, 2021; Green et al., 2021; MacDonald & Hill, 2021).

Future Implications

The interview data demonstrate a difference between how teachers are currently trained versus what was necessary during the pandemic. Moving forward, more research is needed to fully understand the impact of online/hybrid classroom schooling environments on teachers and learners. It is necessary to keep humanistic learner development at the forefront. Teacher pre-service programs need to continue preparing teachers to build effective face-to-face LC, while balancing the ability to build online LC. Digital literacy courses need to be a component of pre-service teaching programs to create a well-balanced teacher skillset with DT as a mediation tool.

Conclusion

The declaration of COVID-19 as a pandemic by WHO in March 2020 caused global turmoil in education. The transition to online schooling was a natural and automatic solution to maintaining educational continuity. Teacher narrative stories analysed hermeneutically from the lived experiences of educators showed that transitioning to online schooling was not seamless. Teaching in a face-to-face model cannot simply be replicated when providing a DL model.

Effective classrooms, regardless of medium, need to consider the LL, SEL, and LC development of both teachers and learners. The ability to integrate, create continuity, and build engagement are key elements. There is a need to ensure that learning environments are effectively developed through research-informed pedagogical methods. The pandemic offered an opportunity to see the positives and negatives of online schooling. However, in our view, it is critical for pedagogy to keep LL, SEL, and LC development at its forefront. Moving forward, if online schooling is to be explored further *en masse* for K-12 populations, more time and consideration must be given to the voices of teachers in the field. Educator experiences during this pandemic are a valuable source of research to inform both prospective online schooling and teacher training for online schooling.

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Chapter 7

An Action Research Study to Examine Perceptions and Practices of Teachers Promoting Student Development of Executive Functioning Skills in all Learning Environments

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Abstract

Executive functioning (EF) skills are widely seen as important developmental skills critical to support student learning and independent work habits (Diamond, 2013). Defined as “a set of control processes that allow individuals to manage and direct their attention, thoughts, and actions to meet adaptive goals” (Samuels et al., 2016), EF skills can be difficult to teach, and even more challenging to measure. A cohort of junior high school teachers participated in an action research study examining the impact of collaborative inquiry on their perceptions and classrooms practices. In paying deliberate attention to the design of the learning environment, teachers sought to improve their practice and positively impact student EF skill development. The sudden shift to online learning in March 2020 offered opportunities for teachers to see how unanticipated changes impacted students’ EF skill development, and also to experience the challenges of supporting student EF skills in online environments. Findings indicated that an intentional focus on EF skills in instructional practices, conferencing, and establishing explicit classroom routines were key features to foster student EF skill growth. Critical features also included consistency across the school setting and overt attention paid by teachers to how EF skills were manifesting in their practice. This highlights the need for pre-service teachers, practicing educators, and educational leaders to implement professional learning practices that foster greater understanding of EF and how to support the development of EF skills.

Résumé

Les compétences du fonctionnement exécutif (FE) sont largement considérées comme étant, sur le plan développemental, essentielles pour soutenir l’apprentissage des élèves et leurs habitudes de travail autonome (Diamond, 2013). Définies comme “un processus de contrôle qui permet aux individus de gérer et de concentrer leur attention, leurs pensées et leurs actions sur des objectifs favorisant les capacités d’adaptation” (Samuels et al., 2016), les compétences du FE peuvent être difficiles à enseigner et plus encore à évaluer. Une cohorte d’enseignants du premier cycle du secondaire ont participé à une étude de recherche-action visant à comprendre l’impact de l’enquête collaborative sur leurs perceptions et leurs pratiques en classe. Accordant une attention particulière à la conception de l’environnement de l’apprentissage, les enseignants ont cherché à améliorer leur pratique de manière à influencer positivement sur le développement des compétences du FE des élèves. Le passage soudain à l’apprentissage en ligne, en mars 2020, leur a permis de découvrir comment des changements inattendus ont joué sur le développement des compétences du FE des élèves, sans méconnaître les défis que cela soulève pour le soutien des élèves dans des environnements virtuels. Les résultats démontrent que le recours au FE dans les pratiques d’enseignement, les routines bien établies en classe et les entretiens de groupes constituent des

éléments clés pour favoriser le développement du FE chez les élèves. Or à la lumière de cette étude, il est essentiel que le FE soit appliqué de manière cohérente à l'échelle scolaire et que les enseignants eux-mêmes appliquent sciemment les compétences qui le soutiennent. Ceci souligne la nécessité pour les enseignants en formation, les éducateurs en exercice et les leaders en matière d'éducation de mettre en œuvre l'apprentissage professionnel des pratiques d'enseignement qui favorisent une meilleure compréhension du FE et l'acquisition des compétences qui en dérivent.

An Action Research Study to Examine Perceptions and Practices of Teachers Promoting Student Development of Executive Functioning Skills in all Learning Environments

Throughout their daily activities, students are required to continually make decisions and adjust to situations that push them to plan and prioritize, organize ideas and materials, and concentrate on topics for prolonged periods of time and resist impulsive decision-making. Many of these tasks involve executive functions “a set of control processes that allow individuals to manage and direct their attention, thoughts, and actions to meet adaptive goals” (Samuels et al., 2016). Evidence has shown that possessing executive functioning (EF) skills at school entry is more predictive of school achievement than intelligence (Blair & Razza, 2007). In addition, students who experience challenges with EF skills are at risk for lower employment success, increased incidences of mental health illness, and higher delinquency rates (Diamond, 2013).

Previous research showed effective interventions for EF skill development included improving teacher capacity to implement classroom-based EF supports (Ennis et al., 2018; Meltzer et al., 2007). In our work with teachers, whether they had ample experience or were new to the profession, we found they universally indicated that EF skills were often overlooked in planning and training. Our teacher participants shared that EF was not a feature of their pre-service programs and was regularly left unaddressed in professional learning. An action research study was initiated in the fall of 2019, 6 months prior to transitioning to online learning in the wake of the COVID-19 pandemic and concluded during the 2020–2021 school year. A group of junior high teachers (Grades 7–9) participated in a series of collaborative professional learning experiences that were grounded in professional inquiry. Our work aimed to understand in what ways a comprehensive approach to designing learning environments impacted the executive functioning skills of junior high school students.

The shift to remote learning in the spring of 2020 exacerbated what had previously been observed by teachers in schools: successful learning requires students to successfully demonstrate EF skills. As learning environments were less predictable and face-to-face instruction was often not possible, teachers observed that many students were challenged to remain engaged and present in their learning. Decreased peer support, a lack of direct instruction of learning strategies, and reduced supervision were commonly experienced by students, many of whom struggled to sustain attention, monitor their learning, and initiate tasks. Teachers voiced the need for students to build these skills and the necessity of professional learning support required to teach EF skills to students across learning contexts.

This chapter outlines the findings from a study aimed to increase teacher confidence to support students' executive functioning skill development. While the original study design shifted because of the COVID-19 pandemic, an unanticipated benefit arose as teachers shared their experiences and observations of how EF skills presented in online learning contexts. We also share important learnings about how teachers might best be supported to teach, monitor, and assess EF skills in an increasingly digital world.

Relevant Literature

Executive Functions

Within the research literature, there is a lack of agreement on specific elements and constructs of EF. Some academics envision EF as a single, unitary construct (Barkley et al., 2001), while others posit EF includes three principal factors, working memory, inhibitory control, and attentional flexibility completely independent and distinct from each other (Hughes, 1998; Welsh et al., 1991). Yet another prominent framework proposes three factors, shifting, updating (working memory contents) and inhibition, which are both distinct and interrelated, sharing commonalities while still separable (Friedman et al., 2008; Diamond, 2013; Miyake et. al., 2000).

An emerging perspective highlights a move away from domain-general component processes to consider EF as skills used in service of goal attainment — inclusive of the values, norms, and knowledge that an individual possesses (Doebel, 2020; Perone et al., 2021). According to Doebel (2020), EF is consistently engaged in the processes involved in attaining goals, both in lab settings and in real world contexts. Doebel's (2020) proposed view incorporates these goal-directed processes within the executive control that individuals demonstrate, rather than approaching executive functioning as skills isolated from a particular task or goal (Doebel, 2020).

In reducing EF to discrete, measurable, independent skills observed in a lab setting, it is posited that researchers inadvertently neglect important considerations for the development of these behaviours in context of specific situational experiences (Perone et al., 2021). Doebel's (2020) work recognized that “cognition and behaviour should always be understood in context” and “there are no cognitive or behavioural components that can be activated and applied across contexts” (Perone et al., 2021, p. 1199). This thinking supports the complexity and context-dependent nature of EF skill development. Perone and colleagues (2021) related that “in this way, goal-directed behaviour is built from but, importantly, not reducible to, these components” (Perone et al., 2021, p. 1200).

Associations between the progression of EF skills and the cognitive development of children, specifically in the pre-frontal cortex that is most associated with executive functioning (Best & Miller, 2010; Bolton & Hattie, 2017), show that EF skill development is an ongoing process which continues to develop into early adulthood. The developmental trajectory varies with age (Best & Miller, 2010), requiring teachers who wish to address these skills in their classrooms to be attuned to the behavioural and learning needs along with the developmental maturity of their students.

Executive Functioning and Classroom Environments

Existing literature and research in executive functioning has focused primarily on interventions to target specific constructs or skill development for children (Diamond & Lee, 2011; Diamond & Ling, 2016; Takacs & Kassai, 2019). While evidence of impact on improving specific targeted skills through interventions is widely available, our searches revealed limited literature that addressed the impact of the learning environment on executive functioning. EF skills have been shown to be impacted by factors such as school safety, student-teacher conflict and peer interactions, and classroom-level emotional support (Cumming et al., 2020). Additionally, Bardack and Obradovic (2019) shared that a teacher's EF behaviours and the emotional, behavioural, and instructional supports demonstrated in classrooms impacted students' EF skills. Despite this broad availability of literature on executive functioning, the limited number of studies focused on supporting student EF skill development through the design of learning environments highlighted a need for additional understanding of this topic.

Collaborative Inquiry and Professional Learning

In an educational context, collaborative inquiry provides a vehicle for inquiring teachers to “engage in iterative cycles of action and reflection” (Schnellert & Butler, 2014). Collaborative inquiry has proved to enhance instructional practices, increase confidence, improve collaborative skills, and heighten empowerment of educators, and in turn, to profoundly impact school culture (DeLuca et al., 2015; Donohoo et al., 2018; Townsend & Adams, 2014). In their examination of existing literature on collaborative inquiry, DeLuca and colleagues (2015) identified that although there are multiple models for collaborative inquiry, there are three features continually present in each of these: dialogical sharing, taking action, and reflection. These three criteria featured prominently in each of the collaborative inquiry sessions in which our teacher-participants engaged throughout this action research study.

Research Design

Methodology

Action research methodology was undertaken to investigate the impact of collaborative professional inquiry focused on EF skills. Specifically, we examined teacher understanding of executive functioning and their perceptions of how they could impact the development of students' EF skills. As researchers embedded directly in a K-12 school in Western Canada, this methodology was appropriate as we sought to examine the impact of a professional learning approach to both improve EF skills of students and the professional practice of teachers.

Action research is described as systematic inquiry into the teaching and learning process conducted by teachers, administrators, or others with a deep-rooted interest in education for the purpose of gathering information and improving practice (Mertler, 2017). Originally conceived by Lewin in the mid-1940s to bridge a gap between theory and practice, action research allows practitioners to “research their own actions with the intent of making them more effective” (Dickens & Watkins, 1999, p. 128), while being a continual process of research and learning.

Mertler (2017) described the four basic steps of action research we followed throughout our work: identifying an area of focus, collecting data, analyzing and interpreting the data, and developing a plan of action. Recognizing the dual roles that we played — both as researchers examining the impact of the collaborative inquiry and as educational leaders who were responsible for designing and delivering this professional learning to the participants, this methodological approach allowed us to examine our own practices in real time in order to better understand what we might change or improve.

Within the context of the research, we followed Mertler's (2017) four stages of action research (see Table 1). During the planning stage, we identified our topic, gathered information from the context relevant to our work, reviewed the related literature to our topic, and developed a

research plan. During the acting stage, we led the collaborative inquiry professional learning sessions, collecting and analyzing the data throughout. The developing stage included reviewing the findings from our data and the co-development of action plans to implement important findings into classroom and school practices. The final stage, reflecting, included sharing back our findings with teacher participants and reflecting as a research team on our process to look for ways to improve our planning.

Iterations to the acting and developing stages of the research were made in response to emergent observations and the necessity to adjust to the ever-changing nature of schools. As noted by Mertler (2014), “[w]hereas action research has a clear beginning, it does not have a clearly defined endpoint” (p. 37). We experienced this first-hand with an unexpected premature end to our collaborative inquiry professional learning in March of 2020 as students and teachers shifted to online learning in response to COVID-19. Conversations with teachers during the spring of 2020 highlighted the importance of this work through unanticipated learnings about the role of EF in online learning environments and what teachers perceived as challenges to EF skill development during this shift.

Table 1

Detailed Description of Stages of Action Research

Action Research Stage	Description	Actions Taken by Researchers	Timeframe
Planning	● Identifying topic ● Gathering information ● Review of literature ● Research plan	● Consultation with teachers, administrators ● Gathering information on contextual understanding of problem ● Review of current literature ● Proposal submitted to school for research to be conducted	March 2019 – September 2019

		● Ethics approval ● Development of full year research plan and professional learning design ● Participant recruitment	
Acting	● Data collection ● Data analysis	● 4 x 3-hour professional learning sessions ● Ongoing conversations with participants during professional learning to better understand the contextual needs of students and teachers (opportunity for iteration to PL) ● Semi-structured interviews with participants (May–June 2020) ● 3 x 1.5-hour consolidation sessions ● Reflection journals collected ● Iterations to collaborative inquiry PL	October 2019 – November 2020
Developing	● Review of findings ● Action plans developed	● Preliminary plan for EF skill development drafted ● Iterations to collaborative inquiry PL	January 2020 – ongoing
Reflecting	● Communicating results ● Reflecting on process	● Knowledge mobilization – conferences, publications ● Sharing findings with teachers, school administrators, learning leaders	February 2020 – ongoing

Note. Adapted from Mertler (2017)

Participants

Participants included 13 junior high school teachers (Grades 7–9) in a Western Canadian independent school, with professional experience ranging from 2 to 27 years. This school serves students who have learning difficulties, with over 80% of students diagnosed with a learning

disability and over 60% with diagnosed attention disorders. Among attending students, 60% are male and 40% female. A variety of learning supports are offered at the school, including a speech-language pathologist, school psychologist, in addition to reading, writing, and mathematics specialists.

Among the teacher participants were varying levels of familiarity with EF prior to starting this work. All participants self-selected to be a part of this professional learning as a focus for their yearlong professional learning and expressed a keen desire to learn more about executive functioning in an effort to better support their students. Names used in the findings or comments are pseudonyms.

Collaborative Inquiry Professional Learning Design

Between November 2019 and February 2020, teacher participants engaged in regular (n=4) sessions of professional learning in the form of collaborative inquiry lasting approximately 3 hours each. There was an additional 1 hour-long session introducing teachers to this work, and three 90-minute sessions in the fall of 2020 for guided reflection and to consolidate shared learning. Each of the 3-hour sessions used elements of design processes to help participants focus and determine personal inquiry goals in addition to their collaborative inquiry goal — *How might we model strong executive functioning practices and design the learning environment to positively impact executive functioning?*

Methods

A mix of quantitative and qualitative data were collected from teachers, parents, and students; the findings and discussion in this chapter focus on our analysis of teacher data that was collected through semi-structured interviews and written reflections. Analysis of quantitative data,

including the Teachers Sense of Efficacy Scale,¹ TSES, (Tschannen-Moran & Woolfolk Hoy, 2001) and Behaviour Rating Inventory of Executive Functions 2², BRIEF®2, (parent, teacher and self-report; Gioia et al., 2015), is ongoing.

Semi-Structured Interviews

Semi-structured interviews were conducted with all 13 teacher participants in May and June of 2020. Each of these lasted between 25 and 60 minutes and were conducted online due to the shift to remote working during the COVID-19 pandemic. The questions asked during these interviews are included in the Appendix (appended below). Interviews are a common method employed in qualitative research to offer opportunity to better understand participant views of the described phenomena, and they can be “at once evocative and moving but analytically clear” (Brinkmann, 2017, p. 577).

Written Participant Reflections

The use of written reflections further offered rich themes that were analyzed to better understand how participation in a collaborative inquiry model influenced the confidence of teachers to address EF in their practice, their ability to design learning environments to support EF, and their perception of the resulting impact on student learning and growth.

Data Analysis

Thematic analysis based on the six-stage method developed by Braun and Clark (2006) was used to review interview transcripts, identify codes and themes, and triangulate these with written reflections offered by participants. Braun and Clark (2006) acknowledged that with the flexibility and freedom that thematic analysis offers, there remains the need to have clear

¹ Developed at Ohio State University (Tschannen-Moran & Woolfolk Hoy, 2001), TSES is sometimes referred to as the *Ohio State Teacher Efficacy Scale*. We prefer the name, *Teachers' Sense of Efficacy Scale* or TSES ($\alpha=0.94$).

² BRIEF®2 ($\alpha=0.80-0.97$).

guidelines and processes in place to ensure that findings are rigorous, detailed, and defensible. As our data analysis sought to explore the perceptions and experiences of participants, we employed an inductive approach that did not seek to prove or disprove previously established theory. Table 2 outlines the six phases used to analyze our qualitative data and the descriptions of each phase.

Table 2

Phases of Data Analysis

Phase 1 – Familiarizing yourself with the data	Listening to video recordings of interviews Transcribing audio recording Listening and reading transcripts simultaneously for accuracy of transcription Reading written reflections of participants Noting initial ideas and thoughts
Phase 2 – Generating initial codes	Coding interesting features in data set, identifying and collating data relevant to codes
Phase 3 – Searching for themes	Organizing codes into preliminary themes, reviewing transcripts to ensure no data was excluded relevant to themes
Phase 4 – Reviewing themes	Checking preliminary themes against codes and entire data set, determining headings and picture that data present
Phase 5 – Defining and naming themes	Ongoing analysis of themes, determining the “story” the research tells, ensuring language and description of themes are accurate
Phase 6 – Producing the report	Selection of particular quotes, interesting excerpts for emphasis, co-author meetings to ensure agreement over all themes and examples, ensuring research question, literature, analysis, findings, discussion, and conclusion aligned, editing of report.

Note. Adapted from “Using thematic analysis in psychology,” by Braun and Clark (2006)

Findings

Executive Functions as Necessary for Learning

There was consensus among teacher participants that an awareness of executive functioning both primed students for learning and made learning available. When asked in what ways learning and EF are related, one participant pointedly stated, “how are they *not* connected?” Another participant, Rita, noted, “it’s like the plate before the food ... you have to have that in

order to hold everything else.” When she focused on EF in her classroom, she said students “start[ed] gaining control of some of these areas that’s within their own brain,” as compared to the external lesson or curriculum. She elaborated that by supporting EF development in her lessons, she peeled back the “mask” to help students with “real” issues of learning. Rita indicated what initially appeared to be disorganization was uncovered to be strategies student(s) were using to hide a lack of confidence. In supporting students with strategies to improve their organizational skills, she shared that she was able to better understand what her students really needed.

Another teacher noted that she saw a direct relationship between students who struggled with EF and their ability to manage independent learning. She shared that this was heightened during the spring of 2020 when they moved to online learning. Eric voiced the challenges for students to focus on both EF and learning, stating “all their energies kind of going towards staying organized ... where if we give them strategies to stay organized, they don’t kind of have to” and they can be “back on track, ready to learn.” This insight was further elaborated upon by another teacher, who stated “if they can’t read something and sift through their memories and pull out what’s relevant, what’s not [relevant], and avoid this distraction ... they’re just not going to get that deep level of learning” (Dave). By focusing on supporting EF skill development, teachers felt they were “taking away obstacles to get to the deeper things” (Kelsey). Overall, there was a strong feeling among teachers that supporting EF in the classroom was critically important to student success, and that it “is probably a bigger indicator of student success and student growth than really anything else we do in a day” (Mary).

Intentional Attention to Executive Functions

Several teachers spoke about the fact that they had often used strategies in the past to help organize students. These included providing important reminders, daily schedules, and using colour coded binders, but they did so without explicit consideration for why they used these

practices. Most teacher participants recognized a shift in their daily planning to pay deliberate and overt attention to executive functioning in their classroom. For example, Sam shared the importance of intentionally focusing on EF skills in her practice and the impact on students, stating if “you have intentionally focused on those EF skills ... their learning is, and their understanding of the learning and retention of the learning, is much higher.” Furthermore, Sam spoke about the importance of student reflection and daily learning targets specific to EF, noting that it “makes it in the forefront of the kid’s thinking. Again, just that intentionality.” Teachers reported that this intentional focus on EF skills helped students to be mindful of these skills, and their consistent use in their classrooms provided routines that appeared to benefit the students, which is further discussed in the following section.

Consistency

There was unanimous agreement among teachers that for EF skills to be effectively taught, developed, measured, and transferred, consistency was essential in school practices.

Common Language

Teacher participants reflected on the importance of a shared, common language for EF skills amongst both teachers and students. With students, “for them to have the words to describe ... helped to demystify it” (Rita). Pam shared “by using the language of EF, we’re able to provide specific strategies in each of those areas to students who need them as opposed to ‘try harder’ or ‘focus better’... that doesn’t necessarily help the student have something to act on.” In addition to this common language was the need for it to be developmentally appropriate or “kid-friendly,” so students were able to effectively communicate with each other and their teachers.

For teachers, “that consolidation feel where if I’m talking to someone, we’re talking about the same thing” (Kelsey) was seen as critical to providing fulsome support for their students. Sandy identified the importance of taking this common language and moving it one step further

into action: “everybody’s on the same page and approaching the conversation on EF in the same way, they’re using the language ... they’re integrating it into the classroom the same way.” The importance of a common language was identified by seven of the 13 teachers.

Continuity

A lack of continuity was identified by teachers as problematic when trying to help students build skills and eventually transfer their learning beyond the physical classroom. Discontinuity between grades was perceived to be a challenge as teachers saw EF skill development as a long-term commitment. Dylan voiced concern that “I would hate for them to not have the same expectations on day one of next year,” and Dave shared “if there’s not continuity from year to year, if the kids are living in that environment and it’s relearning it every year, we’re not going to get the gains we need.” Rita spoke to the potential of developing a sequence for executive functioning included as a review where teachers shared “what worked, what didn’t ... strategies that are at grade level, the reasons behind it, and what would be a stepping off point for next year.”

Sandy talked about a whole school approach to EF, citing a need to establish “what we, as a school community, want our school to look like and feel like.” Kelsey succinctly shared that for this focus on building EF skills in students to work, “everybody [needs to be] on board” and it is communicated as a priority for all students and teachers. Several teachers noted this approach needs to start with a rationale for why the school is making EF a priority.

Learning Environments

Dylan, Roger, Sandy, Rita, and Pam each spoke during their interviews about the need to pay attention to the design of the learning environment and its impact on their students. Examples were provided of both the instructional design and the physical layout of learning spaces. Rita reflected on how she shifted her mindset away from being focused on correcting the student, noting “I needed to impact the environment rather than just talking at the child repeatedly.” One

teacher spoke about rethinking their lessons to overtly identify the EF skills they were using to teach students, specifically “incorporating that into our lessons ... today you’re going to learn about how to write a detailed essay and here’s how you’re going to do it: with [this] graphic organizer” (Dave).

Several teachers spoke of the impact that lesson plan structure could have on EF skills. Some of the common teaching practices they used to help students with both content and EF skills (e.g., review of previous learning, overt attention to learning outcomes, reflection through self-assessment) were all seen to support EF skill development. Teachers felt these practices established clear, consistent expectations for student learning and were perceived to be vital for students to have predictable classroom experiences to promote executive functioning. Specific strategies used by teachers are further discussed in the section below.

Other teachers spoke about the physical set up of their classroom spaces and the positive impact it had for their students. Pam emphasized the importance of leveraging visual reminders in her classroom setting, noting “the use of visuals, in places where children will naturally encounter them, [was] something small ... and straightforward, but effective.” Roger added that his use of space in his classroom changed dramatically, clearing out excess materials to model what good organization might look like. Both Sam and Sandy spoke about considering how student seating in the classroom could support students and provide opportunity for them to see how other students were demonstrating EF skills.

The physical learning space was identified as challenging to manage when students were engaged in online learning. Participating teachers observed that some students worked in their bedrooms, while others were more centrally located in the house with other family members present in the same space. Teachers were often unable to see if students had their learning materials with them, some students chose to remain off-screen (without video) during lessons, and

teachers spoke of hearing and seeing background situations they perceived to distract their students (e.g., siblings). The relationship between online learning and EF skills is further discussed in a subsequent section of our findings.

Strategies Used

Visual Reminders and Prompts

A variety of strategies were used by teachers as they sought to support their students in developing EF skills in the classroom. Most notably, checklists and visual reminders were used by eight of the teachers to aid working memory and provide easily accessible cues for students. Items listed included learning goals, materials required, and tasks to be completed. One teacher shared that a helpful tool was a “graphic to put in their locker of everything they needed to bring” as a means for students to proactively gather their materials prior to entering the classroom. She went on to discuss how this meant less time was spent at the start of the class getting students organized. Another teacher spoke about placing a sticky note on a student desk with their stated EF goal (e.g., organization) and a visual prompt. Students would refer to this note as they completed reflections on their personal EF goals and progress. One teacher and their partner described how they tried to use checklists more frequently at the start, then gradually withdrew this support with the aim of increasing student independence. Two other teachers discussed their use of agenda to support student organization and planning. Rae discussed how she perceived checklists to have been an important strategy for her students in the remote learning environment, adding it helped students, parents, and herself to be aware of student responsibilities and what the tasks were for each day. Other teachers spoke of intentionally embedding self-assessments, checklists, and overt learning targets into their daily practice to highlight the EF skills in the content of lessons.

Goal Setting

Student-led goal setting was identified by nine different teachers as an important strategy for executive functioning skill development. As a team, the six Grade 8 teachers led students through a process beginning at the start of the year when students learned about the different EF skills, completed self-assessment surveys to identify potential areas of strength and growth, and then created their own personal EF skill goals for the year. These teachers shared that with increased agency and self-awareness, their students demonstrated personal accountability for their growth. Along with the student-led goal setting, these teachers shared that they all had frequent, regular conversations with their students, which included self-assessments and reflection on their progress towards their goals and overt discussion of what evidence might be used to support these self-assessments:

We put a greater emphasis on the student to be able to track [their goal], but also just like actually to know what it means for them to, you know, be a time manager or a task initiator or whatever it was. (Pam)

Pam went on to share that the common language enabled students to talk about their EF goals and progress. Another teacher (Rae) explained she had students complete daily goals focused on what they hoped to accomplish that day. Rae shared “it took practice from all of us to be able to figure out what kind of goals we needed to be setting and what the language needed to be, so it was a learning process.” Three other teachers spoke specifically to their perceived importance of student-led goal setting to increase agency and promote personal accountability for their EF skill growth.

Student Conferencing

Another widespread strategy used by the majority of teachers was student conferencing to promote EF skill growth and progress monitoring. The frequency and timing of these conferences varied, but many described this strategy as a means to promote student reflection and to get a

deeper understanding of how their students were perceiving their EF skill growth. According to Roger, the one-on-one conferencing was an “invaluable tool” that “absolutely makes a difference.”

Challenges to Measure Executive Functions

With this goal setting and conferencing came challenges as teachers discussed the complexities of measuring EF skill development. Most identified measurement of EF skill development as an area for professional growth. Five teachers spoke about the difficulty they had in trying to measure EF skills and student growth. In particular, while students with organizational goals often had checklists or rubrics to use, others who were working on skills tied to emotional regulation or other skills such as flexibility or stress tolerance found these difficult to measure.

Pam and her partner teacher, Eric, worked with students to co-develop self-assessment of their EF skill growth, a process they said was challenging as their students struggled to identify success criteria which could be evidence-based. Pam shared “[this] has just made me realize how hard it is to do good assessment ... particularly when it comes to EF.” Roger noted that the switch to online learning provided additional challenges with measuring EF growth of his students, which is further addressed in the next section.

Executive Functioning in Online Environments

While our work with teachers was designed to take place in a face-to-face environment, the unanticipated move to online teaching and learning provided an opportunity to explore teacher experiences and perceptions of student executive functioning skill development in online environments.

There was consensus that executive functioning impacted students in online learning environments. Many of our teacher participants spoke of challenges students experienced when their environment was shifted without warning. While they acknowledged the difficulties associated with a lack of proximity to support their students, many commented on their

perceptions of additional impacts this change had on their students. Specifically, organization, task initiation, and sustained attention were noted to be particularly problematic in online schooling. Pete spoke about the changes to the dynamics of online learning, saying “I can hear mom yelling and other kids screaming in the background ... there’s a lot going on there for working from home ... and you’re invited into that different environment.”

Many teachers described the difficulty of monitoring and assessing EF goals in an online environment. EF skill goals that continued into the online environment were primarily focused on organization and student use of planners (e.g., agenda) to support this skill. The teachers who noted a continuation of these goals provided examples of students uploading pictures of their agendas, taking screenshots of to-do lists, and submitting weekly written reflections of their organization skills.

Further to this, an awareness of the need to support students to organize their class and learning materials in a digital platform became more apparent. Sandy observed a need for students to build skills around online environments, citing challenges when “trying to get everything done digitally and have then organize in a digital portfolio and navigating different platforms.” She described the beginning of the online learning experience to have taken weeks to get the kids organized digitally. Dave noted the need to think about how to help students within this new learning environment, sharing “we should really be focusing specifically on how to do this [organize students online] ... we need to refocus on it specifically — what we can do to support them remotely.” Eric described the shift in routines as a challenge for everyone, moving from one set of expectations to a new environment where he was spending his time in remote learning “chasing kids down” for work.

Positive Responses to Online Learning

While most teachers discussed the challenges specific to EF skills they saw in remote environments, there were several examples provided of students who demonstrated growth since shifting to online learning. Sharon spoke at length about specific examples of students who showed noticeable growth when moved to online learning in the spring of 2020. She shared her observation of one student demonstrating growth in response inhibition. Sharon expressed that this student, who had difficulty waiting his turn to speak, demonstrated increased self-monitoring (described by Sharon as patience) in online exchanges that she had not seen before. Sharon described that during “online learning, [another student] has excelled.” She attributed much of this observed growth to the student’s perception of being constrained when working in a physical classroom and feeling overwhelmed by the presence of all her classmates. An additional student redesigned her personal schedule, no longer feeling limited to school hours for her work. Sharon shared that although she recognized the complexities of having students engaging in learning during non-school hours, some appeared to benefit from greater autonomy over their own work. These examples of response inhibition and goal-directed persistence demonstrated by the students was shared to be a highlight that Sharon had not expected, and an example of the complexities that EF skill development presented to all teacher participants in online learning.

Discussion

Four themes were identified: (a) the necessity of EF for student learning; (b) intentional embedding of EF skills and skill development into daily practice and the learning environment; (c) the importance of consistency; and (4) the perceptions of skills in online learning.

Relationship of Executive Functioning Skills and Learning

Initial perceptions of participants saw EF as a set of discrete, instrumental skills which could be taught, practiced, and repeated. By shifting their thinking to designing learning to support

EF skill development, the teachers' perception changed to recognize EF as a much more complex and interconnected phenomenon. Also, building EF skills was viewed by teachers as a means to reduce the cognitive load of students and teach them skills (e.g., organization, task initiation, time management) to be more independent and more productive. To support student learning, therefore, EF skill development should be considered and prioritized to make learning available and accessible for all students.

Teacher Intentionality

The majority of teacher participants shared that this collaborative inquiry work helped them to understand the need for an intentional focus on EF in their daily practice. Many participants highlighted a shift in their thinking that moved them from seeing EF as isolated skills they targeted one at a time (e.g., organization) to embedding modelling and scaffolding the skills into their routines, lessons, and classroom discussions. In this way, teachers believed that students could experience how EF skills could be integrated into their routines and lives in a concrete and practical manner. This promoted envisioning what effective EF skill use might “look like” in practice. Some teachers noted this represented a shift in their own thinking and practice, sharing that it took time to become familiar with this approach as an important consideration for instructional planning.

While intentionally teaching these skills to students was consistent with elements of their previous practice, for many teachers who had little or no experience with designing the learning environment and modelling EF skills consistently and overtly, this was a real/welcome shift. Participants noted that a focus on redesigning the learning environment moved them away from a previous approach of “talking at them [their students]” about EF. Additionally, an awareness of how to design an environment to model these skills included considerations for how to make this learning explicit.

Teachers agreed that overtly teaching, modelling, and sharing the terminology associated with executive functioning were critical first steps in helping students become self-aware. Teacher participants found that by engaging them to learn about EF, students took ownership and increased personal investment in their growth. Strategies to engage students included conferencing, regular reflections, and the co-development of both their personal EF goals and the success criteria by which they measured their growth.

To support the learning and the transference of strategic approaches, participants felt that both the physical environment and the instructional design of lessons needed to have EF skill development embedded; they also considered that this would help students understand how EF manifests for them personally in their academic and non-academic lives.

The Need for Consistency

Teacher participants identified that for EF skill development to be successful, it needs to be consistently and coherently addressed throughout multiple learning contexts. A continuity of EF skill development between classroom grades, and environments was important to promote year to year growth and provide continuity with successful approaches. Teacher participants agreed that consistent application of common knowledge, language, and understanding of EF for students and teachers was critical for success.

Executive Functioning and Online Learning Environments

Teacher participants in this action research study identified increased challenges with the shift to online learning in the spring of 2020. They highlighted difficulty in modelling practice and addressing key skills while online. They shared that when students had poorly developed EF skills, these had significant impact on the quality and effectiveness of online learning; they also highlighted the importance of deliberately teaching these skills to their students in all learning contexts. The challenges of interacting with their students in an online space meant that many of

the routines they had been accustomed to in their classroom environments had to be reconsidered and redesigned, and in some cases, they were not transferable to the online environment.

Accordingly, teachers noted the importance of overt modelling, reflection, and structuring routines to encourage EF skill development during opportunities for synchronous learning they had with their students.

While explicitly teaching EF skills in any environment is an approach many educators may not have previously considered, this research highlights a need to intentionally integrate these “learning to learn” skills in all teaching contexts, in either in-person, blended, and online learning environments.

Summary and Recommendations

Our research identified and synthesized several participant perceptions. Participants noted that for the development of executive functions to be successful, teachers require a consistent and coherent approach across all learning contexts, including opportunities for students to build awareness, agency, and personal commitment to EF skill development. Consistent language was a necessity for students and teachers to adopt the strategies introduced and apply them both within and beyond any academic environment. Additionally, these strategies and practices needed to be intentionally embedded into the daily routines of both teachers and students for transfer to take place, and for students to better understand how executive functions support their success in all aspects of life.

We contend that ensuring a pedagogical approach inclusive of EF supports for students is desirable for all learning environments and modalities to promote students to be successful, self-aware, and productive learners. Additionally, we assert that it is of the utmost importance for teachers to intentionally consider executive functioning skills when designing learning in all environments. In particular, by purposefully embedding EF skills in online learning, and designing

the online environment to support the growth of EF skills, these strategies can help to support student learning across broader contexts.

Research has shown that well-developed EF skills in children can prevent other difficulties and struggles, such as poor academic achievement, poor social skills, low employability, and potential justice system involvement (Jacobson et al., 2011). We suggest that EF skills can be directly taught in diverse learning settings. In this way, teachers' effort to directly support EF development has the potential to limit negative outcomes for children before they emerge. We propose that greater leadership attention to the development of professional learning opportunities for current teachers in their EF skills practice is needed. To better understand the integrated nature of EF skills and learning, we additionally recommend that the embedding of explicit strategies for teaching and supporting EF skills in teacher preparation programs coincide with professional learning for in-service teachers and educational leaders.

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Appendix

Semi-Structured Interview Question

Q1	Can you tell me a little about why you joined the EF group this year?
A2	Can you tell me a little about your experience with EF? -How might this have differed from your approach previously?
A3	Can you tell me about your perspective of EF and how it might connect to learning?
A4	How has your understanding of EF evolved?
B5	Can you tell me about how EF presents in the students you work with? -Tell me about what has worked this year in your approach to EF with students. -Tell me about what did not work.
B6	What have been your experiences about successes and challenges approaching EF more broadly?
B7	From your experience this year, how would you approach EF next year?
C8	If asked, how might you describe this professional learning approach to EF to a colleague?
C9	Can you tell me about your perspective with regards to the process of collaborative inquiry?
C10	Our inquiry question was, “How might we model strong executive functioning practices and design the learning environment to positively impact executive functioning?” - How has your understanding of how to design an environment to support EF skills evolved this year? -What was the impact of that approach on your students?
D11	Can you tell me about your perspective about having one primary PL focus?
D12	Can you tell me about your perspective about learning as a cohort?
D13	In a perfect world, what might the next steps look like for EF at your school?
Q14	What else would you like to share?

Chapter 8

Supporting Teachers' Understanding of Innovative Maker Pedagogies During a Pandemic Through the Design of Ethical and Relational Online Professional Learning

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Abstract

This qualitative research explores the challenges involved in designing online professional learning (OPL) for teachers with a focus on innovative pedagogies, specifically maker-centred practices. This OPL was designed in response to teachers' expressed need for support to the government mandated pivot to emergency remote teaching (ERT) during the 2020 pandemic. The research question addressed is: What are the many ways in which we create the conditions for meaningful, authentic, and respectful professional learning focused on innovative practices, such as making, in an online environment? In this study, the conceptual model considers human-centred design and Nodding's (2013) relational practice in the context of the Ontario College of Teachers' (OCT) four-part conception of professional ethics. Implications include that designers: (a) can enhance teacher learning by highlighting the connection between empathy, perspective-taking, and techno-pedagogical competence with making; (b) should focus the sessions on common tools, as well as transferable activities and curriculum, to support early success; and (c) design with teachers, which requires the intentional design of conditions for teacher learning, targeted supports and scaffolds for learning, awareness of resources needed, and provision of appropriate instructional guidance and expertise.

Résumé

Cette recherche fondée sur l'approche qualitative explore les défis liés à la conception d'une formation professionnelle en ligne (FPEL) pour les enseignants et les enseignantes dans le domaine du bricolage numérique et physique. Conçue pour répondre aux besoins exprimés par le personnel enseignant dans le cadre du virage obligatoire vers l'enseignement à distance au cours de la pandémie globale de 2020, notre recherche aborde la question suivante : comment peut-on créer une formation professionnelle à distance d'envergure, authentique et respectueuse afin d'aider le personnel enseignant à développer les approches pédagogiques novatrices telles que les pédagogies Bricoleur? Encadré par les normes de la déontologie pour la profession enseignante

déterminées par l'Ordre des enseignantes et des enseignants de l'Ontario, nos analyses reposent sur des principes de conception centrés sur l'humain, et sur la notion de pratique relationnelle de Noddings (2013). Nos analyses permettent d'observer que : (a) lorsque les concepteurs le rendent explicite, le lien entre l'empathie, la prise de perspective et la compétence techno-pédagogique peut appuyer l'apprentissage; (b) les concepteurs devraient miser sur les outils utilisés par tous les participants et participantes, de même que sur des activités flexibles qui s'appliquent à tous les milieux scolaires pour favoriser des succès rapides; et (c) la co-conception d'une formation professionnelle en ligne avec le personnel enseignant nécessite la mise en place intentionnelle de conditions propices à l'apprentissage, y compris le soutien ciblé, l'échafaudage des pratiques techno-pédagogiques, l'attention aux ressources nécessaires et l'accès aux conseils et à l'expertise pédagogiques adéquats.

Supporting Teachers' Understanding of Innovative Maker Pedagogies During a Pandemic Through the Design of Ethical and Relational Online Professional Learning

Designing for responsive, respectful, and caring online professional learning opportunities can be challenging. Exploring the use of hands-on physical and digital technologies in online settings adds a layer of complexity. These challenges have been exacerbated with the shift to emergency remote teaching in a global pandemic.

In this chapter, we examine and reflect on the case of an online professional learning (OPL) program for K-12 teachers that focused on the concept of making and the use of digital tools for teaching computational thinking and was designed and iterated by two of the authors during the initial stages of the pandemic in the spring of 2020. Utilizing the Ontario College of Teachers' (OCT) four standards of ethical practice, (i.e., care, respect, integrity, and trust) and the central tenets from the research on human-centred design (HCD), this study uses a retrospective approach to investigate the explicit and tacit assumptions, as well as the gaps and oversights, that limited and may have run counter to the overall goals of the online professional learning program during the first iteration.

We explore the following research question: what are the ways in which instructors can create the conditions for meaningful, authentic, and respectful professional relationships and engagements for learning about makerspaces and making when we connect, collaborate, and communicate online? We present a review of literature on makerspaces and making, human centred design, and Noddings' notion of the ethic of care to provide a context for this research.

The Concepts of Makerspaces and Making as Opportunities for Rich Learning

Makerspaces are “physical locations where youth use tangible materials to create personally meaningful projects alongside others” (Keune & Peppler, 2019, p. 281). Scholars suggest that in the creation of physical and digital artifacts, learners develop understandings

related to design, engineering, coding, and computation (Halverson & Peppler, 2018) while developing key competencies such as creativity, problem solving, innovative thinking, collaboration, and risk taking (Becker & Lock, 2021). Although learning in makerspaces is meant to be hands-on and interest driven (DiGiacomo et al., 2020), this approach was challenging during the pandemic. Educators had to consider how to address learner needs when significant features, like the physical dimensions of a learning environment and opportunities to work alongside others with varying levels of expertise, were no longer present. The pivot to online learning also created dilemmas related to equity, access, and student engagement. In addition, teaching and learning about aspects of making processes in an online setting presented challenges affiliated with the materiality and physicality of making (Kinnula et al., 2021; Lock et al., 2020).

Human-Centredness as Fundamental to Design

Although the meanings of design thinking and human-centred design (HCD) are often misconstrued (Baker & Moukhliiss, 2020), we concur with Buchanan (2001) who contends that HCD is fundamentally an affirmation of human dignity. HCD is defined as a process “to gain and apply knowledge about human beings and their interaction with the environment, to design products or services that meet their needs and aspirations” (van der Bijl-Brouwer & Dorst, 2017, p. 2). These needs and aspirations are attained through the pursuit of design that can bolster the human ability to interlace dignity throughout various aspects of their lives (Buchanan, 2001). An important aspect of HCD is listening to stakeholders, including empathy as a key component throughout the design process (Giacomin, 2014; Hess & Fila, 2016). For designers, empathy is achieved in multiple ways, including through observation, dialogue, and imagining oneself in the user’s position (Fila & Hess, 2015; Hess & Fila, 2016). It is through empathy that designing for dignity happens. For example, when designing neighbourhoods consideration must be given to

safety, accessibility, and inclusion as this process involves situating designers in the places of those for whom they are designing (Becker, 2021).

The OCT Ethical Standards for Teaching as “a Vision for Professional Practice”

At the heart of the OCT Ethical Standards for Teaching (2022) is “a commitment to students and their learning” (Ontario College of Teachers, p. 1) in the form of four standards: care, integrity, respect, and trust. The standards are explained in greater detail in the following sections.

Care

The OCT’s ethical standard of *Care* includes “compassion, acceptance, interest and insight for developing students’ potential. Members express their commitment to students’ well-being and learning through positive influence, professional judgement and empathy in practice” (Ontario College of Teachers, 2022, p. 1). Notably, this definition centres the teacher’s role and duty of care but makes no reference to the importance of reciprocity or relationality. Noddings (2013) writes that “the essential elements of caring are located in the relation between the one-caring and the cared-for” (p. 9). A teacher’s actions may signal an intention to facilitate care, but if the teacher seeks to design learning environments where care is experienced, then the teacher must also invite the students (the cared-for) to enter this relation on their terms. When students enter relationships on their own terms, there is a greater potential to align with their needs. Furthermore, opening space for reciprocity can disrupt a teacher’s privileged position of power in determining what care looks like; it transforms care from an object-centred activity to a human-centred one (Krippendorff, 2004). This indicates respect (another standard) for the student’s right to opt-in or opt-out. On the part of the one caring, a reciprocal, human-centred approach requires dutiful attention to the experiences and needs of every student, including those most vulnerable. This requires the teacher to identify, reflect on, and recalibrate the place of dominant ways of being by putting oneself in the place of the learner.

Integrity

Notions of care are also implicit in the OCT's standard of *integrity*, which is defined as “honesty, reliability, and moral action” achieved by “continual reflection.” This framing suggests attention to core values and standards as determined by outsiders (Penuel et al., 2014; Santoro, 2017). It begs the question as to how do designers, who come with particular cultural backgrounds, consider their personal and professional integrity as well as the integrity of teaching for the diversity of learners they encounter (Santoro, 2013)? Integrity in “human-centred design views the holistic inclusion of human beings as central to the design process” (Becker, 2021). Buchanan (2001) states that in fore-fronting design as human-centred, we consider an *integration* of “how humans act out their lives in various social, economic, political, and cultural circumstances” (p. 37) with an overall focus on human dignity. This means that when designing with care, one considers the social, economic, political, and cultural *teaching* circumstances of the participants.

Respect

Care and integrity are also interwoven with respect. For the OCT,

Intrinsic to the ethical standard of *Respect* are trust and fair-mindedness. Members honour human dignity, emotional wellness and cognitive development. In their professional practice, they model respect for spiritual and cultural values, social justice, confidentiality, freedom, democracy and the environment. (Ontario College of Teachers, 2022, p. 1)

Again, the focus is on the teacher as a model. In terms of action, however, the OCT does not clarify what respect might look like in practice or how respect for human dignity, emotional wellness, and cognitive development might become intrinsic in educators' design decisions. Noddings (2012) suggests that receptive listening is a fundamental strategy. Using principles of human-centred design (Buchanan, 2001), we also see that reciprocity and criticality are the processes through which respect might be co-constructed in an online learning environment.

Trust

Trust, also interwoven with the other standards, includes “fairness, openness, and honesty” according to the Ontario Standards document (2022), with a stated expectation that teachers’ professional relationships are based in trust. Trust, however, is not a one-sided association. Building trust in online environments necessitates the need for a reciprocal, caring relationship between and among learners and the teacher (Paliszkiewicz & Skarżyńska, 2021; Wang, 2014). The derivation of the word trust springs from the Old Norse word *traustr*, meaning confident and strong (Onions et al., 1966). In trusting and caring relationships, mutual strength and flourishing are a goal. Buchanan (2001) suggests that design should “support and strengthen the dignity of human beings” (p. 37). Indeed, Krippendorf (2004) submits that the goal of HCD is to inspire all stakeholders to achieve their best. Therefore, we propose that trust, established through “fairness, openness, and honesty,” is about designing learning environments that ensure that all learners thrive.

A Conceptual Model for Analysis

Using the Ontario College of Teachers’ (OCT) four-part conception of Ethical Standards of the Teaching Profession (2022), the researchers developed a conceptual model to inform analysis of the design of maker-centred OPL for Ontario teachers during COVID-19. In Figure 1 we present the model situated in the overarching context of the pandemic. The model is structured around the course design in relation to the four OCT Ethical Standards of the Teaching Profession (care, integrity, trust, and respect) and informed by the construct of HCD (Buchanan, 2002) and Nodding’s (2013) notion of education as relational practice. The model is an invitation to consider the question Nodding poses:

We may start with schools as they are, identify their primary functions, and ask how they may best be organized to serve their functions. Or we may start with our picture of caring

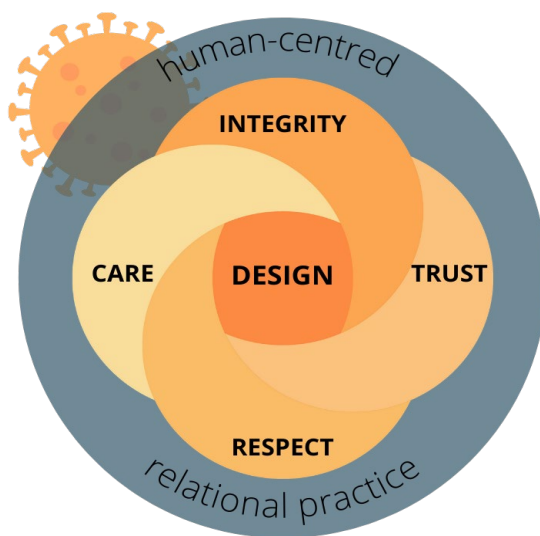
and education and ask what sort of organization might be compatible with this picture.

(p.180)

The combination of education as relational practice and HCD have enabled us to consider the essential elements of each standard component in a particular way to inform the analysis of our design.

Figure 1

Conceptual Model of Ethical, Human-Centred Relational Practice of Design During a Pandemic



Next, we outline in more detail the research and course design, followed by the findings.

Methodology and Research Design

This qualitative research draws on the secondary use of data from the research conducted during the early months of the pandemic (March to June 2020). We provide an overview of the original study (Morrison et al., 2021) and describe how these data were used to explore the ways the program aligned with the OCT standards of ethical practice and principles of care, respect, integrity, and trust in teaching as well as how the program aligned with HCD principles.

In the original Participatory Action Research (PAR) study, a team of four researchers used the “spiral of self-reflective cycles” of planning, acting, observing, and reflecting (Kemmis &

McTaggart, 2007, p. 276) to design and implement during the pandemic online maker-focused professional learning sessions for teachers. These researchers are experts in making processes and experts in online learning, but acknowledged they were emerging practitioners of this integrated form of OPL for making processes. The team turned to theory and research to guide the development of sessions and the choices made as they reflected and as the sessions progressed; however, they were equally reliant on participant feedback to determine the focus of the sessions. The primary objective was to support teachers adjusting to emergency remote teaching (ERT) in terms of technical knowledge (i.e., tips on digital tools to use for specific purposes) and to lessen their burden as time went on by co-hosting class sessions with them and their students to model promising online pedagogical practices. In the first weeks of mandated ERT, teachers in some school districts were being encouraged to upload videos of themselves delivering content asynchronously rather than use synchronous video conferencing platforms. The researchers worried that a shift away from socio-constructivist learning would lead to student disengagement and a disconnect from others that would negatively impact their mental wellness. In a meeting with teachers in one of her networks two weeks into remote learning, Hughes witnessed a Grade 2 teacher crying because she had been unable to connect with and support three of her students online, despite having reached out to their parents via email and phone. Her despair was heart-breaking. Hughes quickly mobilized the team.

The Sessions: An Overview

The researchers designed and facilitated OPL sessions for teachers with regards to online pedagogy, maker pedagogies, and STEAM (Science, Technology, Engineering, Arts and Math). Sessions included hands-on, learner-centred, inquiry-based, and subject-integrated activities (Hughes, 2017). Importantly, after each session the researchers engaged as a team in video-recorded debriefs to unpack their experiences — what worked well in each session and what could

be improved upon. Here, they engaged in cycles of planning, facilitation, reflection, revision, and preparation, which is particularly helpful in the development of theoretically grounded professional learning. The sessions took place from 25 March to 24 June 2020 (Figure 2 provides an overview of the sessions). Early sessions focused on online teaching tips and strategies to help teachers quickly pivot to ERT. Later, sessions transitioned to more in-depth online programs and topics as the teachers' needs shifted to a focus on using digital tools to support curricular goals.

The first set of sessions were developed in response to (a) informal conversations the research team had with teacher-friends and colleagues (e.g., skills- and technology-based concerns, student engagement and achievement concerns, etc.); and (b) teacher's social media posts and communications from the provincial government via news channels regarding their plans for ERT.

During registration, teachers were asked, "What do you hope to get out of this session?" so the team could tailor sessions to each unique group of attendees. Exit forms used at the conclusion of sessions gathered feedback on what worked well, what could be improved, and what kinds of future sessions teachers wanted. The goal was to make these OPL sessions as responsive to the teachers' needs as possible.

In May 2020, the researchers shared an informal survey with teachers regarding their online challenges, successes, and concerns; types of online support they have received; and their perceptions of student engagement in online environments. The goal was to develop a robust picture of the teachers' experiences to inform the design of future sessions. May 2020 also marked the lab's pivot away from emergency tech-focused OPL and toward individualized and embedded OPL that was human-centred and relational by design. At this stage, the team engaged individual teachers to co-plan and co-facilitate maker/STEAM classroom sessions related to their curricular goals.

Figure 2

Timeline of Sessions and Information Gathering for Planning Purposes

THE SESSIONS

MARCH, 2020

- **20th** - Online Teaching Tips & Strategies
- **23rd** - Online Teaching Tips & Strategies
- **25th** - Online Maker Modules [central feature: **block coding**]
- **31st** - Gr. 7-12 e-Learning Teaching Tips & Strategies

APRIL, 2020

- **2nd** - **Block Coding** with Scratch
- **7th** - Gr. K-6 e-Learning Teaching Tips & Strategies
- **9th** - Intro to **MakeCode Block Coding**
- **14th** - Google Classroom & Multimodal Tools
- **16th** - Math & TinkerCad
- **28th** - Maker Modules

MAY, 2020

- **4th** - STEM Webinar
- **12th** - Maker Modules

*Most of May was devoted to working with teachers co-developing & co-facilitating online sessions for their students. Sessions focused on math and **block coding**, primarily.

JUNE, 2020

- **10th** - Math & **Block Coding**
- **16th** - Math & Bloxels
- **17th** - Math & **Block Coding**
- **24th** - Interactive Whiteboards & Presentations

THE INFORMATION GATHERING

MARCH + APRIL 2020

- Informal conversations with teacher-friends
- Posts by teachers on social media
- Watching/listening to news updates from the Ontario government
- Question on session registration form: "What do you hope to get out of this session?"
- Debrief feedback form:
 - What worked well in the session?
 - What are some improvements that could be made?
 - What future sessions might you be interested in attending?

MAY, 2020

- See above
- Online Teaching & Learning Survey

How Sessions Were Determined and Planned

Data Collection and Analysis

The research team met after each synchronous virtual professional learning session to reflect. Verbal reflections were collected via Google Meet and stored in a password-protected university Google Drive account (i.e., a cloud-based storage account); they were later transcribed and housed in the same account. Informal pre-and post-session feedback forms (completed by session attendees) were also included in the data analysis as was the informal online teaching and learning survey shared on social media in May 2020.

For the purposes of the present analysis, two members of the original research team (Morrison and Hughes) collaborated with three colleagues who were interested in investigating the ways the program aligned with the OCT standards of ethical practice and principles of care, respect, integrity, and trust and the principles of HCD. Data were analyzed through several rounds of coding using a combination of first-level, a priori codes, and second-level emergent codes (Miles et al., 2020). The four first-level codes were derived from the OCT ethics framework and included trust, respect, integrity, and care.

As the OCT definitions were mapped onto concepts from HCD (Buchanan, 2001) and relational practice (Noddings, 2012; 2013) for the purposes of this study, it was necessary to create condensed versions of these definitions for easy reference in the coding process. Keywords found in condensed definitions helped the five researchers home in on the subtle differences between terms. The second-level emergent codes included terms like learner considerations, virtual PL challenges, and virtual PL planning. These were used to further define and add nuance to the four primary a priori codes. Initial coding was conducted by Morrison and followed by several rounds of discussion and analysis with the research team to determine trustworthiness.

Findings

Observed in the actions of the original researchers were design decisions that reflected the intersection of the OCT Standards of Care and key elements from HCD and relational practice (Buchanan, 2001; Noddings, 2013). Within the context of each decision, the present research team identified how the design practices were shifted in the OPL sessions according to participant needs, thus highlighting the iterative nature of the design process (Scheer et al., 2016). Findings are presented in three parts. Part one provides examples of the major design decisions undertaken by the original team of researchers. In part two we unpack how the OCT Standards of Care were embedded in design decisions. In part three, we explore the major challenges encountered in the design and the enactment of the workshops.

Part 1: Design Decisions

Decision 1: Support Teachers in Learning to Work/Learn/Make Online. Our first design decision was to immediately provide support to teachers to help them in their sudden (and disorienting) shift to fully online teaching and learning. In response to the Ontario Premier's initial announcement regarding the plan for ERT after March 2020, Hughes suggested to the team in a recorded debrief:

What do you think about doing a session next week on teaching online? . . . So, teachers are going to be panicked about how to teach online. So, maybe something to give them tips. Tips and tricks for teaching your students online K-8 or K-12.

Teachers' expressed needs included: the basics of how to get online, how to set up a virtual classroom, and how to use digital tools in their teaching. As a result, the early phase OPL design centred on logistics, as teachers shared with the team the lack of support received from schools and boards.

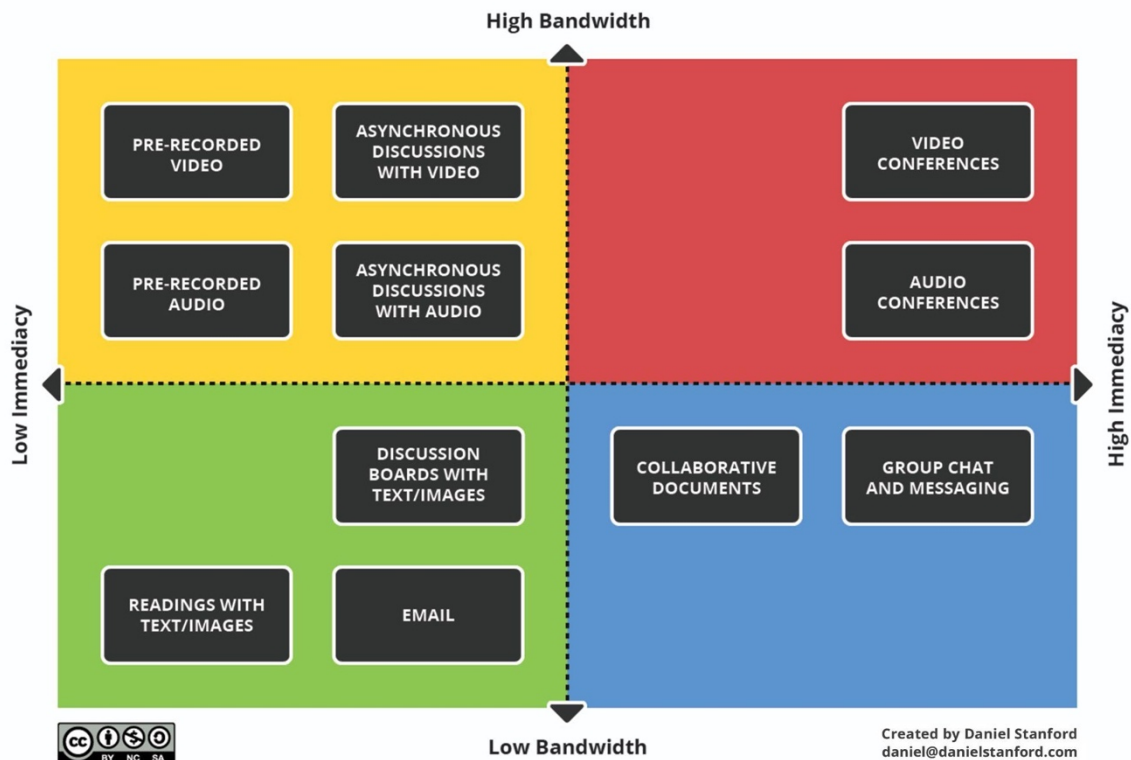
Early OPL sessions focused primarily on responding to teachers' requests for assistance in making the transition online (March/April). Once teachers developed some comfort teaching online, in later sessions (May/June) the team responded to requests from teachers for more nuanced pedagogical help. Many of these later sessions materialized as embedded classroom-based OPL, where the team co-planned and co-facilitated online lessons with teachers and their students.

Decision 2: Design for Equity and Access. The team designed the OPL with equity and access in mind. For example, in terms of technology, the research team made it a priority to stay up-to-date on approved school technology tools and they offered sessions based on these tools, so that the learning was relevant and immediately applicable in teachers' contexts. This OPL project focussed on tools that were free, easy to use, flexible, and adaptable in relation to learners' needs. Resnick and colleagues (2009) described this approach metaphorically as designing activities that have low floors (easy entry points), high ceilings (many levels of complexity to accommodate experience levels and growth), and wide walls (multiple entry points for different learners and their interests). It was important that the tools be applicable to different grades, experience, interest, and ability levels.

In planning sessions, Hughes suggested both teachers and students would have a range of internet connectivity and access to technological devices. Therefore, teachers would need a range of remote teaching and learning ideas to choose from. Figure 3 was shared with teachers to get them thinking about the various teaching tools and methods they could take up, depending on their own and their students' devices and internet connectivity.

Figure 3

Daniel Stanford's Bandwidth/Immediacy Matrix



Note. Used with permission.

The team's intention was to demonstrate what could work for teachers' ERT, while keeping varying bandwidth issues in mind. Equipped with this knowledge, teachers could make informed choices at the intersection of technological devices, internet connectivity, and learning activities to help students continue to thrive and achieve in their learning.

Another example of designing for access was a particularly effective online coding activity that had a low-floor (i.e., easy entry point) for those new to coding in Scratch, and a high-ceiling, for those with more experience. In a recorded debrief on 2 April 2020, one of the researchers shared:

[Blake] created code and we had to then access the code, “look inside,” from our own accounts and then hack it to fix it. ... It was an interesting way of everybody being able to do the challenge, to instantly have access to the code and for it to be a “oh, look, this didn’t work, let’s problem solve.” And then you see the outcome with the animation. And then ... when somebody figured out one solution, they shared it. And then [Adam] not only fixed the code, because he’s got more skill, [he] created something even above and beyond that and showed us how he did it, so it kind of snowballed.

This activity was inclusive because those participants less familiar with coding could manipulate existing code as an entry point. Everyone was given access to the same faulty code and everyone had the challenge of attempting to debug it. Participants could work together, or alone, and there was no limit to what could have been added to the code. Adaptability was reflected in the work from the participant with more Scratch experience who not only debugged the code, but also added to the code to create something new.

The two examples demonstrate how equity and access were considered in both the technology tools and activities that the team chose to include in the OPL. The team considered the teachers’ access to technology and their varying skills levels, while simultaneously considering the same for their students.

Decision 3: Design for Learning Transfer. The OPL learning experiences were designed to optimize transfer; both the transfer of knowledge and skills across different digital platforms and the transfer (or use) of these digital tools in different curriculum subjects (from math to art to English).

In terms of knowledge and skills transfer, the sessions primarily included the use of block coding (see Figure 2), which meant that teachers could build on their expertise in this area from one interface to another. This decision was critical in building teacher confidence and supporting

experiences that would demonstrate the transferability of knowledge across digital platforms. Part of the focus required teachers to “play” with the technologies to make those connections. One of the graduate students helping to facilitate these sessions stated in a recorded debrief on 7 April 2020:

And for these people who maybe haven’t used it [MakeCode block coding program] before, sometimes just playing and messing with stuff is what’s needed. Like I just learned functions, for instance. I’ve done functions in other coding platforms but I’ve never done it in here. So sometimes I think free playtime is good for sure.

The notion of transferability was not limited to technology. In the same recorded debrief as above, Morrison reflected that some of the attendees might have required a different content entry point for engagement and might have needed to see demonstrated how the different tools could be applied to different disciplines such as English Language Arts. She explained:

to offer another entry point, I said “if you don’t want to go the route of making the math-art connection and trying to have that as the entry point” I said “you can also go from a storytelling/humour perspective ... speaking from experience, figuring out patterns and math, and [creating] art that comes from math is not my bag.” The only thing that motivates me ... to engage is something that’s humorous or in some sort of story form. So I showed them that [story] example and I think that gave them another idea for an entry point.

In designing multiple entry points, the researchers modelled options for block-coding integration in the teaching and learning process.

Designing for transfer meant that teachers could envision various ways in which the block-coding programs could be integrated across disciplines, and in the process, it also meant that

teachers could see how the skills required for one block-coding program transferred to many others.

Part Two: The OCT Standards of Care as Embedded in the Design Practice

All four aspects of the OCT standards (integrity, respect, trust, and care) as mapped onto HCD were found to be evident in the design, iteration, and implementation of the OLP activities analyzed in this study. Although the standards were selected a priori as a theoretical tool for analysis, and therefore applied separately in our analyses, we found the codes difficult to tease apart in the data as they were interrelated and co-dependent. For example, responsiveness to learners' needs featured predominantly in all four codes, and reciprocity was a central feature in the trust and care codes. We contend that interrelationships among codes speaks to the human-centred, interwoven nature of design in general (Becker, 2021; Hess & Fila, 2016); they also reveal the intersection between HCD and the OCT standards, the goal of the standards being “to uphold the honour and dignity of the teaching profession” (Ontario College of Teachers, 2022). Although the practice of design for education is indeed relational, and always multifaceted, we unpack the standards one by one to articulate specific instances of each standard that were manifested clearly.

Integrity. The keywords and ideas we focused on in regard to “integrity” included human dignity and responsiveness to learners' holistic needs. Integrity was the most common element present in all three design decisions. There were numerous instances where the team demonstrated a responsiveness to learners' holistic needs and we noted this particularly in the session debriefs, where team members practised perspective-taking. Perspective-taking was practised to conceptualize how we might respond to learner needs in future sessions — especially those “people who maybe haven't used” the technology before. The iterations of design decisions

intentionally addressed the teachers' affective, pedagogical, and technological needs when considering how they might learn and teach in an online environment.

Respect. The keywords and ideas we focused on for “respect” included reduction of barriers for learners. Respect encompassed keeping learners' diverse needs in mind and reducing barriers to encourage engagement. Participants were provided with multiple entry points into materials and tools with the team mindful of various infrastructure challenges that many teachers and their students could be facing. The goal was to respect the diversity of teachers' interests, backgrounds, technology access, and learning motivations in the classroom.

Trust. For the purposes of coding, “trust” keywords and ideas included reciprocity, caring relationships, flourishing, and thriving. The team created an online learning environment where learners could thrive, which required flexible planning and facilitation. One of the team members offered this advice during a planning session on 2 April 2020:

if you do a more high-level “what is coding, how does it apply to the classroom” kind of thing, then I transition into “this is micro:bit,” lead them through some intro activities, and then if the group is diverse enough, we break it up so that those [who] want more in-depth coding experiences or just-in-time facilitation, they go with you, and everybody else stays with ... me.

The team was committed to responding to participants' needs in two ways: (a) through surveys, in advance of sessions, asking teachers to identify areas where they needed support; and (b) through responsiveness, during sessions, to ensure teachers had support for individualized learning.

Care. The keywords and ideas we focused on included empathy in practice, reciprocity, and responding to learners' needs as determined and indicated by them. A particular focus in applying the “care” code was capturing the ways the team made space for learners to express how they needed to be supported.

Care was reflected in the data through the ways the teachers were engaged in the PL *they* needed for *their* ERT. In the 25 March 2020 debrief session, Hughes asked the team if they could “do some digging and see how it’s [ERT’s] playing out. Maybe we could ask teachers ‘what have you heard?’ Like on our Facebook page or whatever. ‘What have you heard about the platform you’ll be using?’” The goal was to determine which LMS platforms the teachers in different boards would be using to organize their classes (e.g., Google classroom), so the team could assist the teachers in becoming more familiar with these platforms.

The team polled teachers during OPL sessions to ask “what sort of software they have access to ... [so] we can cater future sessions to that,” and they also reached out to teacher friends to ask “what information has been sent.”

The team was also responsive to teacher feedback. In one of the first OPL sessions on March 25, participants were asked to provide the team with insight into the types of future sessions they would find meaningful. One response included focusing on one technology and doing a deep dive, and the team applied the feedback into their subsequent designs. For example, different participants suggested a focus on micro:bit, Scratch, and CoSpaces. As a result, the team offered sessions on these tools, allowing participants to understand better how to use them.

All four aspects of the OCT standards (integrity, respect, trust, and care) as mapped onto HCD were evident in the OPL. In our analysis, we found evidence that aspects of each standard overlapped, which made for a truly interdependent and holistic framework.

Part Three: Challenges in Enacting Design Decisions

In the design and implementation of the OPL, the team encountered a few challenges. For example, although the team invited feedback from teachers on their needs, there was limited engagement. A survey shared on social media only elicited two responses. It is possible that teachers were simply overwhelmed by the demands brought on by the pandemic and, more

specifically, by the immediate demands of ERT. While the team prioritized listening to teachers' needs — respecting this reciprocal balance in what it means to care — it appeared as though the teachers did not have the time to add another “to-do” item to their list. It is also possible that some teachers did not know how to articulate what they needed or wanted — especially early on in the transition.

Another challenge the team encountered in the sessions was the range of general technological skill-level and prior experience with certain tools, which made group learning in the online environment and responding to learners' individualized needs (found in integrity, trust, care, and respect) particularly challenging. In one debrief, one team member articulated how the range of ability levels and experiences challenged the environment of trust. In this case, the online learning environment did not necessarily set the stage for the learners to flourish and succeed. In a recorded debrief on 25 March 2020, one of the researchers explained:

That's hard not being able to have those side bars [conversations] because as [Crissy] and I are sitting here talking, I'm feeling bad for this poor other woman in case it's distracting to her or what have you. So, it was challenging having that spread of expertise and not being able to segment them off somehow into other rooms if the group had been bigger.

In this case, learning was constrained by the digital platform. It was difficult to have a one-on-one conversation with a participant without interrupting the learning process of others present in the same breakout room (Lock et al., 2020).

Another consistent challenge throughout the OPL was the disproportionate need to rely on verbal or written communication for participant feedback. Lacking the embodied or gestural communication common in a face-to-face (F2F) setting, it was onerous to quickly “read the classroom” when it came to gauging the efficacy of the pedagogical strategies and activities we were using. In one of the recorded debriefs on 21 April 2020, Hughes shared:

and you know part of the problem with the crickets, the dead air, is because ... you can't see people's expressions. Whereas when you're in a face-to-face situation you can read the classroom. You can read the mood or whether they're engaged or not. But you can't so much online.

This challenge in effectively “reading the room” impacted the team's ability to respond to learners' needs in the moment. Periodically, the team stopped everything for a check-in or poll to gauge attendees' progress and/or understanding. These check-ins required attendees to communicate in the chatbox or on mic and relied on attendees feeling comfortable to communicate openly. In a new context with strangers, there may not be the necessary trust built for participants to feel comfortable articulating what they understand or not.

Although there were challenges to overcome in the OPL, the iterative and reflective design of the program enabled the team to empathize and to respond to teachers' needs at each stage of the pivot to ERT, and in ways aligned with the OCT Standards of Care and human-centred, relational practice.

Discussion

In the present analysis, we note empathy figured prominently in the design process. Empathy is considered a key aspect of HCD (Heylighen & Don, 2019; Ideo.org, 2009) and we observed that the team empathized with the teachers often as, for example, when they provided multiple entry points for teachers to learn different coding platforms.

What also emerged when analyzing and interpreting the data, was an appreciation of the layers of complexity involved in demonstrating the empathy required when designing innovative online learning. In our case, the innovative online learning focus was teacher professional learning centred on maker pedagogies and their tools. Prior to and during the online sessions, and while they were still attending to the OCT standards, the research team/workshop designers needed to be

responsive to the learners from several different perspectives: (a) the pedagogy perspective; (b) the technology perspective; (c) the maker perspective; and (d) the multi-modal perspective. These four perspectives are explained in more detail below.

Pedagogically, we note that empathy led to important design decisions such as offering learners choice through careful listening, building on teachers' prior knowledge, and scaffolding the learning in inclusive ways (Husbands & Pierce, 2012). Technologically, empathy was demonstrated in considering the range of technologies and infrastructure that may be supported in schools, and in suggesting options for teachers in line with Stanford's Matrix (2020) (Figure 3). In addition, teachers' prior experience with technology was diverse; therefore, an intentional design element in the OPL was helping the teachers develop transferable digital skills by using multiple, yet similar, interfaces over a period of time. This focus on learning a particular technology, along with practice and sustained follow-up, is crucial to learning transfer (Brion, 2020).

In terms of empathy toward the teachers as makers, the designers had to consider the intricacy of making processes. The team considered: (a) challenges related to teachers' readiness for making and tinkering (Hughes et al., 2022) and the risk-taking inherent in a maker mindset (Becker & Jacobsen, 2020; 2021; Hughes et al., 2022); (b) challenges related to materiality (Lemieux, 2021; Lock et al., 2020; Mehto et al., 2020); (c) cognitive and disciplinary challenges arising from participants' background knowledge (Becker & Jacobsen, 2019; Lock et al., 2020; Stohlman et al., 2012); and (d) collaborative challenges in professional learning exacerbated by the modality of presentation (Francis & Jacobsen, 2013), such as conducting one-on-one conversations about the making work during a large group presentation (Lock et al., 2020).

The multiple modalities necessary for making-focused OPL also required empathy. Online learning presented challenges in relation to the technological and maker skill-level of individual

teachers, and the reliance on written and verbal modes of communication (Lock et al., 2020) as opposed to gestural movements.

Though important, we questioned whether the notion of empathy was enough. Design scholars have pushed back on the wholehearted embracing of empathy as a key step in the design process, in part because it raises an ethical dilemma (Heylighen & Dong, 2019; Spiel et al., 2017). Can designers really know the experiences of users? Ultimately, the “designer’s own values during the process of gaining empathy will determine trade-offs” (Heyleighen & Dong. 2019, p. 118).

Spiel et al. (2017) recommend four key actions important for going beyond empathy: (a) considering multiple viewpoints; (b) flexibility in data acquisition; (c) openness to contradictory statements; and (d) constancy of critical reflection. The OPL designers were attentive to these key actions and demonstrated integrity in their use of empathy by considering learners holistically, especially given the extra layers of complexity with technology modality, pedagogy, and materials. Challenges outside the team’s control, such as the pandemic, technological infrastructure, and individualized learning needs in an online setting meant that designers had to be constantly attentive and willing to shift gears. The human-centred and relational approach (Scheer et al., 2016) taken up by the designers meant that, over time, the iterative nature of the work did lead to learning, both for the designers and the teachers. The learning went through gradations and stages, from just getting online and getting started with technologies; later, it evolved to practices and supports that were tailored to individual teachers, and then into co-created practices with teachers. Our analysis suggests that as the human needs evolved, the practices matured to the stage of co-design of OPL for making.

Based on our findings, we offer several recommendations to inform OPL related to making processes. First, in the design of OPL, the designers can enhance teacher learning by highlighting the connection between empathy, perspective-taking, and techno-pedagogical competence with

making processes. We observed in the data that stages of need evolved over time, from online teaching basics to sophisticated applications of various online programs for learning, and that the designers' responses to teachers' immediate needs helped to develop trust. Then, as teachers' comfort and skill developed, they wanted to deepen their practice, and the designers could place more emphasis on the maker approach, maker ethos, and making culture (i.e., with connections to real-world circumstances and authentic problems).

Every school district had different restrictions, different technological infrastructure, and different supports and affordances for learning and learners. Our second recommendation is that OPL designers select and focus sessions on transferable tools and activities to create the necessary conditions for teachers to experience early success. This approach builds comfort and skills with technology, with multiple modalities, and with making processes that would enable transfer to teachers' classroom practice. OPL designers can build upon an early focus on accommodative learning to enable teachers to develop understanding that can be flexibly applied in their broad range of contexts. From this foundation, OPL designers could seize opportunities to tailor sessions and eventually engage in co-design with teachers to facilitate broader learning transfer.

Finally, OPL design with teachers does require the intentional design of conditions for teacher learning, targeted supports and scaffolds for learning, awareness of resources needed, and provision of appropriate instructional guidance and expertise. While attending to OCT standards of integrity, care, trust and respect, designers of OPL must consider and be responsive, simultaneously from pedagogical, technological, maker, and online perspectives, to the diverse needs of teachers as learners.

Conclusions

As we slowly emerge from waves of pandemic crisis in education at every level in Canada, our critical, human-centred conceptual framework is offered not just as a discrete methodological or analytical heuristic for our qualitative case study data. We also offer it as the principled articulation of elements that, if prioritised and taken-up systemically, could inform the design of schooling centred on students' and educators' social and emotional needs after a time of unprecedented vulnerability, loss, and hardship. OPL has provided a lifeline to many teachers during this pandemic and, given the many benefits that have been realized, OPL is likely here to stay. Our theorization is meant to advance broader professional understandings of care, integrity, respect, and trust using critical considerations of power, human dignity, and reciprocity in effective OPL related to making processes. As we do in this chapter, we invite designers of OPL for teachers to question how a commitment to professional learning requires not just the enactment of dominant perspectives, but also an active questioning of who decides what counts as care, respect, trust, and integrity, and whether and how teachers' needs, voices, agency, and capabilities as learners are present in the overall design process.

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Chapter 9

The Silver Lining: Professional Growth Resulting From Pandemic Teaching Experiences

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Abstract

When the COVID-19 pandemic reached Manitoba, schools closed and teachers shifted their practice to remote learning. Southwest Horizon School Division formed “online grade groups” to bring teachers together and share information from the school division and the province. As teachers worked through these challenging times, school division officials observed that the collaborative environment was instigating professional dialogue and growth. Therefore, the purpose of this phenomenological case study, framed by sociocultural learning theory, was to preserve the points of professional learning to make them accessible even after the pandemic was over. Data collection rest on the interviews with teachers and school division administrators, and on the analysis of the online grade groups’ records. The interview transcriptions were analyzed using N-Vivo software. We identified several areas of professional growth resulting from the pandemic teaching experiences: instruction, assessment, technology integration, home-school partnerships, mental wellness, and professional collaboration. While some have referred to remote learning as crisis or emergency teaching, this study suggests that the stressful circumstances of the pandemic prompted high levels of teacher collaboration and reflective practice, which resulted in professional growth.

Résumé

Lorsque la pandémie de COVID-19 a atteint le Manitoba, les écoles ont fermé et les enseignants ont modifié leur pratique pour se tourner vers l'apprentissage à distance. La division scolaire Southwest Horizon a formé des « groupes de niveau en ligne » afin de réunir les enseignants pour partager l'information émanant de la division scolaire et de la province. Au moment où les enseignants traversaient cette période difficile, les responsables de la division scolaire ont observé que l'environnement collaboratif a en fait favorisé le dialogue et le développement professionnels. Par conséquent, l'objectif de cette étude de cas phénoménologique, encadrée par la théorie de l'apprentissage socioculturel, est de préserver les acquis de l'apprentissage professionnel pour les rendre accessibles même au-delà de la pandémie. La collecte de données repose d'une part sur des entretiens avec les enseignants et les administrateurs de la division scolaire et, d'autre part, sur l'analyse des enregistrements des groupes de niveau en ligne. Les transcriptions des entretiens ont été analysées à l'aide du logiciel N-Vivo. Nous avons identifié plusieurs domaines de croissance professionnelle résultant des expériences d'enseignement en cas de pandémie: l'enseignement, l'évaluation, l'intégration de la technologie, les partenariats maison-école, le bien-être mental, ainsi que la collaboration et la croissance professionnelle. Alors que certains ont qualifié l'apprentissage à distance d'enseignement de crise ou d'urgence, nous soutenons que les circonstances stressantes de la pandémie ont suscité des niveaux élevés de collaboration et de pratique réflexive de la part des enseignants, ce qui a favorisé en retour la croissance professionnelle.

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In March of 2020, teachers in Southwest Horizon School Division in Manitoba, like many teachers in the world, faced teaching remotely for the remainder of the year. One participant explained that it was a “massive energy-sucking experience” and that it left them feeling anxious because “so much was unknown.” To support teachers, the school division hosted a series of online “grade group” meetings for teachers who taught in common grades or common subject areas. It was a way to share information and connect teachers who could support each other during these challenging times. When the superintendent noticed the professional responses and evidence of the corresponding growth of teachers, she wanted to preserve what teachers learned about teaching and learning from this required period of online practice. To respect teacher wellness in the spring and anticipating that the pandemic would be under control before school started in September, our research team decided to meet and conduct interviews with teachers in the fall. However, it quickly became clear that the 2020–2021 school year was going to be another learning curve. As a result, we pushed the interviews into winter and expanded the purpose of the study by identifying and recording teacher learning throughout the pandemic. While several scholars have labeled teaching during the pandemic as nothing more than crisis teaching (Cutri et al., 2020) or emergency teaching (Trust & Whalen, 2020; Veletsianos & Houlden, 2020), we contend, thanks to this phenomenological case study framed by sociocultural learning theory (Rogoff, 2003; Vygotsky, 1978), that the stressful circumstances of pandemic teaching initiated high levels of teacher collaboration and reflective practice, which resulted in professional growth. The teachers in this study shared their increased knowledge of technology for learning as well as important stories of growth in instruction, assessment, home-school partnerships, mental wellness, and professional collaboration.

In this chapter, we present the stories of eight teacher participants and their experiences during the COVID-19 pandemic. We begin with a contextual analysis of the case including a description of the school division, a summary of the provincial response to the COVID-19 outbreak in Manitoba, details of the school division's response to the changing health protocols, and an explanation of the online grade groups facilitated by the school division. Then, we outline the related literature, the theoretical framework, and the methodology before moving into the findings and conclusions.

Background

Although schools across Canada experienced similar circumstances during the pandemic, it is important to understand the specific context of the case under investigation. The restrictions imposed by the provincial government, and the school division's subsequent response to those restrictions, affected the lived experiences of the teacher participants. The background section includes the school division context, the Manitoba context, and the structure of the online grade groups that provided the initial impetus for this study.

School Division

Southwest Horizon School Division (SHSD) located in the southwest corner of Manitoba, in an area devoted predominantly to agriculture, covers 6,500 square kilometers, and includes seven town schools and six Hutterian colony schools. The student population of SHSD hovers around 1,500 students from kindergarten to Grade 12. The rural setting of this area means that some schools are distant from one another and the size of each kindergarten to Grade 12 school varies with the size the community in which it is located (Southwest Horizon School Division, 2021). The smallest school employs 1.11 full-time teacher equivalents (FTE), and the largest, 33.4 FTE. Teacher collaboration is limited by both distance between schools and school population (superintendent, personal communication, 27 January 2021).

Manitoba

The first probable case of the COVID-19 virus in Manitoba was announced on 12 March 2020. The government decided that schools would be placed on one week of remote learning, but shortly after it announced that students would be out of school until the end of the year (CBC News, 25 September 2020). Teachers prepared printed packages of learning resources and assignments to be sent home, but in most cases, they prepared to meet their students online and hoped that parents would assist with learning support, encouragement, and classroom management.

During the summer, similarly to what occurred in other provinces, school staff prepared to follow ever-changing health restrictions, cleaning protocols, and safety standards to ensure the safe reopening of schools. The Manitoba government planned for students to attend class in person, unless the student or an immediate family member was vulnerable to the virus (CBC News, 25 September 2020). However, the requirement to self-isolate each time a student or a family member felt symptoms that were indicative of the COVID-19 virus, or had a possible exposure, meant that classroom teachers frequently experienced students joining the class remotely on a temporary basis, while teaching other students face-to-face.

In the fall of 2020, Manitoba experienced a second wave of higher case counts, and the government adjusted the health restrictions based on new scientific information regarding the COVID-19 virus. Increased social distancing forced classes to move to gymnasiums, multi-purpose rooms, and libraries. During the second wave, many citizens worked from home, and most businesses closed. Schools remained open, except for two weeks of remote learning following the December break.

Online Grade Groups

In the spring of 2020, after schools had shifted to remote learning, it was evident that there was a need for teachers to collaborate and share remote teaching experiences, and for the school division to devise a strategy to disseminate information. Therefore, SHSD senior administration planned a series of grade-group meetings — short, online, check-ins for teachers with similar teaching assignments, facilitated by a member of the senior administration team. Initially, the meetings were developed for kindergarten to Grade 8 town-school teachers and colony teachers, but the meetings evolved to include more specialty groups so the content could be tailored to teachers' needs, as illustrated in Figure 1 (Strategic Initiative Learning coordinator, personal communication, 11 January 2021).

Figure 1

Schedule for Online Grade Group Meetings

Teacher Group	Meetings held during the following weeks in spring 2020:			
	April 13	April 21	May 11	June 22
Kindergarten	x	x	x	x
Grade 1-2	x	x	x	x
Grade 3-4	x	x	x	x
Grade 5-6	x	x	x	x
Grade 7-8 General	x			
Colony Teachers	x			
Phys. Ed.		x		
Music/Band		x		
Grade 7-8 Math & Science		x	x	x
Grade 7-8 ELA & SS		x	x	x

Note. In each one-hour online meeting, teachers shared their experiences and received information regarding both provincial and school division pandemic response decisions.

Fall 2020 Experiences

For the fall of 2020, classrooms in SHSD had to have all furniture, excluding desks, removed to increase space to meet provincial health restrictions. This meant removal of carpets,

centres, and tables for small group learning. The loss of small group instruction challenged many teachers' routines and pedagogy to a point where they experienced increased feelings of anxiousness and despair (Strategic Initiative Learning coordinator, personal communication, 11 January 2021).

When the second wave hit in November, many teachers once again had to pivot. Increased physical distancing requirements meant that in many schools not all students could fit together in one classroom. Four schools in SHSD shuffled to accommodate larger groups of students utilizing lunchrooms, libraries, and band rooms. In two of them, this meant re-locating the entire senior years' wing to an alternative space outside of the school, so those classrooms could be used for early and middle years' classes.

These new restrictions also led to the "duplex model," whereby one teacher teaches between two classrooms at the same time (Strategic Initiative Learning coordinator, personal communication, 11 January 2021). Teachers were allowed to have a short period for instruction before part of the class would need to move to a different space. In some cases, an educational assistant supervised the students who were moved to the additional space, but in other cases teachers tried to move between rooms or utilized technology to communicate.

Related Literature

The initial shift to remote learning was only the beginning of changes that would be required due to health restrictions associated with the COVID-19 pandemic. The (entire) field of education, which tends to change slowly over time rather than quickly and spontaneously, was required to pivot to online learning in a matter of days (Pokhrel & Chhetri, 2021; Trust & Whalen, 2020). Veletsianos and Houlden (2020) described the shift to remote learning as "flexible digital education deployed in haste, driven by an immediate need to adapt to rapid changes in delivery ... amidst the threat and uncertainty of a widely circulating, poorly understood pathogen" (p. 851).

Furthermore, that shift was the beginning of a period of unpredictable changes to classroom learning as governments and school systems entered a phase of continual change that corresponded with the development of scientific knowledge about the virus (Canadian Teachers' Federation, 2020; Gicheva, 2021; Trust et al., 2021b). Sokol et al. (2021) identified teachers' negative responses to government messaging and made the link to burnout and the teachers' feelings of loss of control. This perceived lack of control frustrated teachers because they had experienced significant personal autonomy in their classrooms prior to the pandemic (Canadian Teachers' Federation, 2020; Gicheva, 2021).

In the transition to remote learning teachers faced many challenges, including early career teachers who struggled to shift their pedagogy to an online medium (Kraft et al., 2021; Trust & Whalen, 2020). Seasoned teachers were more likely to be challenged by how to utilize the online technologies that were available (Kraft et al., 2021; Trust & Whalen, 2020). Many teachers struggled with student attendance and engagement in online classes (Canadian Teachers' Federation, 2020; Kraft et al., 2021; Trust & Whalen, 2021a). In the spring of 2020, "almost two-thirds of respondents (64%) reported that no more than half of their students were checking in with them on a weekly basis" (CTF, 2020, p. 18). When students attended classes, teachers found that they lacked engagement (CTF, 2020; Francom et al., 2021; Pokhrel & Chhetri, 2021; Trust & Whalen, 2021a). Teachers worked longer hours to prepare for online teaching (Gicheva, 2021) and their feelings of self-efficacy diminished (Kraft et al., 2021), even though their perceptions of achievement would eventually increase (Sokol et al., 2020). Teachers experienced difficulties maintaining mental wellness due to a lower sense of success (Kraft et al., 2021), the burden of caring for children and families, and the authentic life experiences of living through a pandemic (Hargreaves, 2021; Kraft et al., 2021).

Educational researchers have recently published a wealth of research about the work of educators during the pandemic (e.g., Hargreaves, 2021; Kraft et al., 2021; Trust & Whalen, 2021a; Veletsianos & Houlden, 2020). Much of the literature about teaching during the pandemic focuses on the challenges that teachers faced: technology (Trust & Whalen, 2020), engagement (CTF, 2020; Kraft et al., 2021), distance learning pedagogy (Klein, 2021), and mental health (Sokol et al., 2021). Hargreaves (2021) explained that teachers expressed the loss of connecting emotionally with their students in an online environment, particularly with their vulnerable students (see also, Alberta Teachers Association, 2020). Similarly, Mete and Eunbae (2018) identified the lack of social interactions during online learning. Despite these challenges, teachers also embraced the use of technology (Sokol et al., 2020) and engaged in improving their online skills (Klein, 2021).

With the pandemic at the forefront, distance-learning methods became an essential component of instruction. Teachers focused on the need to learn new technologies to stay connected to their students and to offer quality instruction (Trust & Whalen, 2021b). Remote teaching initiated significant growth in teachers' knowledge, skills, and abilities with using technology in the classroom (Klein, 2021). Teachers started using different resources (e.g., Google Classroom and Zoom) in a variety of subject areas to encourage learning and participation (Francom et al., 2021).

Studies we consulted on teacher growth focused on gaining information for how to address future crises in education (Trust & Whalen, 2020; Yunjo et al., 2021), rather than on refining classroom practice. This study, grounded in the knowledge established by sociocultural learning theory (Vygotsky, 1978), and the knowledge of teacher growth based on collaboration, professional learning communities, and teacher reflection, contributes to the collective literature by shedding light on the growth teachers experienced during the pandemic.

Theoretical Framework

Our study uses the theoretical framework Sociocultural Learning Theory (Rogoff, 2003; Vygotsky, 1978), which proposes that learning occurs through social interactions, the use of language, and other cultural tools that allow learners to work collaboratively together to overcome challenges. Vygotsky (1978) explained that through collaborating with others who are more knowledgeable, learners can improve their skills (see Figure 2). For example, teachers who struggled with technology when health restrictions forced a period of remote learning in March of 2020, turned to their more tech-savvy colleagues for support. Assistance and encouragement from these “more knowledgeable others,” coupled with daily practice in their online classrooms, led to the ongoing acquisition of technology skills. Once teachers gained skills in the online environment, they shared their knowledge with colleagues, students, and parents, so the knowledge of the entire network grew. Rogoff (2003) explained that “we are prepared by both our cultural and biological heritage to use language and cultural tools and to learn from each other” (p. 3). This perspective reflects the interdependence between individuals and social processes in learning and development, while encouraging learners to participate in a range of cooperative activities that promote learning collaboratively (Vygotsky, 1978). As learners internalize the effects of collaboration, they acquire new strategies and knowledge of the world and culture (Rogoff, 2003; Vygotsky, 1978). Vygotsky (1986) explained that such reliance on the social source of knowledge brings language, culture, and context together and to the forefront. Sociocultural learning theory affirms the value of both collaboration (Hargreaves, 1994) and reflection (Loughran, 2002) to teacher growth (see Figure 2).

Rogoff (2003) used the concept of guided participation to highlight how cognitive development occurs in a social context and focused centrally on the interrelatedness of individual interactions and support that stretch understanding and skill in using the tools of the culture.

During the pandemic, these tools were often technological and located in online spaces (see Figure 2). For several participants, the working relationships developed through the online grade groups empowered them to shift their practices to an online medium and to grow together from these learning experiences. Furthermore, teachers in this study explained that they reached out to more knowledgeable colleagues for guidance as they planned and executed strong online lessons. Collegial networking became a key component and individuals who possessed or acquired skills shared their knowledge with others. The sophisticated collaboration between teachers helped them grow and feel supported during these challenging times.

Clarke and Hollingsworth (2002) described teacher growth as an inevitable and ongoing process. The authors viewed teacher growth as an adaptation; that is, teachers adapt their practice to respond to shifts in the environment. They explained that teachers work within learning communities to adapt to the changing classroom circumstances. Darling-Hammond et al. (2017) and Hargreaves (2021) contended that schooling and teaching are collaborative and social, and that teachers depend on the support of colleagues. Teacher collaboration is development-oriented, extends across time and space, and tends to be predictable (Hargreaves, 1994), as teachers learn to engage in reflective practice. Sociocultural learning theory embraces collaboration and co-creation of shared knowledge within networks of practice.

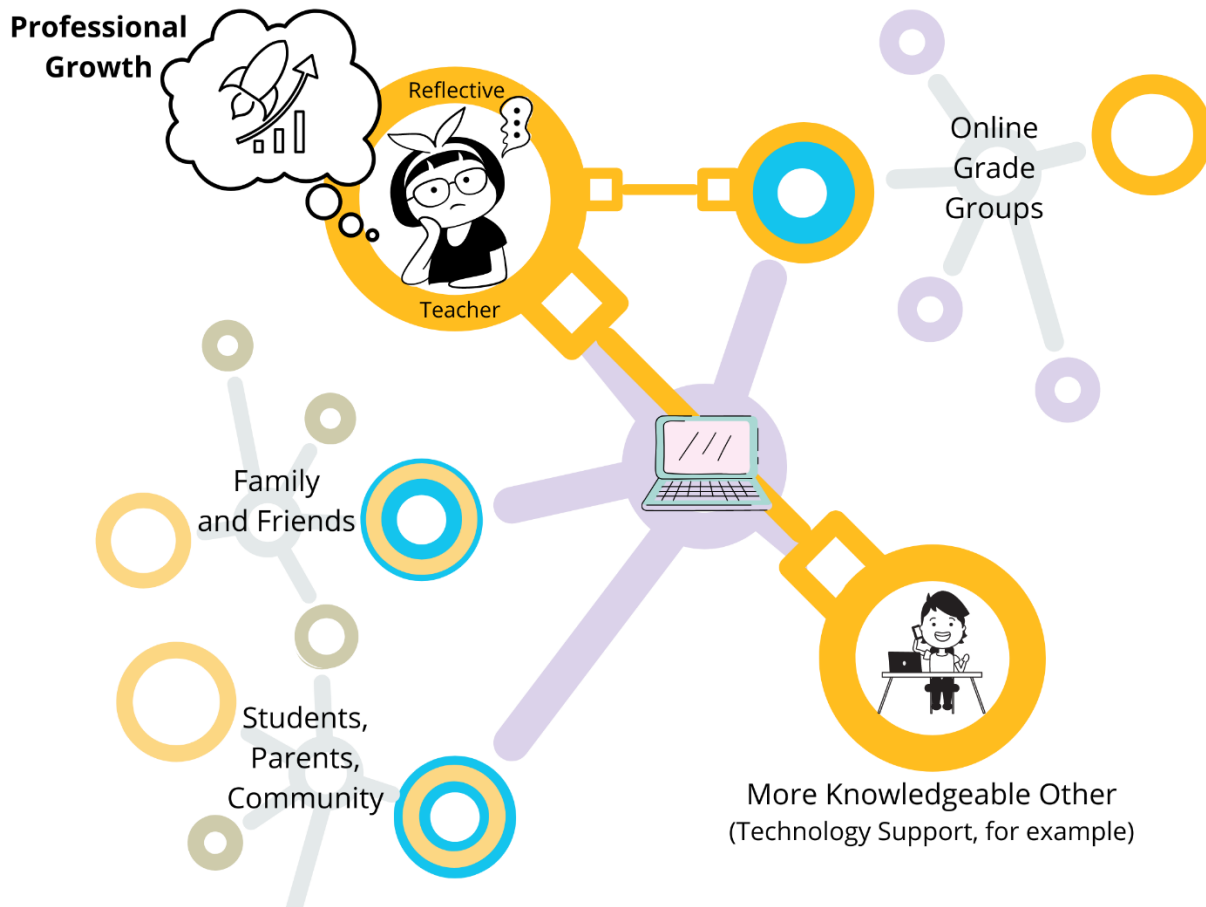
Teacher reflection is widely accepted (Marcos et al., 2011) as a key strategy in professional growth and development (Marcos et al., 2011; Ottesen, 2007). Loughran (2002) explains the role of teacher reflection in growth and development through contextual knowledge and the “ability to recognize and respond to such knowledge that the reflective practitioner becomes truly responsive to the needs, issues, and concerns that are so important in shaping practice” (p. 42). Teaching during the pandemic led to a shift in context and many teachers struggled to adapt to the new reality. Through collaborative efforts, reaching out to more knowledgeable others, and

professional reflection, many teachers grew to recognize the contexts of the online environment and the socially distanced classroom environment (Hargreaves, 2021). Their collaborative and reflective practices led to the acquisition of new knowledge and skills (Marcos, 2011). Teacher reflection regarding pandemic teaching involved a process of scrutiny and deliberation that permitted change and growth in existing practices (Marcos et al., 2011; Ottesen, 2007). Figure 2 illustrates how sociocultural learning theory (Rogoff, 2003; Vygotsky, 1978) provides a lens to view the personal and professional connections that supported teacher well-being and spurred professional growth during the COVID-19 pandemic. The technology support person is represented as the more knowledgeable other (Vygotsky, 1978). Yellow elements in the diagram represent professional connections and blue elements represent personal connections. The laptop in the middle symbolizes the importance of technology for communication.

Figure 2 demonstrates how the theoretical framework can illuminate the lived experiences of teacher participants. The network of personal and professional connections both reinforced teachers' mental wellness and supported their professional growth. The teachers were connected to colleagues, school division support, parents, students, family, and friends. Many of the participants described their connection to a colleague, perhaps one of the SHSD technology specialists or someone in their school, who could support them with remote teaching. In addition, teachers connected through the online grade groups for teaching ideas and personal support. Teachers noted the importance of increased communication with parents and students as well as dependence on relationships with their family and friends to support mental wellness. Sociocultural learning theory (Rogoff, 2003; Vygotsky, 1978) highlights the value of connectedness for personal and professional growth.

Figure 2

Personal and Professional Network of Pandemic Teachers



Methodology

This phenomenological case study considered the experiences of teachers working in Southwest Horizon School Division in Manitoba during the first year of the COVID-19 pandemic.

Phenomenology is a design of qualitative inquiry used to describe “the lived experiences of individuals about a phenomenon” (Creswell, 2014, p. 14) and about the core knowledge they develop (Creswell & Poth, 2018). The study focused on the experiences of teachers as they navigated through shifting pedagogical contexts and adjusted to uncertainty instigated by the global pandemic and society’s growing scientific knowledge regarding the virus.

The purpose of this study was to identify the growth teachers experienced when forced to engage in teaching practice in unusual and challenging circumstances. The data included interviews led via Zoom in January and February 2021 with eight teachers, the Strategic Initiatives Learning coordinator, and the superintendent, as well as aggregated results from a survey conducted by the school division. Using N-Vivo software, we sorted the data from the interview transcripts into 61 codes that were later compressed into 21 themes, which in the end resulted in several areas of growth that, we contend, represent what teacher participants intended to include in regular practice following the pandemic.

Approximately 75 teachers who were participants in the online grade groups responded to a school division survey in June of 2020. The school division consented to allow us to use the aggregated results as part of our data. The survey asked teachers about their pandemic teaching experiences and prompted them to share improved pedagogical practices they wanted to maintain following the pandemic. Interviews provided opportunities for teachers to expand on their survey responses and to share stories of their lived experiences.

Findings

The findings include our analysis of the interviews with eight online grade group participants (see Figure 3), and the aggregated results of a survey conducted by the school division with all teachers who attended at least one of the online grade group meetings.

From our analysis of data, we noted that teachers in the study had identified several common areas of growth resulting from the unusual context of their work during the pandemic: instruction, assessment, technology integration, home-school partnerships, mental wellness, and professional collaboration. In the sections that follow, we describe the six areas of growth identified by teachers and interweave other studies that align with our findings.

Figure 3

Interview Participant Descriptions and Pseudonyms

Name (Pseudonym)	Grade Level	Type of School
Kendra	7/8	Large town school
Brittany	5/6	Small town school
Crystal	7-12 Math	Small town school
Harley	5/6	Large town school
Jordan	7/8	Small town school
Allison	7-12 ELA	Medium town school
Rhonda	Early/Middle	Colony school
Janice	Early	Colony school

Note. The chart details the interview participants and outlines their grade levels and school size.

Instruction

When teachers were required to shorten instruction time, they were able to connect with the value of being concise, choosing developmentally appropriate language, and using focused instruction. Janice explained, “it forced me to confront the language that I was using, simply because I tend to use more elevated language or words that [students] may have never encountered before.” Crystal confessed, “I realized how much I ramble.... I had to learn how to shut up, to say what I needed to say.” Interestingly, when teachers started to use more concise and more easily understood language, they realized that students became more independent.

As students gained more independence, similarly, to claims by Thomson (2010), teachers started to see value in short, focused lessons. Janice described:

when we were able to go back into the classroom, I tried to keep a lot of the same routines that I had before we left in March. And I realized very quickly that it was not going to work. So now I’ve restructured a lot of things to try and maximize the information that I give to the students, not overload them, and they’re thriving.

Brittany reflected on the value of bringing more focused instruction into her face-to-face classroom: “when we were in remote learning it was like, we have 20 minutes so we gotta get down to business. It allowed me to say, this is what we need to work on.” Kendra added, “my routines and expectations evolved because I wanted to make sure I was as concise as possible.” Although it was difficult to constrict the time for important concepts in their curriculums, teachers learned that there was value in concise language (see also, Hughes et al., 2016) and focused instruction. Participants indicated that this was knowledge that they would continue to draw upon to improve their practice.

Assessment

Teacher participants explained that online learning necessitated a shift in assessment practices. In the face-to-face classroom, teachers were accustomed to a wide variety of information that they could use to assess whether students understood the lesson, engaged appropriately, and stayed on track (Hargreaves, 2021). Kendra expressed:

When you are in the classroom, you can really read a kid’s body language or facial expressions as to whether or not they’re getting it. It’s a heck of a lot harder to do that through a computer screen! And, I was having a hard time knowing when kids who wouldn’t necessarily speak up needed some extra support.

Challenges with assessment in the online environment prompted teachers to use formal assessment strategies such as exit slips, hand-in assignments, and online tools that were set up for students to self-evaluate while providing feedback about student progress (Lee et al., 2021).

I had to find tools that gave them instant feedback and established accountability. So, there was always a Google form or something they could fill out afterward. I had to find as many things that kids could do to get feedback and feel involved. That way I tried to replicate those conversations we would have in the classroom when I was walking around. (Harley)

The tools helped teachers to keep formal records of student growth and, in the opinions of the teacher participants, led to greater engagement and self-assessment. Participants acknowledged that they would utilize these formal assessment strategies to improve their classroom pedagogy.

Technology Integration

Both in the surveys and the interviews, teachers acknowledged their growth with technology integration and reflected on how technology could enhance many classroom practices. All the interview participants shared that they accessed technological support from their colleagues or shared their knowledge to support other educators.

Our tech person was very helpful to me.... He would remotely calm me down. And I'm like, "I don't know how many people you are doing this for but thank God you are my direct line of support." (Kendra)

Teacher participants shared examples of how they used Kahoot, Jamboard, and Flipgrid, among other tools, to enhance classroom assessment, spur greater engagement, and make learning resources more accessible for students and parents. Survey participants recognized the value of recording and posting videos of lessons and instructions.

The pandemic forced the adoption of multiple technological tools (Adoy & Mäeots, 2021; Tartavulea et al., 2020). Teacher participants realized that these tools helped with assessment, sharing resources, and made personal instruction accessible. Kendra spoke passionately about the value of using technology to provide one-on-one instruction on a need-to-know basis. "I think many of us have embraced the 'I can help you right now! Let's do a face-to-face on Zoom.'" She went on to explain,

I say to the kids, 'Well, snap me.' So, I have a lot of my older kids. They'll snap a math question and text it to me.... I'll do it on paper, take a picture of it, and send it back.

Harley also shared knowledge of making resources more accessible by putting them in a student-friendly digital format:

I found that I started to digitize as many resources as possible. And it's been invaluable because I basically have everything at my fingertips now. But then I realized very quickly that PDFs, for example, are not user-friendly. So as much as I want to digitize, I had to make them student-friendly.

Survey respondents identified the value of using digital platforms (Class Dojo, Seesaw, etc.) that allowed them to share resources and post assignments. Allison explained that after returning to the regular classroom, she continued to increase her use of websites to store her class materials:

I have moved a second course to Google classroom, which has allowed kids to work at home. Some of the kids now take a different class during my class time. It is online. 'You need help? Come see me on Zoom!'

Teacher participants recognized growth in their use of technology for learning and explained that they would continue to utilize technology in their classrooms. "The independence that my students developed doing remote [learning], I have tried to continue with that and to help it grow.... Taking a little more responsibility for their education is something that I try to encourage" (Brittany). Similar to Smith & Moura's (2021) findings, most of the teachers in this study found value in using technological tools to make education more accessible and students more independent.

Home-School Partnerships

In general, we found that the shift to remote learning necessitated more communication with parents and caregivers and required them to take a more active role in the education of their children. Not only did teachers appreciate the support, but also came to understand how valuable those connections were for their students. Rhonda stated, "I found that the more I was connected with the families, the better it was." Similar to Gicheva's (2021) findings, Kendra explained that

pandemic teaching required an additional investment of time to prepare online lessons and communicate effectively with students and their families. However, she acknowledged her appreciation for the role that parents played, “we have had amazing support from parents.” These statements suggest the authentic relationships that developed between teachers, students, and their families.

In both the surveys and in the interviews, participants observed the important role that parents played during remote learning. Harley explained:

What I found was that home-school relationships became the most important indicator for student success. [I am not sure what we would have done] without parent cooperation ... it has been a very challenging task to keep [students focused on] the importance of school and the drive to complete schoolwork.

Parents engaged as coaches and mentors in their children’s learning as teachers taught remotely. Crystal noted that during remote learning, teachers depended on parents to ensure that students attended class and stayed engaged in the lesson. “It was a team effort and the students that toughed it out till the end succeeded as a result of that group effort with parents.” In both the interviews and the surveys, participants noted that the shift in home-school partnerships was something they would like to keep when the pandemic was over.

Mental Wellness

Interview participants described teaching during the pandemic as an “overwhelming” experience. In the spring, teachers were asked to make a fast pivot and move their classrooms online to reduce their contact time with students, to increase their communication with parents, to change their pedagogy, to reconsider the outcomes, and to engage students, who were often absent from class.

In the fall, the participant teachers faced the responsibility of managing health protocols in face-to-face classrooms with the knowledge that the virus could threaten the well-being of their students, themselves, and their loved ones. Teachers accepted the added responsibility of recovery learning and felt the pressure of trying to close the gap left after an extended period of remote learning and missed classes in the spring. Janice explained: “I think coming back in the fall, worrying about the gap in learning because of remote teaching in the spring, and worrying about catching them up ... put greater than usual expectations on [teachers].” Moreover, health protocols required teachers to accomplish that feat without the use of many familiar face-to-face strategies they had utilized successfully in the past, and sometimes with their students spread across two rooms in the school. In this passage, Jordan expressed frustration, “as soon as we got adjusted, the government would come out and change the goalposts. The hardest part was not the students. The hardest part was the lack of foresight from the government.” The circumstances in each phase of the pandemic added stressors that confronted teachers’ mental wellness.

For many teachers, the emotional weight of the pandemic came as a bit of a surprise. Rhonda confessed, “initially, I had no wellness. It took a while to realize how stressed I was.” Brittany explained that she found herself off track with mental health: “And my work-life balance just kind of went down the tubes and I realized that it was OK to set the boundary of I-still-need-time-to-be-without-my-teacher-hat.” Many teachers shared that strategies they had formerly depended on to reduce stress, like massage or workouts in gyms, were off-limits within the provincial health restrictions. Participants shared that they navigated these stressful experiences by finding ways to work out at home, spending time with partners and families, adding new pets, indulging in food and drinks, and purposefully scheduling time for themselves. One teacher shared:

For the first time in my life, I actually reached out to the counseling services just to help manage. The counselor helped me with some of the stress and things that were going on and helped me to find tools. (Rhonda)

When participants reflected on the “lock-down phase” of the pandemic, they realized the need to create “boundaries” and invest in “self-care routines.” Teachers turned off their devices to spend time with family and friends and to “go outside for fresh air” (Janice), and similarly to teachers in a study by Delgado-Gallegos et al. (2021), pushed themselves to find balance to build the strength and resilience that they needed to accomplish their tasks.

Additionally, teachers noted that they became more aware of their students’ mental health needs. Within the surveys and interviews, teachers expressed their beliefs that predictable routines helped their students to know what to expect. Harley acknowledged the importance of social-emotional wellness for students:

I have become softer when it comes to social-emotional wellness. I just felt for students and ... I didn’t know what their situations were one hundred percent of the time. So, I became softer and it’s one of those things that I think will not go away. I think I will become even more engaged with the social-emotional piece.

Harley went on to say that students often attended class for social connections. “They weren’t waking up to talk about word problems; they were waking up to talk about what’s going on [with the pandemic] or what we could do in the future.” Allison employed a routine of checking-in with students to make sure they were stable:

Remote learning definitely emphasized the need for checking-in with kids and their mental health. I think that was a huge thing. Although I had checked-in with kids in the past, I had never made it a priority to do the whole class ... [during remote learning,] I put it out to the whole class, and sometimes it would bring up things that I didn’t expect.

The pandemic exposed the fragility of mental health and led participants in the study to confirm the importance of maintaining practices that support mental wellness in the future.

Professional Collaboration and Growth: A Silver Lining in the Pandemic Cloud

Experiences in the pandemic pushed teachers to realize how important it is to connect with other teachers. “What I did find beneficial from those grade group meetings was just hearing other teacher voices in terms of not feeling so isolated and so alone” (Kendra). Several of the interviewees confirmed this perspective and described the importance of connecting with other teachers because “[they] were all in the same boat!”

The first [online grade group] meeting was pretty quiet but once we got comfortable with each other [the meetings] were pretty neat. It was a highlight of my week, like you know, the silver lining in the pandemic cloud. (Brittany)

Although not everyone enjoyed the grade group meetings, most participants recognized the importance of both collegiality and professional support.

The grade group meetings with the [school] division were great ... for the camaraderie and how we would talk with kindergarten teachers, and we would all kind of figure out how to get these kids to still learn their letters and their numbers without being able to be there with them and have all of the tools that we have in our classrooms. (Janice)

Through the online grade groups and through collaborations with other teachers in their schools, on social media, and usually online, participants reached out to colleagues for support during the pandemic in similar ways to those described in Trust & Whalen’s (2020) study. Teachers identified their increased knowledge in the areas of professional collaboration, mental wellness, home-school partnerships, technology integration, assessment, and instruction as takeaways from their lived experiences during the COVID-19 pandemic.

Discussion

When faced with the unprecedented circumstances of a global pandemic, teachers realized a need to connect with colleagues, to discuss understandings, to reflect on current practices, and to decide how they could adapt (Hargreaves, 2021; Lee et al., 2021; Pokhrel & Chhetri, 2021). Not only did this rapid pivot instigate the acquisition of skills to navigate the online classroom, but it also facilitated reflection on past practice, refinement of existing skills, and growth in foundational teaching knowledge (Lee et al., 2021; Tartavulea et al., 2020). When required to shorten their online instruction, teachers recognized the value of being concise, or when confronted with students who did not understand the lesson, they recognized the importance of using developmentally appropriate language (Hughes et al., 2016). Teachers' reflective practices led them to envision the transfer of skills they refined in the online environment back into their regular classroom practice.

While many researchers have written about the struggles of teachers during emergency or crisis teaching (i.e., Delgado-Gallegos et al., 2021; Fawaz & Samaha, 2020; Veletsianos & Houlden, 2020), this study clearly illustrates that the stressful circumstances of the pandemic encouraged more teacher collaboration, more engagement in professional learning, higher levels of teacher reflection, and significant professional growth. Other studies that focused on identifying the emergence of teacher growth during the pandemic concentrated on preparations for future events (e.g., Yunjo et al., 2021; Trust & Whalen, 2020), whereas our study responded to a gap in the literature regarding the growth in teachers' pedagogical practices resulting from their experiences during the pandemic. Future studies need to consider the actual changes that teachers have implemented and maintained within their teaching practices following their experiences during the pandemic.

Conclusion

The stressful circumstances of pandemic teaching initiated high levels of teacher collaboration and reflective practice, which resulted in professional growth. Clarke and Hollingsworth (2002) established that professional growth in the teaching field often evolves from adaptations to changes in the school environment; in this case, it was a shift to online learning and the implementation of COVID-19 protocols. Through surveys and interviews, the teacher participants in this study shared their increased knowledge of technology for learning, greater investment in collegial collaboration, important stories of growth in classroom practices (i.e., assessment and instruction), acknowledgment of the need for strategies to maintain mental wellness for themselves and their students and enhanced home-school partnerships.

A key conclusion of our study is that despite the recognized challenges, the COVID-19 pandemic conditions also resulted in the discovery of “the silver lining in the pandemic cloud,” a period in which teachers experienced substantial amounts of personal and professional growth.

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Section 2: Relationships & Relationality in Online Learning & Teaching

Chapter 10

Developing Relational Online Teacher Education Pedagogies During a Global Pandemic

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Abstract

This collaborative self-study outlines how we, as teacher educators, drew from our experiences and research from the beginning of the COVID-19 pandemic (March - July 2020) to inform the development of online pandemic pedagogies for the new cohort in Middle Years/Self-Regulated Learning Bachelor of Education Program in the fall of 2020. During this time, we were teaching online and supporting teacher candidates whose only face-to-face learning was in their practicum, when they engaged directly with their students. Like many teacher education programs in Canada, our program is typically offered face-to-face. As teacher educators, we embrace and enact responsive teaching as a shared pedagogical stance in our face-to-face teaching. However, the pandemic required us to reimagine the ways in which teacher education can occur online. We were challenged to apply characteristics in our own practice that we purport our middle years teacher candidates need to develop in order to be effective in their practice as new teachers. As a team, we grappled with ways to teach course content, provide engaging learning experiences, and model collaborative, caring relationships online. The transition to remote learning led us to develop two inquiry questions:

- How did teacher candidates experience online teacher education?
- How did teacher candidates apply what they learned in online teacher education to their face-to-face practicums?

Findings from this research highlight that relational, synchronous, equity-oriented pedagogy is central to the success of teacher candidates' learning in online environments.

Résumé

Cette auto-étude collaborative discute comment nous avons puisé, comme formateurs d'enseignants, dans nos expériences et nos recherches au début de la pandémie (mars - juillet 2020) pour développer des pédagogies en ligne afin de répondre aux besoins d'une nouvelle cohorte inscrite au programme de baccalauréat en éducation *Middle Years/Self-Regulated Learning*, à l'automne 2020. Pendant cette période, nous avons enseigné et encadré en ligne les candidats à l'enseignement qui, normalement, n'enseignent en présentiel qu'au cours de leur stage où ils sont en contact direct avec leurs élèves. À l'instar de l'ensemble des programmes de formation des enseignants au Canada, notre programme est généralement offert en présentiel. Comme formateurs d'enseignants, nous adoptons et mettons en œuvre dans notre enseignement en présentiel un enseignement visant une pédagogie partagée. Cependant, la pandémie nous a contraint à réimaginer les façons dont la formation des enseignants peut se faire en ligne. Nous avons ainsi été mis au défi d'appliquer dans notre propre pratique les caractéristiques que nos candidats à l'enseignement des années intermédiaires doivent, croyons-nous, développer de manière performante dès le début de leur carrière. Notre équipe s'est efforcée d'enseigner le contenu des cours par les meilleurs moyens, de proposer des expériences d'apprentissage intéressantes et de modéliser des relations de collaboration et d'entraide en ligne. La transition vers l'apprentissage à distance nous a conduit à élaborer deux questions d'enquête :

- Comment les candidats à l'enseignement ont-ils vécu la formation des enseignants en ligne ?

- Comment les candidats à l'enseignement ont-ils mis en pratique ce qu'ils ont appris dans le cadre de la formation en ligne dans leur stage en présentiel?

Les résultats de notre recherche démontrent que la pédagogie relationnelle, synchrone et axée sur l'équité est essentielle à la réussite de l'apprentissage des candidats à l'enseignement dans les environnements en ligne.

Developing Relational Online Teacher Education Pedagogies During a Global Pandemic

We are four educators who were already research collaborators prior to the pandemic. Then COVID-19 happened, and British Columbia teacher education programs moved online, which pushed us outside our comfort zones as educators and required us to develop online teacher education pedagogies. In this chapter, we share how we worked to develop and enact relational practices and how we collaborated as an instructional team within an online teacher education cohort during the 2020–2021 academic year.

Context

The University of British Columbia's (UBC) Elementary/Middle Years Bachelor of Education Program houses fourteen cohorts (450 students). The Middle Years/Self-Regulated Learning cohort is designed to recognize the strengths and potential of young adolescents and address their developmental needs (AMLE, 2010). As an application of middle years philosophy and practice, teacher candidates in the middle years cohort explore how to take up and nurture self-regulating learning (SRL) within their contexts and practice.

As such, we work to enact the synergies between middle years teaching, SRL, and teacher education (Schnellert et al., 2020). In the fall of 2019, prior to the pandemic, we established ourselves as an instruction team aligning our courses Classroom Discourses, Cultivating Supportive School and Classroom Environments, Human Development, Learning and Diversity, and Inquiry Seminar.

During the pandemic, we, like so many other education professionals, experienced continuous change that pushed us to reimagine the ways teaching and learning can occur (Burns et al., 2020; Hill et al., 2020). It has been a test to enact the characteristics that we purport middle years teacher candidates need to develop (e.g., adaptive expertise, 21st century competencies) to be effective as new teachers. In the fall of 2020, the Faculty of Education required instructors to

maintain the same schedule and course hours online as the regular, face-to-face program; instructors had the freedom to offer synchronous, asynchronous, or combined instructional approaches using common online platforms (i.e., Canvas and Zoom). Prior to the shift online, we were not using either Canvas or Zoom as central to our instruction. In this self-study, we grappled with designing our courses and content, providing engaging learning experiences, and modeling collaborative caring relationships in an online format.

In this chapter, we outline how we, as teacher educators, drew from our experiences and self-study research from the beginning of the pandemic (March - July 2020) to inform the development of online pandemic pedagogies with a new middle years/self-regulated learning cohort who began their journey as teacher candidates in the fall of 2020. During this time, we were teaching online, supporting our teacher candidates whose only face-to-face learning was in their practicum where they engaged directly with students. The transition to remote learning led us to develop two inquiry questions:

- How did teacher candidates experience online teacher education?
- How did teacher candidates apply what they learned in online teacher education to their face-to-face practicums?

Theoretical Framework

We work together within a teacher education cohort that takes up two overarching fields of study: middle school philosophy pedagogy as well as SRL. While middle school-related research spans many theoretical lenses, we find that middle years philosophy and pedagogy and SRL align well with socio-cultural theory, and we tend to privilege course readings and practices that have a socio-cultural orientation. A socio-cultural lens attends to the social worlds that teachers and students experience and how their lived experiences shape their dispositions, interests, and motivations (Schnellert & Kozak, 2019; Vygotsky, 1978). From this position, learning is cultural

and relational (Ryan & Patrick, 2001). We learn by engaging with others through interactions, cultural artifacts, immersion, and participation within discourse communities (Moll, 2014; Wells, 2007).

Adolescence is a critical stage of development when young people are exploring who they are and how they make sense of the world by negotiating their identities and establishing self-concept (Goldstein & Lake, 2000). They are also seeking to create meaningful relationships and can be significantly influenced by peer interactions (Schmakel, 2008). In response to adolescents' unique needs, middle years philosophy and pedagogy is diversity-positive, responsive, and experiential (AMLE, 2010; Schnellert et al., 2015). Community building and relationships are at the heart of middle years pedagogy and establish the foundation of learning.

In addition to middle years philosophy and pedagogy, teacher candidates in our B.Ed. cohort learn about SRL. SRL refers to the process in which learners actively and deliberately monitor and shift their thoughts, emotions, and actions in the service of meeting personal and academic goals (Zimmerman & Schunk, 2011; Zimmerman, 2008). Individuals who are self-regulating engage in cycles of deliberate action to manage the events they experience in their daily life (Butler et al., 2017). To be an effective self-regulating learner, one must draw from and apply a repertoire of social, emotional, cognitive, and academic skills (Rimm-Kaufman et al., 2009; Schunk & Zimmerman, 2008).

Another theme we address in the middle years cohort is social and emotional learning (SEL). SEL refers to the development of social and emotional skills that support people in experiencing, managing, and expressing emotions meaningfully, making sound decisions, and fostering rewarding interpersonal relationships (Durlak et al., 2015). However, many SEL programs taking a simplistic approach to complex, multi-dimensional social risk, perpetuate harm and colonization (Madda, 2019; Simmons, 2021). As such, adolescents need authentic

opportunities to apply SEL (and SRL) skills in meaningful ways to better equip themselves for the sociopolitical context in which they live.

Teacher education theory and research also highlights the importance of relational pedagogy (Bjorklund et al., 2021; Kessler, 2000; Noddings, 2012). Noddings (2012) underscores the importance of creating an environment of care and trust so that students can flourish in their social, emotional, and academic development. This is especially true in the middle school years (Goldstein & Lake, 2000). When teachers are fully present and maintain an open-heart, listen and respond to the needs of the learners, and bear witness to the learners' meaning-making, they are able to establish reciprocal care between community members (Kessler, 2000; Noddings, 2012). When such pedagogy is enacted in teacher education, care cultivates a sense of belonging and relational trust that is essential for learning and overall well-being (Bjorklund et al., 2021).

COVID-19 and Teacher Education

Over the course of the pandemic, teacher educators have faced ever-emergent issues and reconstituted their understanding of teaching and learning (Association of Canadian Deans of Education, 2020). Our team of teacher educators contended with this emergence in terms of course design, delivery, and student practicum. In parallel, K-12 teachers developed their adaptive expertise to responsively support their students and the teacher candidates they were mentoring (Stringer Keefe, 2020). Catalyzed by the pandemic, the challenge of pivoting to teaching online became a shared focus for K-12 and teacher education (Bozkurt & Sharma, 2020; Quezada et al., 2020).

A United Nations (2020) policy brief written during COVID-19 called “for better training in new methods of education delivery” (p. 2). Calls already existed for teacher education programs to provide teacher candidates experiences to both learn and teach online (Kennedy & Archambault, 2012; Luo et al., 2017; Moore-Adams et al., 2016; Williams, 2015). Studies also

suggest that teacher candidates learn online pedagogies best through experience (O’Byrne & Pytash, 2015; Shand & Glassett Farrelly, 2017).

This chapter reports what we learned from our collaborative self-study with the 2020–2021 middle years cohort. Coursework was entirely online, but teacher candidates had weekly school visits and in-person practicums. Practicums are critical in supporting teacher candidates to make theory/practice connections (Coffey, 2010). Practicum settings can be a place for teacher candidates to “live inquiry” — exploring pedagogical approaches and navigating tensions between their idealized and realized philosophy and practice (Lerseth, 2013). Our research contributes to a growing body of research related to online teacher education during the pandemic. In their study, Basal and Eryilmaz (2021) found that teacher candidates struggled with engagement during online learning in the context of COVID-19. Aperribai et al., (2020) found that teachers’ physical activity and mental health suffered during the pandemic. Teachers’ psychological and emotional state returning to in-person teaching was heightened and manifested as fear, anxiety, and mistrust (Ozamiz-Etxebarria et al., 2021). Teacher candidates had to navigate this additional terrain in schools during weekly practicum preparation visits and their 2- and 12-week practicums.

As we began the academic year with a new cohort of teacher candidates learning online, we leveraged what we had learned from our previous self-study at the beginning of the pandemic. In our initial self-study (Schnellert et al., 2022), we learned about the importance of SEL, SRL, building supportive learning communities, and collaboration as key aspects of online pedagogies in teacher education and K-12. In our current study, we carefully considered the context of K-12 schools where teacher candidates would complete their practicums. Therefore, as a team we committed ourselves to “developing community” as a cohort through cohort check-ins; personalizing support; responsive teaching; introducing active listening and trauma-informed strategies; and, attending to equity, diversity, and inclusion.

Methodology

We engaged in collaborative self-study to better understand and inform our inquiry into teaching our Bachelor of Education courses online. We initially studied the lived experience of teacher candidates — and ourselves as teacher educators — when we had to suddenly transition from in-person to online teacher education in March 2020 (Schnellert et al., 2022). Here, we report how collaborative self-study informed our teacher education practice with an entirely online cohort of teacher candidates during the 2020–2021 academic year.

Collaborative self-study (Berry & Russell, 2014; Samaras & Roberts, 2011) helped us to problematize our practice as teacher educators. The four of us worked together as critical friends to better understand the strengths and barriers within our online pedagogical approaches. Through monthly, collaborative research meetings, we reviewed field notes and course artifacts to identify promising practices and ongoing and emerging tensions.

Aligned with our application to the university ethics board, we conducted interviews with 20 out of 36 new teachers from the 2020–2021 middle years/SRL cohort after they completed the final semester of the program. Twenty-three teacher candidates consented, but three were not available when interviews took place. The interviews were conducted by two of us (Miller and Schnellert) and lasted between 25 and 45 minutes using open-ended questions. Thus, both interviewers were insiders and able to engage in dialogic interviews. However, responses may have been more positively oriented than they may have been if a non-teaching research assistant had conducted the interviews.

Through data analysis, we sought to identify qualities of our pandemic pedagogies and teacher candidates' experiences during their practicum. At the outset of data analysis, we analyzed the responses of four interviewees (Miles et al., 2020). We selected the latter for their ability to provide a cross-section of perspectives based on gender, geographic diversity (in terms of their

practicum), and experiences within the program. We coded the data for possible themes and brought these to a research meeting. Analysis was collaborative and iterative, as we negotiated emerging themes and interpretations (Miles et al., 2020). We used the themes and subthemes we agreed upon as our *a priori* framework to guide the coding of six more interviews for a total of 10. Themes were refined and the remaining interview transcripts were analyzed.

Findings

We report findings using our research questions: *How did teacher candidates experience online teacher education?* and *How did teacher candidates apply what they learned in online teacher education to their face-to-face practicums?* Rather than sharing every response (TCs had a lot to share), we focus on recurring patterns in teacher candidates' responses regarding their lived experience.

Experience of Online Pedagogy

Teacher candidates were enrolled in eight online courses in the first term of the program, four of which were taught by our instructional team. All courses were originally designed for in-person learning. Teacher candidates described three kinds or types of pedagogical approaches: primarily asynchronous courses, transmission/lecture-oriented courses, and activity- and discussion-based courses.

When referring to our self-study team's courses, Kaleigh explained:

I appreciated the fact that most of our work was synchronous. I know some people are really Zoom burnt-out, but I felt like we needed it to be engaged. With asynchronous work I feel like you just don't learn the same way — to read and write and do a discussion online is just not the same as talking with people.

There were lecture components in the majority of our online class meetings. Teacher candidates did not comment much on this aspect of our instruction. Rather, they reported that their

most significant learning occurred from and with each other in breakout rooms, where they discussed guiding questions or completed a learning activity. They appreciated how our team approached the breakout rooms in ways similar to “table talk” or “small group work” in a face-to-face classroom. The breakout rooms “gave the opportunity to reflect on everything that we were learning further and [to] hear different perspectives from our cohort-mates” (Arsh). Alex shared:

It was very valuable that whenever we talk[ed] about something we [had] an opportunity to just take a step back, we all [got] a chance to talk about it, flesh-out our ideas, bounce off other people, talk about our experiences and so on.

But continued:

Except for the times where it wasn’t, if that makes sense? Because there were certainly a lot of times where we would very quickly say, “Oh I didn’t do this reading,” or “I didn’t have the time,” or “I don’t know what to think about this.”

Failing to keep up with the reading and completing tasks to bring to class was a significant challenge for teacher candidates.

Some teacher candidates found online experiences monotonous or repetitive, particularly when the mode of interacting within a course was similar across many courses. Max shared:

A lot of the classes felt very similar based on the assignments given. So, it was tough to keep track of what classes we had to post discussion board replies to, by a certain point they all looked the same.

In many courses, teacher candidates were required to interact in discussion posts (e.g., responding to a question posed by the instructor, reading and responding to peers’ comments). Max shared: “we would get a discussion going and you probably need several hours to read through all of it. Which meant that a lot of it wasn’t getting read, which detracts from the motivation a little bit.”

Teacher candidates responded positively to our team's efforts to offer multimodal learning experiences. Eli felt that multimodal activities during online courses "recognized that students learn in different ways and at different rates." Despite our efforts, teacher candidates who self-identified as "hands-on learner[s]" found the majority of their online course work difficult. For example, Romina shared that whether it was synchronous or asynchronous, she found the majority of the program was

so hard. I am a very hands-on kind of visual, hands-on, experiential learner. I need to do it to learn it, and to be able to replicate or implement. This was personally very challenging for me, as a learner, it was really hard to adapt.

Some teacher candidates contrasted their experience with our team who "adapted all their activities to online ... changing things around to make it interesting" to other instructors who were more transactional, "they were just like, 'Here's the content, just read and come to class,' or not even come to class if it's asynchronous" (Samantha). Efforts to offer multiple ways to engage with, process, and represent concepts were positively received. Eli observed:

You provided our cohort an abundance of opportunities for discussion, for example in breakout rooms, we watched videos, activities, just the multimodal aspect of learning as opposed to just reading a textbook. There were a lot of different ways that we could learn from our classmates, our instructors.

Our instructional team struggled to find ways to offer students experiential learning that modeled instructional practices that could be applied in their face-to-face practicum teaching. But when we did, teacher candidates noticed. Many of the instructional practices that teacher candidates experienced online helped to build their teaching toolbox because they could transfer the experiences into a face-to-face classroom, although some experiences had to be talked about rather than experienced. The teacher candidates found "the activities that we actually engaged in

were so much more useful and I actually applied those into my practicum” (Darshi). Teacher candidates appreciated when they

would read about activities and in the next class we would do them, granted, online, but nonetheless still doing them. It’s one thing to read about a learning activity, but to actually see it unfold and then participate in it was a lot more helpful. (Kasey)

What resonated most with teacher candidates were open-ended strategies used recursively across our four courses. For example, from the first day of the program, teacher candidates were introduced to liberating structures (see: liberatingstructures.com) as adaptable for in-person and online learning. As Nasrin noted: “A lot of the things that we were doing online like the spiral journals, and the mad-tea kind of stuff ... translated really well to in-person [teaching and learning].” However, virtual classes could not capture the dynamics of in-person learning.

Although “the instructors would basically try to model different strategies ... it was kind of tough sometimes seeing it modeled in an online setting and then us trying to have to implement that in-person (Arsh).” For example, in a face-to-face learning experience, our team would often engage in circle pedagogy. Although we still held circles online, we were not able to have the full experience of the circle formation. Samantha noted, “we would never actually feel what a circle was like ... so that was constraining a little bit.”

There were pedagogical practices that translated well online. But there were many instructional routines, practices, learning activities and even content that did not transfer well from in-person to online instruction, and from online instruction to the teacher candidates’ practicum efforts.

Collaboration and Community

In their interviews teacher candidates shared their impressions of our work as a “core” team across our courses, noting that “the four perspectives you brought were totally different yet

cohesive” and that there was a “flow of all the content that we learned, everything was building up to something ... and we re-visited it with many different lenses” (Mevin). Kaleigh shared, “I think what I noticed the most is the collaboration between the four of you. I felt your collaboration, and so it made it really easy to see the work at play.” Christine noted: “As a cohort we felt like the four of you were ... so supportive and made this community. So, it was nice that sometimes we had just two of you and sometimes we ha[d] all four.” The cross-team collaboration had an impact on the teacher candidates:

[I]t was nice for us going through the [first term] ... with that same structure and then going to the second one it did, it felt like a safe space because we saw the four of you so much. So, then it was easy to share ... we felt like a strong community. (Christine)

Darshi shared:

All four of you ... made our environment comfortable, before even learning. [You] made it clear that it was a judgment-free zone, that you were there for us, and you cared for us, and there was just so much love that all of a sudden we were all not nervous and we were learning. I found it easier to listen, to learn, to process whatever everything you were saying — trying to understand it, trying to take it, and digest it, and then reflect on it ... it was so much easier to do, because it was you four teaching, and you first created that environment before we even started learning.

Many teacher candidates referenced the beginning of the program. Darshi noted, “you model; I mean you say ‘we teach who we are,’ and I could really see that, and it really inspired me ... that set the stage and set the tone for the rest of the program.”

Teacher candidates described the cohort as “close knit,” “cohesive,” and “supportive.” Darshi recognized that the “culture that you four brought into the cohort” allowed her to “feel very supported, and loved, and cared for and that helped me with my learning.” Although the teacher

candidates were physically apart from each other, they were connected. David shared that he “didn’t feel like I was doing this thing alone.” Darshi contrasted her experience with the core instructors with other courses across their program noticing when they felt isolated,

It was all, ‘Let’s get down to business, this is what I need to teach you today. Here’s your material, here’s your assessment. Oh, you didn’t do well? Not my problem.’ [But in the self-study courses] even though it was online, I felt well supported even though I’m in a different environment. I still felt very well supported, everyone had everyone’s back.... I had friends in other cohorts; they didn’t experience this.

Interestingly, one teacher candidate who bridged her program (had in-person experience with the cohort the year prior) shared that the “online learning environment was more cohesive” and the cohort was “healthier than last year’s group.” She described how being online mitigated some of the “cliques” that form when folks are physically together “because there wasn’t that chance to be in the hallway and gossip” so it was “easier to navigate socially” (Shoshana).

Responsivity

Several teacher candidates mentioned that the self-study instructors were “flexible and adaptable” and “willing to adapt to the general needs of the cohort ... asking us what we needed, and then taking our feedback and then implementing it” (Romina). Max described how the team modeled adaptability:

The four of you showed a great sense of adapting to the needs of us in our cohort; I got a sense of that all the time in terms of what you were asking of us on a weekly basis and also in terms of our assignments. You were able to detect our feelings and needs quite well and chang[ed] your expectations in accordance with that.... I want to emulate that in my practice in the future, being adaptable to people’s needs. Especially in terms of what I’m asking them to do.

Teacher candidates found connections between our focus on middle years, SRL, and SEL and our instruction. For example, Romina observed that our team of

instructors were teaching us through modeling ... where we were being taught that social-emotional learning and that self-regulation should be this beautiful thread through our teaching pedagogy, and that for us to be available to our students we need to practice those things ourselves and I felt like that was deeply modeled to us. So, it was easy to find ways in our short practicum to integrate that into our practice, because it was constantly being modeled to us.

How Did the Teacher Candidates Apply/Navigate What They Experienced in Their Practicum?

As noted above, with all teacher education courses online, Middle Years/SRL teacher candidates often struggled to understand how particular theories and pedagogical approaches could be applied in classrooms and schools. We were curious to learn if and how teacher candidates were able to apply key practices and concepts in their practicum setting. Their experiences were quite diverse, from easily taking up ideas to having to carefully negotiate opportunities to making theory/practice connections to having more familiarity with a concept than their own mentor teacher had.

Praxis

Some teacher candidates saw and experienced alignment between content from their online teacher education courses and their face-to-face practicum setting. Alex noted:

I saw a lot of what we were talking about.... Especially in regards to how to talk to students, how to deal with these kinds of complex issues, how to deal with grading, how to make curriculum more personal to kids. There's definitely a lot that I could see being implemented already. There was definitely a 1–1 relationship there.

Alex had some challenges in his practicum and this connection between theory and practice gave him a reference point when he had to address some significant issues. Samia was grateful to be in a practicum where she “could see some of the things we were talking about ... these teachers seemed to be on the same page as if they were connected to the program.” However, she felt that this was not the case for all teacher candidates,

like I got lucky with my practicum setting, because it seemed like not everyone was experiencing similar things ... I appreciated the way the [First Peoples] Principles [of Learning were] on the wall and they would make references to the[m]. They would do outdoor learning and then would talk about certain principles and things.

For many teacher candidates, their in situ opportunities focused less on implementing and exploring pedagogical praxis. In his interview, Alex explained:

Sometimes it was hard [to focus attention on] what we learned and were trying to apply. I had a lot of feedback focused on [classroom management]. And so that kind of [took away from focusing on middle school philosophy and pedagogy].

Romina found that all her professors and courses offered and emphasized important theory and research — which was too much to implement in her practice. She took a pragmatic stance as she tried to decide where to direct her attention in her practicum:

Some of the advice I was given was, “take what you can from everything, cater to your strengths.” So that meant that we weren’t going to take everything that we learned from SEL and everything we learned from SRL and First Peoples Principles of Learning, it wasn’t going to all get crammed in there ... take what you can, implement where and when you can. Which was helpful because on the one hand I was incredibly overwhelmed and stressed out, so it helped me realize [that] I don’t have to worry about meeting everything.

Samia also struggled to apply many of the strategies she had learned in our online classes, yet she integrated some central principles we explored:

How many SEL strategies did I consciously build into the classroom? I don't think I did much of that. It infected the way I interacted with students. For example, if someone's tired, not being like, "Hey get up and do work," but treating them with understanding if they come in with emotions and that sort of stuff. I think my framework was effective, but in terms of what I incorporated actively into the classroom, that was hard in long practicum.

Jerry also felt overwhelmed by the number of ideas that she learned in her online teacher education courses. However, she found success by focusing on one big idea introduced in our cohort: "A big thing that I was doing in my practicum [was] self-regulated learning. I felt like that was a big thing I did in my class [a]nd something that my SA had already implemented." Jerry benefited from focusing on a pedagogical approach that her mentor teacher valued. In a year where all B.Ed. coursework happened online, the practicum became even more important in terms of supporting teacher candidates to make pedagogical meaning. When teacher candidates focused their attention on just a few research- and theory-based pedagogies and their mentor had commitments to these or similar approaches, teacher candidates had opportunities to learn through exploration and in situ application.

Jerry had an interesting situation. She completed her first practicum in our partner school district, but because the program stayed online the entire year, she was able to move home and complete her extended practicum in her hometown. The change in sites afforded her the chance to step back and compare how and what she learned in the two settings:

[In] my first experience I felt like there was a disconnect between what we were learning and what was happening in my practicum classroom. We're learning what's the new

theory, what's the best approaches in your classroom, and I felt like, "Oh that's not really happening in my practicum classroom, I'm not seeing that with my teacher that I'm with there. Try and memorize this, put it on a worksheet and add this." As a practicum student you're like, "what the teacher's doing, this is what I should be doing, too." So, I planned lessons in that space, they were along those lines as well. But then when I switched [sites], my teacher was reading all of the [first author's] books and implementing that in her space. She was doing some pro-d work that I could take part in, so that's when it really clicked for me. Even my first day, I could picture what we were reading about because I could see her doing it in the classroom.

Teacher Candidate Agency and Transformative Pedagogies

Looking at the interview data, more than half of the responses regarding practicum related to taking up transformative pedagogies. Disassembling the traditional grammar of schooling to take up equity, diversity, inclusion, and decolonization (EDID) required teacher candidate agency. There were many successes to report; however, TCs struggled to implement EDID research- and theory-based practices in their practicum classrooms.

Teacher candidates encountered common barriers such as the lack of resources and the need for more preparation time. For example, Samia explained:

We had this big plan, me and my teaching partner, that we were going to do a science unit with Indigenous ways of knowing. We were so excited about it. But as it evolved and the teacher was like, "Oh you need to teach that specific thing, and that," and then it just became, "We don't have the resources right now, we'd have to like read ten books to figure it out," it just became, "Right now we just need to teach what we need to teach. We'll figure it out, we'll do it better next time."

In other cases, there was pushback from mentor teachers, students, and/or parents. Kaleigh faced a dilemma working with a very experienced teacher. She herself was a mature student with extensive school-based volunteer experience; she had voraciously read EDID-related resources and attended EDID-related professional development. She struggled to find an opportunity to apply these ideas in her practicum classroom. The teacher was not open to Kaleigh taking up ideas related to EDID-oriented SEL.

For Avneet, her mentor teacher was supportive of her goal to transform classroom assessment to empower all students, but when shifting assessment practices to focus on student-centred formative assessment and mastery, she encountered resistance from students and parents. In her interview she shared:

This program really allowed me to think about the importance of growth mindset, and I really liked the way that we now look at assessment, it's meant to promote a growth mindset. However, I feel like in my experience, the students, the parents, and everyone didn't interpret [the assessment] that way.

When it came to transformative pedagogies, the experiences of teacher candidates were very different. Some worked with mentor teachers who embraced every opportunity that arose. Jerry reported:

This year's been crazy in terms of inclusion, and racism, and equity. In my practicum, every Thursday I showed up and there was a new thing we had to discuss in the practicum class. It was always like, "This anti-Asian hate crime happened last night, that we need to address," so that was really prevalent in my practicum classroom. When something happened, we would address it and talk about it.

In contrast, Kaleigh found that her mentor teacher was not interested in using Universal Design for Learning, an inclusion-based planning framework:

[I was] told, “Oh don’t worry about that, we just can’t ... sometimes we’re just not going to get to them.” And I’m like (gasp). So just as a learner, this doesn’t feel good and I wanted entry points for the kids.

In pursuing her focus on SRL, Arsh helped a student who was neurodiverse in her practicum class find agency despite teacher-imposed limitations:

There was one specific situation where I was learning about inclusive education, and my SA really believed in building adaptations for students around the spectrum, but I kind of wanted them to do what everyone else was doing. So, I tried to basically make my lessons towards that, but then my SA was like, “no you have to have different work for them, different adaptations,” and I obviously took the feedback. Then it was really interesting, where there was one experience where I had built an adaptation after my SA recommended that the student would need it, but the student actually turned it down. And [I] was like, “no I want to do what everyone else is doing.”

There were some instances where teacher candidates felt empowered to share and implement what they had learned in their online teacher education courses. In his interview, Max shared:

There were moments where it seemed like [the SA] was taking some things from my notebook, you know she was learning things from me, in terms of fostering identity, and in terms of fostering a more inclusive classroom environment. And she said so, you know there was one lesson that I did on SOGI [sexual orientation and gender identity] issues, and she was quite clear in the fact that she needs to do much more to inject that aspect into her teaching.

He went on to share:

It's something that I completely didn't think about going into practicum. Like, "what's she going to learn from me?" But wait — she [did] learn some stuff from me, and I have a responsibility I felt, as reflecting that state of the art [EDID pedagogy] — to put it out there and to try it out, so that was a big, an important part of what I was doing in practicum.

In such instances, it was evident that teacher candidates were developing agency as reciprocal learning occurred within the mentor teacher-teacher candidate dyad. Romina explained:

I think a lot of that has to do with younger teachers with different training, compared to teachers that have been in the profession for many years, and maybe don't have as much training in the First People's Principles, they don't really know what that is. It was cool to come in as a teacher candidate and reflect back and say, and think, "That's actually First Peoples Principles, you just did that right there. And the way you delivered that ..." and it was — it was cool to do that, and also help be part of that education and be that informative.

Romina brings up an important point. While teacher candidates are novices, they also have access to research, theory, and practice that is leading edge. Eli shared:

It felt like it was very new, these were ideas that I don't think were shared by many of my colleagues in the practicum school because they are educators that have been teaching for 15, 20 years.... I was working with relatively new theories. And these theories were being discussed at professional development days where my SA and our colleagues were learning, and I would say, "Well this is what we already know, and we're learning at UBC." For example, we learned about ... the First Peoples Principles and how to embed them into our lesson planning. I felt that the staff at the school viewed the First Peoples Principles almost like ticking a box.... And I had to explain during this professional development day, we had learning teams with my SA and a few others, "they're not core

competencies, we're not just picking one or two, right? Ideally, we're doing them all or we're seeing the value in them all." So, I think my view, or my understanding was probably more holistic and more accurate than the way the professional development might have been explaining it.

Discussion

This collaborative self-study offered us insight into the practices we value (e.g., relational, equity-oriented pedagogy) and how we can take these up online. We found relational, synchronous, SEL-infused pedagogy to be central to teacher candidates' learning and success. Teacher candidates identified the importance of time spent developing a cohesive community and how a culture of collaboration fostered a sense of connection and belonging that empowered risk taking (Bjorklund et al., 2021; Noddings, 2012). Teacher candidates noted that they were more actively engaged in online classes where instructors used multimodal approaches. This was most evident when they made comparisons to classes that used discussion boards as the primary pedagogical tool, particularly in asynchronous classes. Responsive planning and teaching were valued by students. This was especially true when teacher candidates were asked for feedback and were part of decision-making regarding instructional approaches. Engaging teacher candidates as co-constructors of the curriculum aligns well with research regarding online pedagogy (Quezada et al. 2020) and SRL (Butler et al., 2017). Finally, middle years/SRL teacher candidates felt that, even online, modeled instructional practices had a direct connection to their practicum.

We must underscore that teacher candidates and teacher educators were navigating a pandemic during this time. During COVID-19, educators' psychological state was impacted by constant stress and worry (Apperibi et al., 2020; Klapproth et al., 2020; Ozamin-Etxebarra et al., 2021). It is not surprising that teacher candidates struggled to focus during online lectures, keep up with readings, and found responding to online weekly posts monotonous. Teacher candidates were

also navigating the pandemic, unable to see their friends and families, and were engaging with peers online that they had yet to meet in person. Hodges et al. (2020) note that we must be careful not to conflate emergency remote and well-designed online teaching. We mounted an entire teacher education program online without faculty having the opportunity to collectively plan for diverse online pedagogies across the eight courses that students took; this likely resulted in some of the poorly received instructional approaches.

Teacher candidates identified that our courses benefitted from consistency of SEL-infused approaches, open-ended strategies, and synchronous dialogical approaches such as breakout rooms, chat-box responses, group projects, and drama techniques (e.g., role playing). Teacher candidates acknowledged and valued that the four of us planned and taught collaboratively and made efforts to model relational approaches. We, as a team, struggled to keep up, planning for online instruction literacy days, hours, and minutes before class began. Despite our concerns, the teacher candidates were able to articulate how our teaching practice aligned with middle years philosophy, that is, we engaged in relational practices with each other through collaboration and co-teaching, and with our students by cultivating a caring community and weaving SEL and SRL throughout our classes.

While this study highlights the benefits of planning as an instructional team, we recognize the challenge in scaling up this approach. In its current configuration, UBC's B.Ed. program, with 800+ teacher candidates, over 140 faculty, and many graduate student instructors and TAs would struggle to create opportunities to plan together. One solution might be to have fewer instructors teaching more courses to the same cohort. Although this is reflective of middle years pedagogy and philosophy (AMLE, 2010), we also see this as good practice inclusive of all levels of teaching and learning.

Research related to online teacher education points out the potential for online learning to modify pedagogy (O’Byrne & Pytash, 2015). While we wonder if all teacher educator courses lend themselves to online teaching, we have, ourselves, transformed our practice and now have the capacity to use online pedagogies to welcome guest speakers (and teacher candidates) from across the province into our classrooms. Online teacher education programs have the potential to counter the “brain drain” when teacher candidates leave their communities for university. These teacher candidates often do not return, perpetuating inequities for rural and remote K-12 schools and students.

As adaptive as we were, this research highlights how online teacher education courses can be ill-suited for preparing teacher candidates for in-person practicums and teaching positions. When teacher candidates had the opportunity to participate in and/or try our pedagogical approaches in their school visits, they reported significantly more meaningful learning and praxis. We found that teacher candidate agency developed when they worked to realize praxis in practicum settings (Johnson, 2012).

One key contribution of this research is an illustration of how equity- and identity-oriented teacher education can be taken up online as interactive practice that decentres the role of the teacher and requires reflexivity, co-construction, and responsive practice (for both teacher educators and teacher candidates). Teacher candidates did encounter barriers in their practicums that had to be addressed, particularly in light of calls for anti-racist education (Simmons, 2019). But navigating barriers in situ offered teacher candidates opportunities to consider and address EDID at personal, pedagogical, and structural levels.

Finally, this study illustrates how teacher educators can find support, encouragement, and creative energy through collaboration such as co-planning, co-teaching, and dialogic engagement across courses. Most successful were our monthly meetings to debrief, problem solve, and

coordinate assignments including a cross-course pedagogical stance task. However, most detailed planning had to happen in dyads (Bel/Leyton; Marna/Miriam) to work out online practices and co-teaching roles. One specific benefit was that Marna (school district-based teacher) and Miriam (university-based researcher/lecturer) were able to teach two courses together owing to the flexibility of online platforms. We will collaborate to introduce and take up dialogic approaches that explicitly decrease precarity for teacher candidates from equity-deserving communities.

Now that we have extended our capacity to integrate technology into our courses and developed equity-oriented, interactive online pedagogies, we look forward to collaborative teaching, both online and face-to-face, beyond the pandemic.

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Chapter 11

Online Doctoral Student-Supervisor Relationships: Exploring Relational Trust

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Abstract

Case study research was used to examine online graduate supervision from the perspectives of supervisors and students who engaged in a Doctor of Education (EdD) program intentionally designed and offered online before the pandemic. The theory of relational trust framed analysis of online doctoral supervisory relationships. Individual interviews with five doctoral supervisors and five EdD graduates were coded through cycles of analysis. Four findings were discerned: (a) A strong interrelationship between the four discerning elements of relational trust indicated the need to cultivate all four within student-supervisor relationships; (b) Respect and personal regard for others were two of four elements of relational trust that surfaced most strongly for supervisors and students; (c) Establishing relationships and developing shared expectations needed to begin early in the relationship to build relational trust; and (d) Trust was maintained throughout the doctoral student's education through frequent, flexible, and responsive online communication and collaboration. Findings demonstrate the importance of supervisors taking the lead in establishing and maintaining relational trust in online supervisory relationships, with implications for institutions to create the human and technological conditions for meaningful, authentic, and respectful online supervision. Institutions have an important role to play by providing online faculty development to expand capacity in high-calibre online supervision. Recommendations are provided to supervisors and institutions to inform and improve the quality of online graduate supervision practice more broadly, especially in the context of the pandemic pivot to online teaching and learning.

Résumé

Dans cet article, nous avons examiné, grâce à une étude de cas, la supervision en ligne d'étudiants au doctorat du point de vue des superviseurs et des étudiants, dans le cadre de notre programme de doctorat en éducation (EDD) délibérément créé et offert en ligne dès avant la pandémie. La théorie de la relation de confiance a permis une analyse des relations superviseurs-étudiants. Les entretiens individuels de cinq étudiants au doctorat ainsi que de cinq superviseurs ont été codés à partir de plusieurs cycles d'analyse. Nous avons ainsi relevé quatre résultats : (a) il existe une relation profonde entre les étudiants et les superviseurs suivant les quatre éléments de la théorie de la relation de confiance; (b) eu égard à cette théorie, le respect des autres est l'un des éléments qui s'est le plus démarqué; (c) la création d'une relation et les attentes qui en découlent doivent être établies très tôt pour stimuler un climat de confiance; et (d) grâce à la collaboration entre les parties, soutenue par une communication fréquente et flexible, la confiance se maintient tout au long du programme. Les résultats démontrent que les superviseurs doivent prendre en main et maintenir une relation de confiance afin que la relation superviseur-étudiant du programme en ligne fonctionne bien. Ceci implique que les établissements postsecondaires doivent offrir les conditions technologiques nécessaires afin de créer des conditions authentiques et respectueuses de la supervision en ligne. Les établissements ont un rôle important à jouer dans le développement professionnel des superviseurs afin d'offrir des supervisions en ligne de haute qualité. Nous offrons des recommandations aux superviseurs et aux établissements dans le but d'améliorer la supervision en ligne, notamment dans le contexte de la pandémie qui a largement ouvert la porte à l'enseignement et l'apprentissage en ligne.

Online Doctoral Student-Supervisor Relationships: Exploring Relational Trust

Doctoral education and supervision are core teaching responsibilities in research intensive universities and faculties of education across Canada. Effective graduate supervision, however, goes beyond guiding students in achieving milestones in the academic program and their research. Establishing and maintaining productive relationships is vital to a successful graduate experience for both supervisors and students. The role of trust is key for ensuring well-being and optimal performance for those involved in that relationship (Al Makhemreh & Kutsyruba, 2021; Helliwell & Wang, 2011; Tschannen-Moran, 2014). Expansion of online and blended professional graduate programs require supervisors and students to navigate and negotiate ways to cultivate productive relationships using primarily technology-enabled learning environments. Trust can begin to manifest early in online supervisor-doctoral student relationships through a “shared commitment to understanding each other” (Jacobsen et al., 2021, p. 635).

In this chapter we, two supervisors and one postdoctoral scholar, explored the ways in which relational trust was developed in online doctoral supervisory relationships at a large research-intensive university in Western Canada. While the five doctoral students and five supervisors featured in this study met with their supervisor/student during the 2 week on campus summer session, the remaining interactions and communication between them were conducted online. The importance of the student-supervisor relationship was articulated by one of the doctoral graduates in our study:

you can't just walk down the hall and find them. You are a long way away ... I think that would be really hard for people. . . . I think in my case, having that person was the most critical factor in terms of ... feeling good about things. Getting through, feeling confident. That's such an important piece and, and I don't know how you prepare faculty members to

take on that role in this particular setting, because it's different as well, right? It's not ... somebody's not sitting in their office. They are not right there.

Doctoral supervisors play a critical role in mentoring students. For decades, supervision has mostly occurred in person, either in offices, field settings, or in the lab. The global pandemic has required supervisors and their doctoral students to pivot to online supervisory relationships, which has left many supervisors and graduate students in uncharted territory regarding mentoring and learning at a distance. Online technologies can expand equitable access to graduate school and can enhance temporal and geospatial flexibility for student-supervisor relationships (Kumar et al., 2020). However, without formal preparation, many supervisors have had to adapt on the job or rely on past experiences in developing online supervision practices (Richards & Fletcher, 2020), for better or for worse.

Determining the ways in which relational trust is developed in online doctoral student supervisory relationships is paramount to moving forward as the world emerges from the COVID-19 pandemic, and in responding to ongoing shifts between wholly or partially online doctoral supervision. Our study gives voice to the elements necessary for relational flourishing between students and supervisors in online supervisory relationships.

Theoretical Framework

The significance of trust is well established as the primary component of positive and productive relationships (Al Makhamreh, 2019; Al Makhamreh & Kutsyuruba, 2021; Bryk & Schneider, 2002; Cherry, 2016; Cranston, 2011; Leithwood & Louis, 2011; Robinson, 2011; Tschannen-Moran, 2003, 2014; Walker, 2010). Kutsyuruba and Walker (2015) define trust in leadership as:

The extent to which an individual engages in a reciprocal interaction and a relationship in such a way that there is willingness to be vulnerable to another and to assume risk with

positive expectations and a degree of confidence that the other party will possess some semblance of benevolence, care, competence, honesty, openness, reliability, hope, and wisdom (p. 109).

Trust is the primary pillar of social relationships (Brabaxon, 2016; Covey & Merrill, 2006; Kutsyuruba & Walker, 2015; Robertson, 2016). Relational ties between supervisor and students establishes an interconnectedness that informs interrelationships. While Bryk and Schneider (2002) conducted their research in K-12 school contexts, we found that their multilevel theory was well suited for examining interpersonal exchanges within supervisor-student relationships. Relational trust, expanded through four discerning elements, that is, (a) respect, (b) competence, (c) personal regard for others, and (c) integrity, offers a useful theoretical frame for describing the extent to which there is consonance between the supervisor's and student's expectations and obligations. We contend that for relational trust to take root and grow, both supervisor and student must observe the behaviour of the other as consistent with the following four mutually held expectations.

Respect

Effective supervisory relationships entail a long-term and multifaceted social exchange among students, supervisors, instructors, and examiners. A base condition is reciprocal respect, in all interactions and relationships, that includes a process of genuine listening, along with a recognition of the important role that each person plays in the doctoral student's education as well as the mutual dependencies that exist among various parties in these activities.

Competence

Competence in the execution of an individual's formal role responsibilities is the second criterion for trust discernment. This consideration connects directly to instrumental concerns about the supervisor's ability, disposition, and expertise to guide and support student research and the

student's ability to achieve desired outcomes: coursework, research proposal, candidacy exam, academic writing, analysis and interpretation of data, and final oral exam preparations.

Personal Regard for Others

Personal regard for others is experienced as individuals perceive that others care about them and are willing to extend themselves beyond what their role might formally require in any given situation. Bryk and Schneider (2002) contend that mutual dependence and personal vulnerabilities characterize social exchanges concerned with relational trust. The importance of personal regard is particularly evident in supervisor-student relationships.

Integrity

Integrity is experienced when there is consistency between what people say and what they do. Integrity implies that a moral-ethical perspective guides and propels one's work. Integrity is manifested within the supervisors and students' relationship when there is a shared belief and value that both sides will follow through on commitments and do what is necessary to ensure the progress and the quality of the research.

The four discerning elements of relational trust provide a powerful theoretical framework for analysis, as each is embedded in the microlevel behaviour between supervisor and doctoral student and serves as a moral imperative for action.

Methodology

A case study research methodology (Merriam & Tisdell, 2015) was used for this qualitative research to "provide a nuanced view of reality" (Flyvberg, 2006, p. 223). This approach allowed the research team to understand the how and why of online supervision experiences from the perspectives of supervisors and doctoral (EdD) graduates in one university, while also comparing differences between these unique stances and perspectives on the development and maintenance of effective supervisory relationships. This single case study is a bounded system consisting of

doctoral students and supervisors in the EdD program. The unit of analysis is the relationship between supervisors and doctoral students. The research question guiding this research is: What are the ways relational trust is established and maintained in online doctoral supervisory relationships and engagements in an online doctoral program?

Supervisor participants were purposely selected from the researchers' home university based on reputation (Miles et al., 2014) and using the criteria of successful supervision of doctoral students to degree completion. Doctoral graduates were purposefully selected from those who had successfully completed their Doctor of Education program (EdD) within the past six years. The EdD graduates undertook their program primarily in online environments with the supervision of the research proposal and the dissertation undertaken solely online. Data were derived from individual interviews with five supervisors and five EdD graduates who consented to participate in the study in July and August 2020. In our sampling, the supervisors and EdD graduates were not paired: in other words, since no identifying data were collected to preserve anonymity, it is not known whether the EdD graduates who were interviewed were supervised by the faculty who participated in this study. Semi-structured interviews were conducted and anonymized by a research assistant (author 2) prior to releasing transcripts to the team for analysis. All three authors engaged in analysis and interpretation of the anonymous data.

Analysis

Initial exploratory coding was conducted by the researchers to examine broad themes related to supervisory and doctoral students' experiences. In order to maintain inter-rater reliability, the authors coded one transcript jointly, thereby determining and maintaining consistency of process. All remaining transcripts were coded individually by the researchers, in which each author took the lead on three of nine transcripts, followed by team discussions to further establish consistency in coding. Second and third rounds of coding were conducted on all

the transcripts to confirm or challenge findings, with follow-up discussion to resolve controversies. Six organizing themes were identified: (a) personal experience being supervised; (b) learning to be a supervisor; (c) supervising online; (d) relationship building; (e) supporting academic writing; and (f) supporting online coursework. From these six themes, the building of trusting relationships as a key determining factor in strong supervisor-student experiences became evident. This discovery led the researchers to conduct another re-coding of the data with a focus on Bryk and Schneider's (2002) four key elements of relational trust. Follow-up coding helped to determine overlaps between criteria and patterns between EdD graduate and supervisor groups.

Findings

Four findings were synthesized from our analysis of data using the theoretical frame of relational trust:

1. Strong interrelationship between the four discerning elements of relational trust was discerned, indicating the need to cultivate all four within student-supervisor relationships.
2. Respect and personal regard for others were two of the four elements of relational trust that surfaced most strongly for supervisors and doctoral students.
3. Establishing relationships and developing shared expectations need to begin early in the relationship in order to build relational trust.
4. Trust was developed and maintained throughout the student's doctoral education through frequent, flexible, and responsive online communication and collaboration.

In the following sections, we elaborate on each of the findings using evidence from interviews.

Respect, Competence, Personal Regard for Others, and Integrity are Interwoven

A strong interrelationship was found between the four elements of relational trust, confirming the presence of all four discerning elements and how these emerged in an interwoven manner in productive online supervisory relationships. The synchronous enactment of the four

elements was observed in how graduates and supervisors articulated philosophical statements on supervisory practices as well as in their descriptions of specific and intentional actions when supervising/being supervised. From our analysis, we classified these supervisor actions into four themes: (a) personalizing learning for each supervised student; (b) supporting the student-as-learner; (c) serving as an academic model; and (d) setting boundaries. We turn to these four themes to explore each in regards to relational trust.

Personalizing Learning for Each Student. A theme that was clearly articulated by supervisors was the necessity to personalize and tailor the program in response to the needs of the individual learner. Some supervisors made global statements about this belief, for example: “My philosophy of supervision is that it needs to be matched to the needs of students and differentiated.” The EdD graduates went further, however, by providing specific examples that outlined the ways in which their supervisor personalized their learning. This personalization could be conducted in seemingly insignificant ways, for example explaining the ethics review process to those new to academia, to more consequential personalized support such as a supervisor’s recommendation to enroll in an extra course to further support the student’s learning. Supervisors working in tandem with committee members also assisted in personalization, beginning with the supervisor’s thoughtful input into committee selection. The committee selection process as described by one student provides an illustrative example of the intertwining of the four elements of relational trust:

My supervisor really listened to me when we talked about who we were going to choose for the committee ... it was guided by my supervisor but it wasn’t mandated by my supervisor. My supervisor had a list. We looked at it together. We talked about the personalities of the committee members [and] what they could offer me. . . . [It] made me feel like I was part of a team as well as that there was an accountability piece for me too.

So because I was the one who made the suggestion for Committee Member 3 . . . I really admired my supervisor for taking a risk, because [they] didn't know Committee Member 3. [Committee Member 3] wasn't in a formal institution. And my supervisor demonstrated and modeled how they learned from Committee Member 3 as well.

When personalizing learning for this student, the supervisor demonstrated *competence* in ensuring the execution of their formal responsibility, that is, to ensure the selection of a strong supervisory committee. The supervisor also exemplified *respect* by carefully listening to the student, while considering and appreciating the roles of all members of the committee. *Personal regard for others* was embodied in the supervisor's expression of vulnerability and their willingness to take a risk by including a committee member who was not personally known, and who was not connected to a formal institution. The supervisor displayed *integrity* by attending to and following through on the student's choice in order to establish a committee that would ensure the quality of the learning and the work. In this case, we purport that the supervisors' attention to the individual and personalized needs of the student led to a high degree of relational trust.

Supporting the Student-as-Learner. A second theme, supporting the student-as-learner, meant that the supervisors saw their students holistically, as human beings first, and second as learners on a continuum. One supervisor indicated part of their practice involved regular check-ins with students, while another stressed the importance of developing relationships. For the supervisors, building relationships one-on-one and in groups could mean regularly scheduled informal online gatherings with no set agenda, and with students who are at liberty to engage in free-flowing conversation, to "as needed" opportunities for on-the-fly, flexible-in-time-and-space meetings to address specific issues or concerns. The intentional building of relationships with students was crucial, not just to ensure completion of the work, but for supervisors to lend support when students were feeling overwhelmed in their professional or even personal lives. The

supervisors' acknowledgement of students' complex and full lives outside the doctoral program led students to an expressed feeling of support, safety, and a willingness to be vulnerable.

Ultimately, as one student stated, it was about their supervisor's and committee's belief in them:

I knew, no matter how hard it was, if I was putting in the work, when it was time for me to defend, there would be no way on this good green earth that I would get to that defense part if they didn't think I was ready.

Paramount in this theme are all four aspects of relational trust. By demonstrating *integrity* and *competence*, that is, ensuring students had executed all requirements to ascertain the quality of the work, supervisors communicated their belief in students as learners. This meant attending to and *respecting* the nuances of students' personal and professional lives, which involved careful listening, achieved through the intentional building of relationships. The *personal regard* for the students' vulnerabilities, not just in their work, but in their personal lives ensured a mutual understanding of their interdependence in relation to successful completion.

Serving as an Academic Model. Supervisors in the study recognized in their own experiences the importance of, and sometimes the lack of, having a supervisory role model. Some supervisors reported extremely positive doctoral experiences, for example, ones in which expertise was acknowledged but not dominating. Other supervisors' experiences, however, were less fulfilling, as articulated by one supervisor: "I don't think I learned very much actually, you know, I'd say that I didn't have a really good role model." Whether they reported a good or weak experience being supervised themselves, the supervisors indicated a commitment to serving as a strong academic role model for their own students.

The EdD graduates all articulated, in different ways, the importance of their supervisor serving as an academic model for them. For example, supervisors were valued for: (a) sharing their depth of knowledge; (b) their "way of modeling what the expectation was in academia"; (c)

their participation in professional organizations; and (d) their joy in learning with and from their doctoral students. One EdD graduate described how they adopted and modeled for other doctoral students what had been modeled for them by their supervisor. When speaking of their experience, one EdD graduate stated that “there’s just something to be said for being a woman in education and having two women in education who are just so phenomenal in what they do and the work, the level of excellence that they ask of others and they ask of themselves.”

Being seen as an academic role model was a key element in the development of relational trust. Supervisors displayed *personal regard for others* by being willing to extend themselves beyond the stated requirements of their position. The supervisor’s willingness to go beyond was a demonstration not only of their *competence*, but also of *integrity* in that there was consistency between what they said and what they did, which acknowledged *respect* for all contributors who worked interdependently to achieve success.

Setting Boundaries. For supervisors, setting boundaries was a competency that spoke to *respect* and *personal regard* for others, but also for themselves. Though not specifically mentioned by students, setting boundaries was a common theme for supervisors. Setting boundaries could mean recommending a direction or scope of study, or bringing clarity to timeline expectations for writing and feedback, or assisting students in setting their own boundaries. Personal regard also came in the form of supervisors setting boundaries related to their own time, attention, and guidance. Some supervisors expressed that establishing clear expectations was challenging but necessary. It meant that the supervisors could ensure the *competent* execution of their role while maintaining *integrity*. Setting boundaries laid the groundwork for *respectful* back-and-forth relationships that showed a reciprocal *personal regard* and caring for the well-being of both student *and* supervisor. We observed that the descriptions of boundary setting by supervisors

revealed an intentionality in guiding students to develop agency and confidence, while maintaining relational trust and mutual respect.

Through their described actions, the supervisors interlaced the four elements of relational trust as an integral part of their mentoring practice. Demonstrating and living the four elements in their work with students meant that they forged relationships that embodied relational trust through respect, competence, personal regard, and integrity for the students and for themselves.

Trust is Built on Respect and Personal Regard for the Other

Our second finding indicated that *respect* and *personal regard* for others were the two elements of relational trust that surfaced most strongly in effective online supervisory relationships. Consistent with these two discerning elements, social discourse between supervisors and doctoral students were marked by genuine listening and an ethic of care that extended subsequent actions beyond what their role required of them. Supervisors and doctoral students depended on media such as telephone, email, or some other form of digital media to enable communication and connection. Therefore, the ways in which supervisors worked with the doctoral students to establish collaborative meetings and workspaces were important in shaping the relationship towards a shared goal. One supervisor highlighted the consideration that went into media choices “to really try to create spaces online that really foster engagement and relationship development. Like that’s just really, really important.” Other supervisors indicated that they used a range of media such as telephone, email, videoconferencing, collaborative online documents, file sharing, and on-demand computer system resources, e.g., data storage and management, depending on the task at hand. All five of the EdD graduates highlighted the importance they placed on the quality of their relationship with their supervisor. Acknowledging the high level of respect that they had for their supervisor, one doctoral student noted, “my relationship with my supervisor was more important to me than trivial debates at work.”

The majority of supervisors in this study extended themselves beyond the defined boundaries of their role as supervisor whether that meant finding additional times to meet; providing emotional as well as intellectual support; and/or being sensitive, flexible, and adaptable based on events impacting the student in their professional or personal life. One supervisor compared communication with doctoral students to a dance: “there are ebbs and flows to things and so knowing when they [the student] have their busy time, and then how do we match with the work that they’re doing.” Another supervisor described the need to have multiple approaches, highlighting “not just having one approach but that approach really does also need to be connected very much to each particular student and their needs.” Reflecting on their experience being supervised, an EdD graduate stated,

my supervisor understood my work environment and also rhythm and demands and expectations within that and ... the benefits to still working and being immersed in education in that way while working on your dissertation, so there was that understanding of not just the context of the phase I was in with my studies, but also my living — working context.

Supervisors also described their need to get to know the students they supervised holistically, not merely as students. Doctoral students were working professionals who were undertaking doctoral studies amid busy personal and professional lives. Supervisors provided multiple forms of support and scaffolding to doctoral students they supervised, noting “the overall wellness and mental health, the good people that I’m privileged to journey with that they, most of them, need a lot more support.” One supervisor described how they connected with a student weekly as this person was struggling with loss of work and feelings of isolation. The supervisor indicated,

this person is highly motivated, highly focused, really responsive to feedback. All those qualities that you really appreciate in a doctoral student, but she is really struggling because of the isolation and the loss of work. So a lot of my energy with this person has been focused on checking in with her every week. ... [O]f course, we always get to her progress in the doctoral program and that's fine, but a lot of my energy has actually been spent being an advocate for her, for additional supports, through student services and also for some financial help.

Our second finding amplifies how supervisors leveraged online communication and connection strategies to engage socially and academically with doctoral students in response to and in recognition of their students' diverse needs, and the ways in which their caring and ongoing actions went beyond what their academic role specifically required of them.

Building Relationships and Developing Shared Expectations Began Early in the Relationship

Our third finding expands on how doctoral graduates and supervisors reflected on the necessity of investing in relationship building and developing shared expectations early, in order to build relational trust from the start. Supervisors reflected on their own experience being supervised. Two supervisors described good relationships with a former supervisor, while three described transactional or distant working relationships with a supervisor. For example, one supervisor described how expectations for supervision have changed over time. "There was no support. I did my doctoral work. I don't recall being given opportunities to do a number of things that we offer our students today. ... It was a different culture I think than what we have today." Other supervisors concurred that expectations for supervision have evolved since they completed their own doctoral programs.

All five supervisors described or inferred a commitment to transcending their own experience being supervised in developing their approach to mentoring and working closely with

doctoral students. Some supervisors made direct connections between their own experiences being supervised and developing a different type of practice as a supervisor. One supervisor described meeting with their supervisor three to four times during their program, and then completing the dissertation on their own. While this supervisor emphasized they did not “feel badly about not getting a lot of personal contact, I learned to think that it was my responsibility to do the work,” but that their own approach to supervision is purposefully different, and “it’s about support and direction, and being responsive to the way that the student is undertaking the work.” Another supervisor indicated that a former supervisor,

was an interesting model because she was actually quite hands off in a lot of ways. Just kind of trusting me to shape my own program. Every once in a while she’d come in and say, ‘Okay, now you’ve got to start thinking about candidacy.’ And I think after that I was pretty much the one who did, driving dates and getting all of those kinds of things organized. Having said that, on the other hand, she was incredibly supportive emotionally. This same supervisor indicated their supervisory practice was still evolving, and that they are “still trying to figure out where that sort of sweet spot is between being hands off and letting students drive their own projects.”

EdD graduates described ways that role expectations and relational trust developed with their own supervisor. One graduate described the direction provided by their supervisor:

My supervisor anticipated things ahead of time and really prepared me for challenges, or scaffolded my learning in different ways, or was very flexible [and so] that encouraged me to do different things. And right at the end, they really challenged me to get it done in a timely fashion.

Another EdD graduate referenced the unconditional and ready support they were given by their supervisor: “the online piece, my supervisor was right there, anything I needed in any

platform, and the feedback was there and encouragement and resources, they would send my way.”

Preliminary and ongoing social exchanges needed to be organized around a distinct set of role relationships between student and supervisor to build relational trust:

Each party in a role relationship maintains an understanding of his or her role obligations and holds some expectations about the role obligations of the other. Maintenance (and growth) of relational trust in any given role set requires synchrony in these mutual expectations and obligations. (Byrk & Schneider, 2002, p. 20)

Supervisors and EdD graduates both emphasized that the relationship building started early and required ongoing attention and commitment to thrive.

Trust is Maintained Through Frequent, Flexible, and Responsive Online Communication and Collaboration

Our fourth finding was that trust was developed and maintained throughout the student’s education thanks to frequent, flexible, responsive, and ongoing online communication and collaboration. Supervisors and doctoral students engaged in a variety of online connections and collaborations in response to various stages of a student’s program.

From the very beginning the supervisor set the tone for communications, ensuring the meetings were designed beyond merely meeting the technical requirements of a doctoral program. Supervisors indicated that they established the tone for meetings by demonstrating genuine interest in the student as a whole person. This was best expressed by one supervisor who noted:

It is extremely important for me to build the relationship and not to be pulling out a bunch of forms and checklists and all of those other kinds of things. There’s nothing mechanical about my approach. I really want to get to know, within appropriate boundaries, I really want to get to know that person.

Supervisors and doctoral graduates indicated that building trust within the relationship was an ongoing process, not a one-time event. Building trust continued throughout a student's doctoral program with responsive exchanges and upholding obligations. The EdD graduates articulated the ways that supervisor responsiveness was manifest. For example:

I felt like [that] my supervisor was very responsive. And I heard back in a timely manner from email. We did have regularly scheduled phone calls and also Zoom meetings where we could connect and talk about how things were going and things like that.

The flexibility that supervisors extended to their doctoral students was acknowledged and appreciated by the EdD graduates. This was manifested by supervisors' responsiveness and flexibility to draw upon a variety of media, depending on what was needed to assist the student, particularly when providing feedback. One EdD graduate described the ways they engaged with their supervisor:

My supervisor is so dedicated, crazy amazing. My supervisor gives me immediate feedback online, I would include any online system that there is. It could be email. It could be within a shared document such as a Google Doc where my supervisor would leave feedback. It could be a phone call. It could be text messaging via phone. We kind of had a level of priority. So texting was kind of — I need your opinion on this like, now. Okay, I tried not to invade my supervisor's privacy if I didn't have to. So I didn't use texting a lot, but a little bit.

The EdD graduates were clear that the high degree of trust that was developed throughout the relationship allowed them to hear feedback as helpful and constructive. Supervisors were also clear that respect was imperative as it created a relationship in which honest supportive feedback could be provided, heard, and acted upon. One supervisor indicated that respect was a precondition

for tough conversations: “students and their supervisors need to have a healthy supervisory relationship where questions can be asked, hard conversations can happen, and it’s not about being offended by it.” A high level of caring developed within trusting relationships that made difficult conversations possible.

EdD graduates and supervisors described how trust was developed and maintained throughout the student-supervisor relationship and doctoral program with frequent, flexible, responsive, and ongoing online engagements. Supervisors described an intentional focus on the person in front of them, on building rapport early in the relationship versus starting with the forms and procedures in the program. EdD graduates shared their gratitude and respect for supervisors who listened carefully and demonstrated care for them as a person, who responded quickly to their concerns, made themselves available for scheduled and impromptu interactions, and provided regular constructive feedback on their work.

The four discerning elements of relational trust provided a powerful theoretical framework for our analysis and articulation of four key findings. We turn now to a discussion of the four discerning elements and how some emerged as more prominent in our findings.

Discussion

Building relational trust begins at the first meeting between the supervisor and doctoral student, is enhanced through preliminary interactions and engagements, and then is built and maintained over time. The initial meeting sets the tone for the relationship and provides the doctoral student with the assurance that the supervisor is invested in their success. This initial phase of building relational trust has been referred to as pending trust by Al Makhamreh and Kutsyuruba (2020). “Students enter the supervision setting with some level of expectation, or what we call ‘pending trust’ that the other party has good intentions, has the competencies to do the job,

and is committed to their identified roles and responsibilities” (Al Makhamreh & Kutsyruba, 2020, p. 132).

Relational trust is a multilevel theory and interweaves four discerning elements identified by Bryk and Schneider (2002). In our case study, we found evidence that this interweaving of the four elements was present in effective supervisory relationships. It was also the case within that interweaving, that at different times, one of the discerning elements became more prominent: when this occurred, the other three elements acted as reinforcement, providing strength and depth to the relationship. It became evident that the supervisor’s competence and integrity created the conditions for developing respect and personal regard within the relationship. This was made known through the ways the supervisors considered and ideated specific provisions for building relational trust in an online setting, by: personalizing learning; supporting the student-as-learner; serving as an academic model; and respectfully setting boundaries. The competence and integrity of the supervisor served to establish the conditions for reciprocal respect in all interactions and relationships, through a process of active listening combined with a commitment to a shared belief and value that both supervisor and student would do whatever was necessary to ensure both the quality of the work and the well-being of each other. In this way, the four discerning elements were found to be present in effective practice in an interwoven manner that became self-reinforcing.

We posit that given the substantial power asymmetry in supervisor-student relationships, student-instructor, and student-program interactions, the supervisor must take the lead and initiate actions in executing their formal responsibilities and staying true to their actions (Parker-Jenkins, 2018). This responsibility begins early in the relationship with the supervisor establishing the basis on which trust is established (Al Makhamreh & Kutsyruba, 2020; Gordon, 2017; Molinaro, 2017). In our case study, supervisors and doctoral students all agreed about the necessity of establishing

relationships and developing shared expectations. The social exchanges between the supervisor and doctoral student were organized around a distinct set of role relationships, whereby each party maintains an understanding of their role obligations and holds some expectations about the role obligations of the other. Specifically, the supervisor must intentionally “lead and initiate actions to reduce students’ sense and experiences of vulnerability in their own interactions and in the student’s engagement in the programme” (Jacobsen et al., 2021, p. 10).

Respect and personal regard are two discerning elements of relational trust that were reinforced through genuine listening and an ethic of care, which are well established concepts in the literature on student-supervisor relationships (Dixon & Janks, 2010; Guerin et al., 2015). Genuine active listening and an ethic of care created the conditions within which doctoral students could thrive within their program. Supervisors came to know and understand their students beyond a supervisor-student relationship which, in turn, created the conditions for the trusting relationship to deepen. Al Makhamreh and Kutsyruba (2020) contend that it is this positive culture between the supervisor and the doctoral student that acts as a “shelter that protects trust and helps it grow” (p. 133).

Supervising doctoral students online is independent of time and distance. Supervisors and doctoral students alike drew upon multiple communication technologies and digital learning platforms to ensure that connectivity and collaboration was maintained (Kumar & Coe, 2017). Frequent, flexible, and responsive online communication and collaboration were essential components of building and enhancing trust within the relationship. Even though supervisors and doctoral students were often separated by time and distance, supervisors extended themselves to ensure they came to know their doctoral student and the patterns and flows that worked best for that student, including interactions and connections on weekends. The supervisor’s attentiveness, awareness, and responsiveness created the conditions for feedback to be given and received, even

when the feedback was difficult and perhaps not what the student had expected, confirming what Halse and Malfroy (2010) reported: students “are more open to receiving critical feedback about their work in a way that they know that it’s coming from a person that has their best interests at heart” (p. 87).

Conclusion

In this chapter we addressed the question, “What are the many ways in which we create the conditions for meaningful, authentic, and respectful supervisory relationships and engagements when we connect, collaborate and communicate online?” We explored this question via interviews with supervisors and graduates from a doctoral program that was intentionally designed and offered online well before the pandemic (Friesen & Jacobsen, 2021). Our findings highlight the nuanced and interconnected ways the four discerning elements of relational trust are developed in online supervisory relationships. We have translated our findings into recommendations for supervisors and institutions on how to create the conditions for online supervision practices that amplify relational trust. First, supervisors need to incorporate all four elements — respect, personal regard, competence, and integrity — in actions they take to build effective online relationships in which they personalize learning, support doctoral students as learners, serve as an academic role model, and set boundaries. Participants emphasized the importance of genuine listening and a recognition of the mutual dependencies and reflexive competencies needed for developing effective student-supervisor relationships. Both supervisors and students must demonstrate integrity in doing what is necessary to ensure the progress and quality of doctoral research. Each “recognizes that all participants in the doctoral process bring resources to and make demands on each other but define their relationship as a cooperative endeavor of reciprocal responsibilities and obligations” (Halse & Bansel, 2012, p. 384). Supervisors in our study

deliberately went above and beyond their own experience being supervised in mentoring and working closely with their own doctoral students.

We recommend that institutions provide online faculty development on supervision that goes beyond typical orientations on formal regulations and requirements to include the ethics of care and the relational aspects of supervision. Early career academics often rely solely on their experiences being supervised as they navigate new power dynamics, roles, and changing responsibilities associated with supervising students (McAlpine, 2017). Leadership and investment in online faculty development for supervision is needed at the institutional level so that quality supervision is not relegated to individual trial and error or sporadic workshops.

We recommend that programs and institutions invest in faculty development and student retention efforts that highlight the supervisor's role and responsibility for relationship building, starting from recruitment to admissions to orientation and the initiation of a student's program. Complex mentoring relationships established between supervisors and students play a significant role in enhancing students' learning experiences and development as researchers (Jacobsen et al., 2021; Walker et al, 2008; Williams, 2005), and in writing and organizing the dissertation (CAGS, 2018), both of which can lead to students' successful completion of their degrees in a timely manner rather than dropping out.

Trust is developed and maintained throughout a student's doctoral education by frequent, flexible, and responsive online communication and collaboration with the supervisor. With so many adjustments for the pandemic, a pressing concern for academic faculty across disciplines is adapting to online supervision and remote support of students (Kumar et al., 2020). Institutions need to provide ready access to robust and reliable online technologies and relevant faculty development (Jacobsen et al., 2021), and also timely support for supervisors and students to thrive with online communication, collaboration, and ongoing engagements.

Our study is significant because it extends Bryk and Schneider's (2002) theory of relational trust to the examination of relationship building for online supervision in teacher education. Our results have implications for the human and technological conditions necessary for meaningful, authentic, and respectful online graduate supervision. We demonstrate the importance of establishing and maintaining relational trust in online supervisory relationships, while providing guidance to supervisors and institutions on leveraging these findings to inform and improve the quality of online graduate supervision practice more broadly, especially given the urgency of the pandemic pivot. Finally, our study indicates that institutions have an important role in providing online faculty development to develop high-calibre online supervision practice.

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Chapter 12

Working with Difficult Knowledge: Online Teaching and Learning of a Diversity and Inclusion Course

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Abstract

This paper explores the way in which two university professors transitioned a mandatory face-to-face course on Diversity and Inclusion, for teacher candidates (TCs), to a fully online, asynchronous environment in response to the COVID-19 pandemic. The course content is emotionally-loaded and generates many tensions that challenge TCs' understandings of their identities and positionalities. The authors explore how they adapted and modified the pedagogy to complement content knowledge in a manner that leveraged technology. Drawing from the concepts of Technological Pedagogical Content Knowledge (TPCK), and the pedagogy of the flipped classroom, the authors describe the ways in which they remade and re/visioned the course. Instead of viewing technology as a passive mode of delivery, the computer, software, and applications were envisioned as the classroom in which the learning was occurring. The chapter concludes with the importance of embedding opportunities for dialogue, such as informal drop-in conversations, and the need to consider the discomfort some TCs had with the ambiguity of using arts-based activities.

Résumé

Cet article explore la transition d'un cours en mode présentiel à un cours sur la diversité et l'inclusion entièrement asynchrone et enseigné en ligne par deux universitaires, en réponse à la pandémie de COVID-19. Parce que le contenu du cours est émotivement chargé, il génère de nombreux conflits remettant en cause les questions d'identité et de positionnement chez les candidats à l'enseignement (TCs). Les auteures démontrent comment elles ont adapté et modifié la pédagogie afin d'offrir un complément de connaissances tirant partie de la technologie. S'inspirant des concepts de connaissance du contenu pédagogique par la technologie (TPCK) et de la pédagogie de la classe inversée, les auteures décrivent les façons dont elles ont révisé et refaçonné le cours. Au lieu de considérer la technologie comme un mode de prestation passif, elles envisagent l'ordinateur, les logiciels et les applications comme une salle de classe au sein de laquelle l'apprentissage se déroule. Le chapitre conclue sur l'importance d'intégrer les possibilités de dialogue, telles que des conversations informelles sans rendez-vous, de même que la nécessité de tenir compte de l'inconfort que certains candidats à l'enseignements ressentent devant l'ambiguïté que pose le recours aux activités artistiques.

Working with Difficult Knowledge: Online Teaching and Learning of a Diversity and Inclusion Course

Context: The Move to Online Learning

On 11 March 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. By 17 March 2020, the government of Ontario declared a state of emergency, which included measures that limited gatherings to no more than five people, with the result that all Ontario universities switched to online learning. As the pandemic continued to rage, by April our university decided to cancel face-to-face classes for the fall semester, which generated some tension for us. Drawing from flipped classroom pedagogy and Mishra and Koehler's (2006) concepts of Technological Pedagogical Content Knowledge (TPCK), this chapter explores the ways in which we, as university professors, transitioned a mandatory and emotionally-charged face-to-face course, Diversity and Inclusion (DI), for pre-service teacher candidates (TCs), to a fully online, asynchronous course in response to the COVID-19 pandemic.

Christine and Julie were both assigned several sections of a mandatory 36-hour DI course for TCs in the fall of 2020. The DI course is cross-divisional, consisting of TCs from the primary, junior, intermediate, and senior divisions, and is offered over 9 weeks in the second year of a 2-year Bachelor of Education programme. There were almost 425 TCs enrolled in the course. Christine was assigned four sections of the course and Julie five sections, each section with approximately 47 TCs enrolled, which represented an increase of 25% in the number of TCs typically enrolled in the face-to-face version of the course. The DI course was designed to disrupt ingrained ideologies and to challenge many of our TCs' understanding of the sociopolitical context of schooling. The majority of our TCs represent the dominant groups in the teaching profession. For example, in an anonymous poll taken at the start of the course, 90% of the TCs identified as white and 75% as middle-class, while 95% were born in Canada and 93% indicated

English was their first language; 75% identified as Christian, 85% as straight, and 73% as cis-gender female. From our experience, many TCs struggle when asked to examine the role unearned privilege has on their successes in school and consequently experience a range of emotions. As such, this is not an ideal course to be taught fully online, particularly with such large numbers. Typically, we can unpack difficult knowledge during in-class discussions and work with TCs who grapple with a variety of issues, in particular separating opinion from informed knowledge. Complicating the TCs' experience, by the time we offered the course, we were in lockdown and isolated to small social bubbles.

Theoretical Framework

One of the positive outcomes of the pandemic was that the abrupt shift from face-to-face learning to online learning encouraged educators to reassess how they teach course content. One pedagogical framework that was embraced during the pandemic was the flipped classroom (Gopalan et al., 2022). We began our TPCK process by identifying the best approach to move the DI course online; we chose to draw upon Christine's research with the flipped classroom (see Cho, 2020; Baker, 2000; Butt, 2014; Fulton, 2012). Christine had been using and studying the impact of a flipped classroom approach in the pre-service visual arts courses she taught, as a way to use technology to encourage greater student-centred learning (Hamden et al. 2013). Given the structure of our online, asynchronous course, our TCs would have to work on their own and we believed concepts gleaned from the flipped classroom would be an effective and engaging pedagogical approach.

The flipped classroom requires students to be responsible for learning the content of the course outside of the classroom, while classroom time is used to apply, discuss, and reflect upon the content (Hart, 2022; Abuzaid, 2022). The three key tenets of a flipped classroom include: first, the transmission of information occurs outside of class; two, class time is used for learning

activities that are active and social; and three, students complete pre- and/or post-class activities to fully benefit from in-class work (Abeysekera & Dawson, 2015). The advantage of the flipped classroom is that each student can learn the content of the course at their own pace and in times and locations that are most conducive to their learning (Myer et al. 2022). However, “[t]he flipped classroom’s success relies upon students undertaking substantial out-of-class work — and being motivated to do so independently” (Abeysekera & Dawson, 2015, p. 4). Therefore, we carefully considered how we would design a course that motivated students to undertake substantial out-of-class work. While technology has become the corner stone for the information-transmission component of the flipped classroom (Beccerra & Mshigeni, 2022), using technology as the sole means of our instruction in an asynchronous course has only emerged due to COVID-19. To determine how best to implement the technology in a motivating manner within an asynchronous environment, we turned to TPCK.

Factors Influencing Our Use of TPCK

Our university determined that courses would be offered asynchronously to account for students who might be in different time zones, experiencing connectivity challenges, schooling their children from home, and/or employment commitments. While instructors have academic freedom, Christine and Julie decided to team up to plan the DI course together. Initially, we met (via Zoom) numerous times in April 2020 to begin thinking about the course. Our Zoom planning and preparation sessions continued throughout May and June.

While we were not limited to platforms, such as Google Classroom, Blackboard Learn was the online learning platform we were strongly encouraged to utilize. We should also note that our institution is considered a small university and only has one Blackboard support technician. Our university in Ontario is located in the “gateway to the North.” Many of our TCs come from rural and northern communities that do not have the same internet bandwidth one would find in larger,

southern cities, and communities. Consequently, with the initial pivot to online learning, some students (and even faculty) were working from their cars in the university parking lot to get a strong internet signal. Due to potential slow connectivity, it was conceivable TCs might experience challenges with data transfers, an inability to download some files, and difficulty viewing embedded video or audio files. We also had to consider that some TCs might not have any access to the internet and so we considered the ways in which our course could be packaged and mailed to TCs, similarly to a correspondence course.

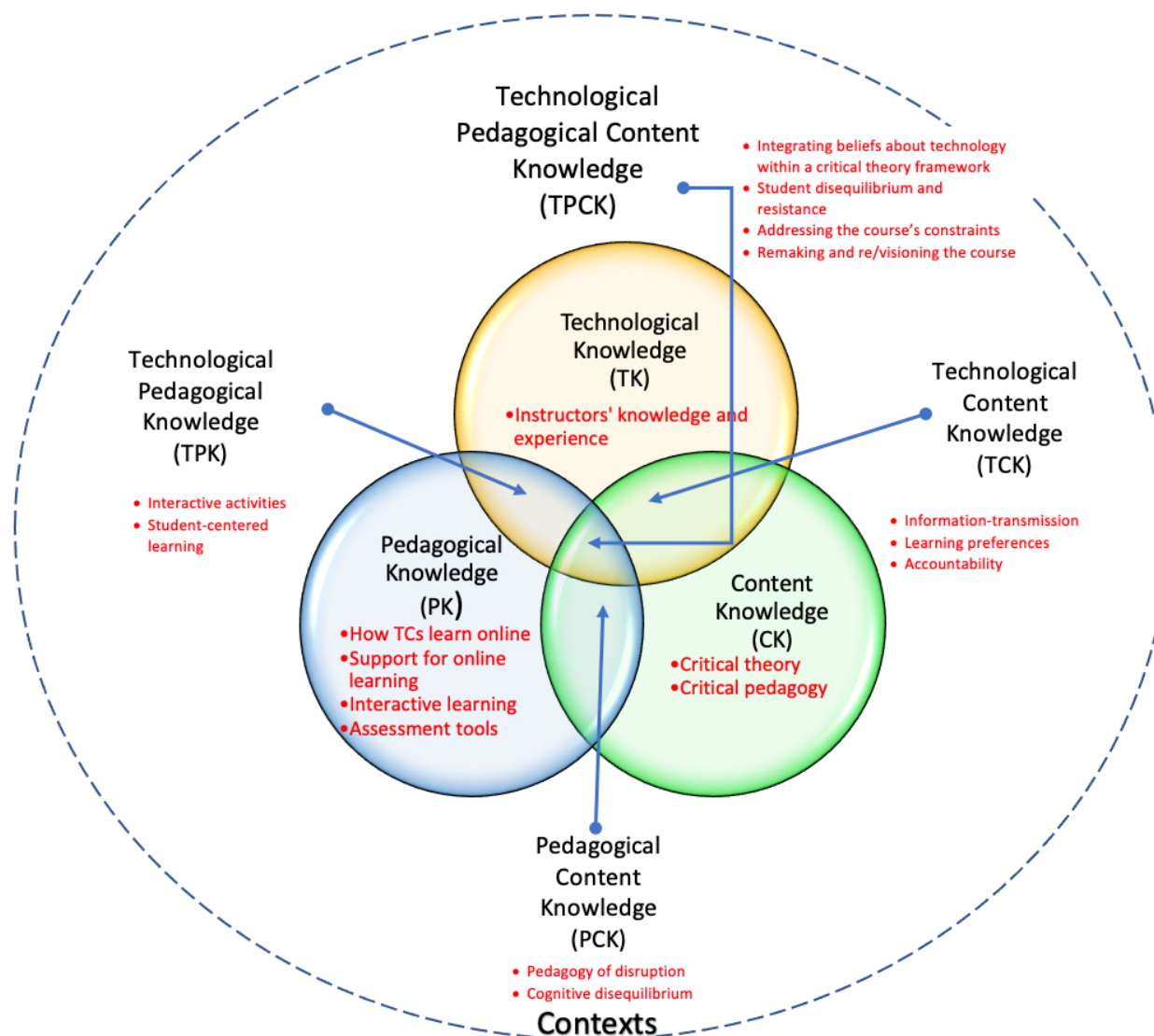
As we contemplated teaching online, we knew that we did not want to view technology as a tool that was a separate entity from the pedagogy and content of the course; rather, we envisioned technology as an integrated element of the learning process. Knowing that we wanted to integrate concepts from the flipped classroom as a key element of the learning environment, we used TPCK as the guiding framework for the development of the course (Long et al., 2017). The TPCK model was developed in 2006 by Mishra and Koehler as a means to illustrate the intersection and synthesis of the basic domains of technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) (Kaplon-Schilis & Lyublinskaya, 2020; Sensoy & Yildirm, 2018). Like Long et al. (2017), we contend that quality teaching with technology requires instructors to understand the connection between TK, PK, and CK in order to develop effective and efficient instructional strategies. What follows is a brief description of the connections we forged between TK, PK, and CK within the context of our DI course (Figure 1 offers a brief description).

Technological Knowledge (TK)

TK is a teacher's understanding of technology and technological tools/applications (Kiray, 2016). Both Christine and Julie have taught online courses in the past and used Blackboard as a complement to their face-to-face courses.

Figure 1

Factors Influencing Remaking of an Online Diversity and Inclusion course



Note. Adapted from “Technological pedagogical content knowledge: A framework for teacher knowledge,” by P. Mishra and M. J. Koehler (2006), p. 1025.

Once we were notified of the decision to move all courses to an online platform, we voluntarily chose to take technology workshops offered by our university as well as tutorials offered by outside organizations. We chose to take the courses with the objective of developing an understanding of how to use technology to make the course more interactive and to seek a means of integrating technology with the pedagogy and content of the course. Through the workshops

and tutorials, we expanded our practical knowledge of the Blackboard platform, SMART software, and effective communication devices.

Pedagogical Knowledge (PK)

PK refers to a teacher's understanding of the processes, practices, and methods of teaching and learning, as it applies to the knowledge of how students learn, classroom management, lesson planning and assessment (Koehler & Mishra, 2009). The pedagogical considerations we drew upon as we created the course derived from our understanding of how TCs learn online, supports for TCs for whom online learning is not their strength, creating an interactive learning experience that draws from the tenets of the flipped classroom, and developing assessment tools appropriate for large classes.

Content Knowledge (CK)

CK is a teacher's knowledge about the subject matter to be learned or taught and includes the understanding of concepts, theories, ideas, and organizational frameworks (Kiray, 2016; Koehler & Mishra, 2009). The content of the course was grounded in Critical Theory, centring on an exploration of positionality. Through the lens of critical theory, TCs examined power and marginality through an understanding of the intersectionality of gender, sexuality, social class, race, ethnicity, language, culture, religion, and age. Furthermore, critical pedagogy anchored the content of the course:

Critical pedagogy is fundamentally committed to the development and evolvment of a culture of schooling that supports the empowerment of culturally marginalized and economically disenfranchised students. By so doing, this pedagogical perspective seeks to help transform those classroom structures and practices that perpetuate undemocratic life. Of particular importance, then, is a critical analysis and investigation into the manner in which traditional theories and practices of public

schooling thwart or influence the development of a politically emancipatory and humanizing culture of participation, voice, and social action within the classroom. The purpose for this is intricately linked to the fulfillment of what Paulo Freire defined as our “vocation” — to be truly humanized social (cultural) agents in the world. (Darder et al., 2003, p. 11)

Using a critical pedagogy lens, we also drew upon critical multiculturalism, anti-Black racism, feminism, anti-oppression, and queer theory, amongst others.

The underlying concept of TPCK is that the basic domains just discussed of PK, CK, and TK cannot be viewed as separate entities: rather, the basic domains and the four overlapping domains (TPK, TCK, PCK, and TPCK) must be viewed as being seamlessly integrated (Hall et al., 2020; Mishra & Koehler, 2006). What follows is our exploration of the four overlapping domains in relation to the construction of the online version of the DI course.

Pedagogical Content Knowledge (PCK)

We began planning the course with an acknowledgement that our TPCK would emerge as we engaged in the process of designing our technology-integrated lessons (Koehler et al., 2007). Specifically, we created TPCK through discussions regarding how to effectively and efficiently integrate technology to support and enhance Pedagogical Content Knowledge (PCK). PCK is a teacher’s ability to manipulate subject content matter so that it is represented in multiple ways, can be adapted to meet student needs, and can be connected to the curriculum and assessment requirements (Koehler & Mishra, 2009). We strove to enhance our PCK by matching our content knowledge with our pedagogical knowledge associated with teaching the content of the course (Kiray, 2016). Within the context of the DI course, PCK includes an awareness that takes into account that the content of the course often makes TCs feel uncomfortable, at the very least, which may result in some degree of resistance that compromises the TCs’ learning. With an

understanding of the impact the content of the course has had on TCs, we were aware that pedagogical considerations were required and must be tailored to TCs' individual needs.

We reflected on our past experiences teaching DI courses and the strategies we used to engage TCs with what can be difficult and uncomfortable knowledge. A delicate balance exists when teaching courses that take a critical stance, as we are then disrupting so-called conventional thinking, long held beliefs, and conceptions. We do not want to ostracize our TCs as we are committed to the development of social justice-minded future teachers, but we are also conscious that we are implementing a form of critical pedagogy — a pedagogy of disruption (Giroux, 1992). As Mills (1997) asserts, “disruptive pedagogies are teaching practices which disrupt marginalizing processes by encouraging students to identify and to challenge the assumptions inherent in, and the effects created by, discourses constructing categories of dominance and subservice within contemporary society” (p. 39). We continually asked ourselves two key questions: “How does a pedagogy of disruption translate to an online environment? How do we support our TCs' learning and discomfort in an asynchronous environment?” We do not teach the DI course by offering pat answers or providing a toolbox of activities TCs can use in their future classrooms. Rather, we seek ways to disrupt TCs' thinking. We consciously reject the “saris, samosas and steel-bands” (Mullard, 1983) approach to diversity and so-called multicultural education. As such, we take a constructivist approach to our course. According to constructivist learning theory, learning is an active process in which learners construct their own meaning and understanding (Bruner, 1961; Dewey, 1929; Piaget, 1980; Vygotsky, 1962).

To assist our TCs in constructing their own knowledge and understanding, we focused on working with TCs to build a foundation rooted in critical thinking and an analysis of the structural dimensions of privilege that will inform their future work in schools. This way, we want them to

consider the entirety of schooling including the hidden or null curriculum (Eisner, 1985).

However, a disruptive pedagogy can generate resistance. As Sensoy and DiAngelo (2017) explain,

When confronted with evidence of inequality that challenges our identities, we often respond with resistance; we want to deflect this unsettling information and protect a worldview that is more familiar and comforting. This is especially true if we believe in justice and see ourselves as living a life that supports it. Forms that resistance takes include silence, withdrawal, immobilizing guilt, feeling overly hopeless or overly hopeful, rejection, anger, sarcasm, and argumentation. (pp. 1-2)

The resistance TCs face corresponds to Piaget's (1950) state of cognitive disequilibrium.

According to Piaget, disequilibrium occurs when learners encounter information that requires the development of a new schema or the modification of an existing schema. Since disequilibrium is uncomfortable, learners seek the quickest route to return to a state of equilibrium. To return to a state of equilibrium the learner can develop a new schema, adapt an existing schema, or discount the information and leave their existing schema unaltered.

We are used to dealing with TCs' resistance in a face-to-face classroom environment. Sometimes the silence can be palpable; we have become adept at reading the room, sensing discomfort, and witnessing overt outrage and conflict. Our pedagogical approach housed within the flipped classroom model included group work and posing targeted content questions for TCs to consider. As we thought about planning for online learning, we were conscious that we engage differently when we can talk about matters, hear and provide counter arguments, and expand on ideas in real time, a possibility hampered by asynchronous, online engagements with 425 TCs.

To address TCs' resistance, we provided weekly optional office hours via Blackboard Collaborate, in which TCs could come to us to discuss any aspect of the course, including what generates a state of resistance. We were fortunate that office hours were scheduled by our director

so as to not overlap with other courses. In addition, halfway through the course we offered an optional *Philosophical Discussion* group via Blackboard Collaborate that met on a Friday afternoon. The discussion was promoted as a social get-together where TCs could have a lively discussion about social justice issues. Despite having 425 TCs, only about 10 TCs participated in these events. While the Collaborate sessions provided us with an opportunity to address the content of the course that the TCs were struggling to rectify with their existing schema, we knew from experience that many more were no doubt demonstrating resistance, but our forum did not provide an avenue for their resistance to be made public.

Technological Content Knowledge (TCK)

TCK refers to a teacher's understanding of the different ways technology can be used to represent and enhance course content (Koh, 2020). One of the first requests we made to our Blackboard technician was to acquire a summer working shell. In this way, we could upload all the content and organize the course together in one place, then have the shell migrated to the nine course sections before the fall term began. Our self-imposed timeline ensured that we would have time to print out materials that could be mailed to TCs (which thankfully did not occur).

We began to develop our TCK by examining the materials of the face-to-face course and considering how we could use technology to represent the content. We knew that we did not wish to take the passive approach of embedding a recording of our lectures within a PowerPoint presentation. The first tenet of the flipped classroom, information-transmission, required the TCs to view PowerPoint presentations of the modules content, read the assigned chapters and articles, and view videos. The first key information we transmitted to the TCs was in the form of an introductory video which served as an orientation to the course. As nothing was scheduled for the TCs, we created a mock timetable to assist our TCs with time management, suggesting they visit our course twice a week for 2 hours. We also created a participation tracking sheet for TCs to

ensure they completed all the various tasks and activities in each module. The TCs uploaded their log to the dropbox at the end of course, which also served as a form of accountability. In addition, we utilized the calendar function in Blackboard, ensuring TCs would get reminders about due dates as well as awareness of various religious and social observances throughout our time together.

Our greatest challenge was how to effectively deliver the content of the course. In our face-to-face courses, the challenging critical theory components were delivered by the instructor through a lecture format or a structured discussion. Conscious of bandwidth concerns (and after hearing reports that TCs were incurring huge internet bills as they were continually going over their data allotments), we determined we did not want to upload videos of lectures. To compensate for the lack of lectures, we decided to choose a textbook. The book *Is Everyone Really Equal? An Introduction to Key Concepts in Social Justice Education* (Sensoy & DiAngelo, 2017) uses an intersectionality approach that we also embrace in terms of how we deliver the course content. The book tackles very challenging concepts and specifically addresses ways to constructively engage with a course that takes a critical stance. We complemented the chapter readings with articles, blogs, and videos. The use of varied forms of information-transmission ensured that we were addressing a variety of learning preferences so that all TCs had the required information to engage with the course content and be prepared for the learning activities that would occur in the online modules (Hart, 2022).

Technological Pedagogical Knowledge (TPK)

TPK refers to a teacher's understanding of how to implement different pedagogical approaches that are based in technology (Koh, 2020). TPK requires an understanding that technology occurs within specific systems and cultures of practice that can define or constrain the types of pedagogical choices teachers make (Mishra & Warr, 2021). Although we both have taught

the course face-to-face in the past, we made a pedagogical choice to fully redesign the course to ensure we were optimizing technology, rather than just transferring our face-to-face version of the course to an online format. Although our course was constrained to an asynchronous format, we still chose to use the tenets of the pedagogical approach of the flipped classroom as we believed that would be the most effective means of enabling TCs to actively connect with their learning.

Typically, within the flipped classroom student-centred learning activities occur face-to-face within a classroom (Long et al., 2022). As we viewed Blackboard as our classroom, we used interactive technology strategies such as games and simulations. For example, we used the United Way's Make the Month (makethemonth.ca) online simulation to enhance TCs' understanding of how poverty impacts Canadians. Make the Month is an interactive digital poverty simulation that requires participants to make decisions that will affect their ability to financially make it to the end of the month. The simulation required the TCs to connect activity to the content in their assigned readings and videos.

We also asked them to read Gainer, Valdez-Gainer, and Kinard's (2009) *The Elementary Bubble Project* which describes a critical media activity used with fourth grade students to explore ways to critique the subtext of advertising messages. The project draws from the work of artist Ji Lee. We invited our TCs to find advertisements and insert "talk back" speech bubbles to expose the hidden messages being conveyed by the ads. The bubble activity required the TCs to ground their ideas in the key concepts of the course. We opened a blog on Blackboard for TCs to upload their images and invited feedback from their colleagues. The use of a blog ensured that the TCs were co-creating their knowledge with their peers.

The third tenet of the flipped classroom requires students complete pre- and/or post-class activities to fully benefit from in-class work and to be accountable for their learning. Therefore, we designed nine quizzes (one for each module) based on the readings. We opted for true/false,

multiple choice, multiple answer, and jumble type questions so that the Blackboard program would do the marking. Here, we benefited from TCs who worked ahead as they flagged glitches in our questions or incorrect answers that we could fix before everyone in the course completed the quiz. We set up the quizzes so that the TCs were automatically provided with feedback. While we created the quizzes within Blackboard, we also created PDF versions that could be printed or emailed to TCs having connectivity issues.

Technological Pedagogical Content Knowledge (TPCK)

TPCK refers to a teacher's understanding of pedagogical strategies for teaching course content through the integration of technology (Koh, 2020). The key element of TPCK is that technology is not perceived as an "add-on"; rather, technology is given the same weighted consideration as the course content and the instructor's pedagogical choices. For us, we viewed TPCK as an extension of our TC, TP, and PCK. Specifically, we transitioned to TPCK by integrating our beliefs about using technology to develop TCs' understanding of positionality within a critical theory framework, utilizing our knowledge of technology-based course content and resources, and our knowledge of technology-based strategies for understanding and exploring social justice issues (Koh, 2019).

As Mishra and Warr (2021) point out, for technology to be effectively and efficiently integrated into a classroom it must fit within the following: the processes and experiences of the student and teachers; the educational system; and, the culture of the learning environment. With this in mind, as we developed the course, we maintained awareness of the constraints that were within and outside of our control. For example, constraints within our control included the technology tools, course content, and our pedagogy. The constraints outside of our control included: the number of TCs, the asynchronous format, the delivery mode (Blackboard Learn), the duration of the course (36 hours), scheduling of the course, and the TCs' disequilibrium as a result

of course content. By identifying and being cognizant of the constraints of the course, we constructed TPCK that attempted to turn the constraints into advantages.

Our TPCK required us to consider what our online learning platform could offer us pedagogically and how that would enhance or hamper our content. Rather than attempting to force fit a face-to-face course into an online environment, we chose to remake and re/vision the course to compliment the mode of delivery. Instead of viewing technology as a passive mode of delivery, we envisioned the computer, software, and applications as the classroom in which the learning was occurring. We worked to make the Blackboard platform welcoming and easy to navigate by ensuring that the wording in the menu matched the key components of the course. A video welcoming the TCs to the course was created by the professors to introduce themselves, review the course content, and demonstrate navigation of the platform. In addition, we chose to create nine colour-coded modules to correspond with the 9 weeks of classes (typically, in a face-to-face setting, that would mean 2 hours twice a week). Each module included folders containing the readings, videos, and activities, which corresponded to roughly 4 hours of course content, not including the assigned (and supplemental) readings.

In addition to designing our classroom, we considered the TCs who would be in attendance. A key aspect of virtual learning is flexibility, particularly in an asynchronous course. TCs could complete the course at any time of the day. As well, they could complete small or large chunks at a time. All the fall Bachelor of Education courses (9-week courses) in our programme were “scheduled” (but not timetabled) for 5 weeks of class time, followed by 4 weeks of practicum (presumably in actual or virtual classrooms), then a return to complete the final 4 weeks of classes before the December break. We determined that the entire course had to be uploaded before the course began to: (a) accommodate TCs with low bandwidth who might need to go somewhere to download large quantities of content at one time; (b) mail correspondence packages, if required;

and (c) address any technical problems with the course content. While we did not know it during the summer months planning our course, the practicum weeks were severely impacted by COVID-19 with numerous TCs who, unable to attend practicum, were glad they could continue, unimpeded, with their coursework. We set, and met, our goal to have every aspect of the course ready by the end of July for a September start.

We considered the lessons we would be delivering in our virtual classroom. In designing our lessons, we wanted to use as many of the Blackboard's tools as we could to make the course engaging while keeping in mind the number of TCs with whom we were working. One workshop we attended in the summer was on SMART Learning Suite. We were excited by the possibility of creating interactive activities that could replicate dialogue and group work for the TCs; we specifically inquired whether the activities could be run in an asynchronous course and were assured they could. The online software was being offered free of charge. We spent a considerable amount of time creating engaging interactive activities only to discover that they needed to be launched in real time by the instructor (so not asynchronous). In addition, near the end of the summer the provider began charging for access to the site, which was not acceptable for our purposes. We had to recreate the activities, and they were not as interactive as we had envisioned.

Throughout the planning process, at the forefront of our thinking was our two key questions: "How does a pedagogy of disruption translate to an online environment? How do we support our TCs' learning and discomfort in an asynchronous environment?" The first chapter of the textbook we were using outlined five guidelines for engaging with critical social justice content. We decided to use these guidelines as a weekly self-check for the TCs using a Likert-type scale (by creating a Blackboard poll), so we could monitor their comfort/discomfort with the various modules and topics. The five guidelines include: one, "Strive for intellectual humility" (p. 6); two, "Everyone has an Opinion. Opinions are not the same as informed knowledge" (p. 9);

three, “Let go of anecdotal evidence and instead examine patterns” (p. 11); four, “Use your reactions as entry points for gaining deeper self-knowledge” (p.13); and five, “Recognize how your social position informs your reactions to your instructor and the course content” (p.15). In addition, the five guidelines enabled the TCs to meet the objective of the course. Specifically, the guidelines developed TCs’ understanding that engaging in socially just, equitable, and meaningful educational practices is an ongoing process that requires an awareness of not only current research in the field, but also how our identities, positions, social contexts, and other barriers inform *how* and *what* we teach as well as *what* we know and *how* we know it.

The Assignments

For the tenets of a flipped classroom to be effective in an online environment, we had to ensure that our learning activities were active and social. Perhaps what has become synonymous with online learning is the requirement to post threads in the discussion room. There is an expectation by instructors that discussion rooms are monitored for inappropriate posts and/or to address misinformation. With 47 TCs in each section and each of us teaching four or five sections, just having each student post one comment could result in a minimum of 235 comments. If TCs respond just once to each other’s posts, there would be at least 470 posts per week to read, respond to, and monitor. The number of posts that might be generated was immense. As such, we made a conscious decision to turn off the discussion room and worked to find other ways that TCs could interact, but in a tighter, more manageable manner.

We wanted the TCs to share who they were, make connections, and engage in conversation. We took advantage of the diversity of the TCs’ experiences by creating a photo journal assignment that required TCs to go on three walks in the community where they lived and take a photograph of an element in their community that informed them about the social class, ethnicity, gender norms, religion and/or ability of their neighbourhood (see Cho et al., 2022). The

assignment also addressed guideline 3, “Let go of anecdotal evidence and instead examine patterns.” In a Blackboard blog (randomly generated with 4–5 TCs per blog group), the TCs posted an image at three different points in the course, uploaded a brief summary of why they chose the image, and an explanation of how the image connected to the readings and course content. TCs were required to give feedback to at least two colleagues in their blog. The photo journal summaries aided TCs in their quest to address the first guideline, “Strive for intellectual humility.” The blog was a place for TCs to ask clarifying questions of each other. We asked them to make connections to other readings and discuss the implications of their image in their own life and positionality. We definitely saw growth in TCs’ ability to ask questions, make connections, and discuss implications as they moved through the course. We observed TCs being aided by guideline 2, “Everyone has an Opinion. Opinions are not the same as informed knowledge.” We observed them pushing each other’s thinking a little more, asking open ended questions, and offering more informed ideas.

Several activities, for instance the elementary bubble project blog and games we devised — such as “what are your prejudices” — required TCs to utilize guideline 4, “Use your reactions as entry points for gaining deeper self-knowledge.” The activities were designed to explore their initial reactions and to work through and interrogate why TCs had the reactions they had and how that connected with the course content and ultimately their future work in schools.

The final assignment was a consolidation of the three photo journals and gave TCs an opportunity to look back at their original posts and ideas, as well as peer feedback, and to explore their own growth and development in the course. The entire process was driven by guideline 5, “Recognize how your social position informs your reactions to your instructor and the course content.” We provided writing prompts for the final consolidation which included:

- What are the messages that are overtly and/or covertly revealed by the images you chose?

- Why did you choose these images?
- What did you want to explore by choosing these images?
- What do these images say about the community in which you live? What's not being said?
- Explore any challenges or areas of tension that emerged for you. How did you attempt to address these challenges?
- What roadblocks, challenges, or fears remain after completing this course? How do you envision working through these fears?

Many TCs provided additional resources in the form of weblinks, videos, podcasts, etc., which demonstrated their use of technology with respect to content and pedagogical approach.

Conclusion

We had the benefit of the summer to transform our traditionally face-to-face course into an online format, and to reflect upon and use the tenets of TPCK to design our course within the tenets of the flipped classroom framework. This approach enabled us to address our two key questions: “How does a pedagogy of disruption translate to an online environment? How do we support our TCs’ learning and discomfort in an asynchronous environment?”.

In response to the first question, “How does a pedagogy of disruption translate to an online environment?”, informal feedback from TCs indicated they enjoyed the course, found it to be well-organized, and expressed deep impact from the course content. A key aspect of the flipped classroom research is the value of accessible online materials that allow for greater student-centred learning with technology as an integrated element of the learning process (Cho, 2020). Moving forward, we will provide more time on the quizzes and consider the discomfort some TCs had with the relative and inherent ambiguity of using arts-based activities, like the photo journal. We also determined it might be useful for TCs to gather some census information about their neighbourhood, after their first walk, to determine if their perceptions were grounded in reality or

anecdotal evidence. Furthermore, when we return to face-to-face instruction, we will be able to implement the course in a flipped classroom manner. By providing a significant component of the content material online, we can utilize classroom time for activities that require the application of knowledge and for addressing the emotional tensions of the course content.

As for the second question, “How do we support our TCs’ learning and discomfort in an asynchronous environment?”, our greatest concern still pertains to supporting the fragility of TCs’ emotional responses to the course content. The course contains difficult knowledge to think and talk about during typical course delivery, let alone online. We also speculate, from the disclosures in final assignments, that some TCs got into heated debates with family and friends with no opportunity to talk through the issues/concerns in a traditional course setting. While the course we developed was very effective, we realize the need for more opportunities for dialogue, such as informal drop-in conversational settings. While we did offer drop-in conversational occasions within the online course, the idea to host them occurred during the course and was not reflected in the syllabus. Moving forward, we would advocate for scheduled synchronous sessions 2 hours per week. These conversation sessions would be held: (a) after the first photo journal walk had been uploaded; (b) just before TCs go out on practicum; (c) after they returned from practicum; and (d) a final wrap up session at course’s end. Assuming university constraints remain constant, we could not mandate attendance, but if it was scheduled and an invitation appeared on the syllabus, we expect we might have a strong student participation.

Through TPCK we were able to successfully implement the flipped classroom within an emotionally charged asynchronous course. Because the entire course is now online, when we do return to campus, we will continue to use technology to support and enhance the flipped classroom approach. Our takeaway from transitioning an emotionally charged face-to-face course to an online learning environment is that professors must refrain from viewing online learning as the

same as in-class learning. Professors must consider the technological knowledge they and their students possess, examine how they must adapt their pedagogical approaches to an online environment, and provide the content of the course through a variety of modalities.

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Chapter 13

Exploring Cultural Responsiveness in Mathematics and Science Teacher Education. Courses: A Reflective Dialogue on Teaching-Learning Relationships and Engagements Amidst the COVID-19 Pandemic

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Abstract

As teacher educators, we are called to critically reflect on how we can be responsive to the needs of diverse students while simultaneously supporting our own self-care as we learn to adapt to the COVID-19 pandemic-imposed virtual, remote teaching and learning. As a mathematics teacher educator and a science teacher educator, our reflections in this chapter centre on the impact that this virtual, remote teaching and learning has had on our growth and development as culturally responsive pedagogues. Informed by a comprehensive theoretical framework of (trans-multi)culturally responsive education, we engaged in a duoethnographic inquiry to reflect on and with(in) our moments of teaching, (un)learning, and (re)learning to interrogate the interplay of our engagement with Self and Other(s). Our key research question is: What does it mean to be a culturally responsive educator while teaching in virtual learning environments amidst a pandemic? Through a qualitative analysis of our reflective dialogues, we identified three key tensions: (a) teaching in a sea of faceless names (the call to reimagine learning communities while confronting disembodied teaching and learning); (b) learning to live without a voice (the call to rethink students' funds of knowledge within a mute/unmute discourse); and (c) heartfelt fatigue (the call to be responsive amidst compassion fatigue). By engaging in this dialogical inquiry, we have attempted to bring forth the privileges, powers, and critical lessons of two teacher educators and, in doing so, we raise provocative questions that may offer gentle guidance towards responsive practices in teacher education.

Résumé

En tant que formatrices d'enseignants, nous sommes appelées à réfléchir de manière critique à la manière dont nous pouvons répondre aux besoins d'élèves de divers horizons, tout en veillant à nos propres besoins personnels et en apprenant à nous adapter à l'enseignement et à l'apprentissage virtuels, et à distance, imposés par la pandémie de COVID-19. Nos réflexions dans ce chapitre, à titre de professeure de mathématiques et de professeure de sciences, portent sur l'impact que cet enseignement et cet apprentissage virtuels et à distance ont eu sur notre croissance et notre développement comme pédagogues sensibles aux différences culturelles. Rigoureusement formées à un cadre théorique en éducation (trans-multi)culturellement sensible, nous avons opté pour une enquête duoethnographique afin de réfléchir sur nos actions d'enseignement, d'apprentissage (et désapprentissage) et de (ré)apprentissage pour nous questionner tant sur notre engagement avec nous-mêmes qu'avec les autres. Notre objet de recherche est le suivant : que signifie être un éducateur sensible à la culture dans des environnements d'apprentissage virtuels au cœur d'une pandémie? Par l'analyse qualitative de nos réflexions dialogiques, nous avons identifié trois importantes sources de tensions potentielles : (a) l'enseignement dans un océan de noms sans visage (d'où l'appel à réinventer les communautés d'apprentissage face à un enseignement et un apprentissage désincarnés); (b) apprendre à vivre sans voix (d'où l'appel à repenser les fonds de connaissances des élèves dans un discours muet/non muet); et (c) la fatigue

sincèrement ressentie (d'où l'appel à être sensible malgré une fatigue de compassion ressentie). En nous engageant dans cette enquête dialogique, nous avons tenté dans ce chapitre de mettre en évidence les privilèges, les pouvoirs et les leçons critiques de deux formatrices d'enseignants et, ce faisant, de soulever des questions provocantes et susceptibles d'offrir, comme modèle de formation des enseignants, une orientation douce dans les modes d'adaptation.

**Exploring Cultural Responsiveness in Mathematics and Science Teacher Education.
Courses: A Reflective Dialogue on Teaching-Learning Relationships and Engagements
Amidst the COVID-19 Pandemic**

In this duoethnographic inquiry, we, a mathematics teacher educator and a science teacher educator, share our lived experiences of teaching at the University of Regina (U of R) during the COVID-19 pandemic. In our roles as course instructors, we were engaged in supporting K-12 teacher candidates' learning in mathematics, science, and environmental education courses during the fall of 2020 and the winter of 2021. Our inquiry was guided by the following research question: What does it mean to be a culturally responsive educator while teaching in virtual learning environments amidst a pandemic? Positioning our research within a framework of (trans-multi)culturally responsive education (Raisinghani, 2018, 2019), we draw on critical and transformational multicultural education perspectives (Keating, 2007; Nieto, 2000) and theories of culturally responsive teaching (Gay, 2018; Ladson-Billings, 2006).

As Breault (2016) mentions, duoethnography is a relatively new qualitative research method which creates opportunities for researchers to “interrogate the cultural contexts of autobiographical experiences in order to gain insight into their current perspectives on and experience of issues related to personal and professional identities” (p. 777). Hence, in this dialogic duoethnographic encounter (Breault, 2016; Reed-Danahay, 2009), we reflect on our collective journeys as learners, teachers, teacher educators, and researchers while we focus on the impact that the pandemic-imposed remote, virtual modes of teaching and learning have had on our growth and development as culturally responsive pedagogues. In so doing, our work responds to a key theme in this publication, which is to reflect on “the many ways in which we create the conditions for meaningful, authentic, and respectful learning and teaching relationships and engagements” in our online interactions with students and research collaborators. Through a qualitative analysis of our reflective dialogues, we identified three key tensions that emerged for

us: (a) teaching in a sea of faceless names (the call to reimagine learning communities while confronting disembodied teaching and learning); (b) learning to live without a voice (the call to rethink students' funds of knowledge within a mute/unmute discourse), and (c) heartfelt fatigue (the call to be responsive amidst compassion fatigue).

As we discuss these three tensions, we also attempt to share the privileges and powers that are embedded in technology-reliant, virtual, remote modes of teaching. We also interrogate the benefits and drawbacks of virtual modes of teaching mathematics, science, and environmental education as experienced by us and by our students. Our goal is to create spaces for critical conversations about issues influencing diverse students' and educators' experiences in remote, virtual learning environments as we continue to navigate our educational journeys amidst the COVID-19 pandemic in Canada and in wider global contexts. Throughout this chapter, we aim to provide readers with opportunities for resonance with the stories and tensions, and as a means of reflection. We conclude with provocative questions that may offer gentle guidance towards responsive practices in teacher education as well as for future research.

Exploring Self and Other(S)

Considering that teaching often reflects who we are and how we are positioned, we begin, as the authors of this chapter, by unpacking and exploring our own identities and positionalities that shape, and are constantly shaped, by the specific socio-cultural contexts in which we teach.

Latika: As an uninvited guest, I am thankful for the opportunity to live, learn, teach, and raise my children in the Indigenous Peoples' lands in Canada. As a racialized woman scholar in STEM (science, technology, engineering, and mathematics) who is also a daughter, sister, wife, mother, and a friend, I am aware of the multiplicity of identities that I hold, and the hidden idiosyncrasies that may characterize my role(s) and engagements through the diverse understandings of my identity and positionality. Informed by teaching and learning experiences in multiple cultural

contexts, which include Canada, India, the Republic of Marshall Islands, and the Federated States of Micronesia, and as a new Canadian citizen who came to Canada as an International student, the issues of diversity are at the heart of everything I do in the field of education. My research and teaching interests include critical multicultural education, culturally responsive education, Indigenous ways of knowing, and community-engaged learning. Informed by my doctoral research which explored Canadian teachers' perspectives on students' cultural diversity and viability of culturally responsive teaching, I aim to invite (trans-multi)culturally responsive education in contemporary diversity-rich classrooms.

As a teacher educator at the U of R, I am aware of my presence in the traditional territories of the Treaty 4 and Treaty 6 peoples, and therefore, in my teaching, I deliberately begin all class sessions with the Territorial Acknowledgement. I also make conscious efforts to ensure respectful integration of Indigenous and diverse cultural ways of knowing in all science and environmental education courses that I am privileged to teach. Although the opportunities for diverse students who come from international contexts could have been amplified because of the virtual, remote modes of teaching, the student populations with whom I engaged were predominantly white.

Kathy: The student demographic in my classrooms — both virtual during the pandemic and face-to-face during pre-pandemic times — is similar to what you experienced, Latika: predominantly white, middle-class, female students. It also closely reflects my own demographic — a white female settler of Irish decent. With regard to the student demographic, however, it is worth noting that enrolment in the U of R teacher education programs is significantly influenced by the presence of First Nations University of Canada and the Saskatchewan Urban Native Teacher Education Program (SUNTEP) located physically on U of R campus. Thus, Indigenous students often choose to attend these teacher education programs, leaving the programs at the U of R generally dominated by the afore-mentioned demographic.

My research and teaching interests presently focus on critical and culturally responsive pedagogies in mathematics teacher education. In my 20-plus years as a faculty member, I have taught everything from elementary science methods courses to Masters level mathematics curriculum courses to doctoral level research methods courses. Because of this great diversity in courses, I have learned to be strategic with the directions of my research program: that is, I tend to look for intersections between the content of the courses I teach and a possible direction for a research program. Owing to my strong interest in self-study methodologies, I have several projects underway which explore how mathematics teacher educators (MTEs) can study their own practice, both in terms of how they work with prospective and practicing teachers to develop their culturally responsive practice (Nolan & Keazer, 2021b), and how MTEs themselves can model and grow as culturally responsive pedagogues (Nolan & Keazer, 2021a). Reading through your own self-introduction, it is easy for me to see how we were drawn to work with each other on this duoethnographic exploration.

Methods and Methodological Approaches

The impetus to write this chapter arose through our shared interests in culturally responsive science and mathematics education and of inquiring into our responsiveness as teacher educators as we engaged in teaching with(in) remote, virtual settings during the COVID-19 pandemic. Our initial inquiry began through informal conversations during various faculty meetings in the fall of 2020, as we shared our understandings of culturally responsive pedagogy as informed by our experiences and the literature in the field of critical multicultural education, culturally responsive mathematics and science education, and broader areas of teacher education (Aikenhead & Elliott, 2010; Aguirre & Zavala, 2013; Bishop et al., 2008; Blanchet-Cohen, & Reilly, 2013; Ghosh & Abdi, 2013; Harding-Dekam, 2014; Hernandez et al., 2013; Hodson, 2010, 2011; Kirova, 2008; Mukhopadhyay & Roth, 2012; Snively & Corsiglia, 2001). Our conversations became more

concrete when we engaged in a dialogic inquiry through both synchronous and asynchronous modes. Synchronously, we periodically met on Zoom to discuss our teaching and to reflect on the challenges and strengths of shifting to online/remote teaching. Asynchronously, we actively contributed to a Google document to share reflections on our teaching and engage reflexively through posing and responding to questions that arose through our dialogic encounters. We planned for our next steps through e-mail messages and during our Zoom meetings. We used a qualitative approach to collect and analyze our data, which included dialogical written reflections as well as notes taken during Zoom meetings. For analysis, each of us first reviewed data individually to identify common threads and instances of overlapping issues and understandings of cultural responsiveness. We then met through Zoom to discuss these identified themes, consolidating them further as we worked towards collaborative presentations for a U of R hosted Teach and Learn 2021 and CATE 2021 working conferences.

Breault (2016) mentions that duoethnographic research emphasizes “researchers as the site of the research” and focuses on the “interacting narratives” (p. 777) that may allow researchers to interrogate their autobiographical experiences in order to gain insights into issues related to their personal and professional identities and practices. Hence, by engaging in this collaborative autoethnographic research (Chang, 2007; Chang et al., 2013), we hope to connect our personal realities with the social contexts (Reed-Danahay, 2009) as we inquire into our perspectives and experiences of embodying culturally responsive pedagogies with(in) remote, virtual learning environments through engaging in “mutual and reciprocal” dialogues (Norris et al., 2012, p. 13). By presenting our “narratable self” (Wright, 2009, p. 625), while examining the socio-cultural-political-economic constraints within which we teach, our goal is to interrogate our efforts of embracing “culturally relevant care” (Koonce & Lewis, 2020) as we strive towards becoming (trans-multi)culturally responsive educators (Raisinghani, 2018, 2019) amidst the pandemic.

Theoretical Framework

A theoretical framework of (trans-multi)culturally responsive education (Raisinghani, 2018, 2019) served as a guiding lens for this research. Amalgamating critical and transformational multicultural education perspectives (Keating, 2007; Nieto, 2000) with culturally responsive teaching (Gay, 2018), a (trans-multi)culturally education framework calls for an interrogation of dominant discourses that often legitimize certain cultural norms while subjugating other(ed) cultural ways of knowing. Informed by Bhabha's (1994) "third space" and Goodenough's (1976) notion of "multiculturalism as a normal human experience," a (trans-multi)culturally responsive education invites one to recognize the multiplicity of cultural identities that each one of us may hold. Thus, by problematizing the understandings that consider culture as static and often associate it with one's ethnicity, race, and nationality, this framework calls for acknowledging the hybridity and dynamism of culture as a way of life that continually evolves as one engages with other(s) in processes of living life; this framework also invites educators to see cultural diversity as encompassing all cultural experiences that one may bring into schools (Raisinghani, 2018, 2019).

Considering education as a socio-culturally constructed and politically-economically informed process, a (trans-multi)culturally responsive educational approach embraces Gay's (2018) notion of culturally responsive pedagogy (CRP) that emphasizes critical understandings of culture as central to any educative process. CRP demands that teachers become cognizant of the fact that their own beliefs about various dimensions of students' cultural diversity and socio-cultural and contextual factors may play a key role in how students' educational experiences are shaped (Gay, 2013, 2018). Related to this, Ladson-Billings (2006) notes that a common misperception of teachers who set out to be culturally responsive is their focus on "what to do" with students (what lessons and activities to do with them), rather than a reframing of "how we think: about the social contexts, about the students, about the curriculum, and about instruction"

(p. 30). That is, according to Ladson-Billings, teachers (and, in our context, teacher educators) “must begin to understand the ways our theories and philosophies are made to manifest in the pedagogical practices and rationales we exhibit in the classroom” (p. 30).

Taking these understandings further, a (trans-multi)culturally responsive education framework invites teachers to initiate a journey of becoming (trans-multi)culturally responsive educators. This involves three key steps: (a) embracing relational care, which demands treating others as they would like to be treated as also emphasized in the Noddings (2012) ethics of authentic care; (b) cultivating critical cultural consciousness, which demands a critical and ongoing inquiry of one’s conceptualization of culture, diversity, and difference. This is informed by the critical multicultural education perspectives (Nieto, 2000) and Pinar’s (2012) *currere*. *Currere* invites one to engage in a critical reflexive inquiry to examine one’s unconscious biases and relationship with Self and Other(ed), while reflecting with(in) and on the moments of teaching, following Schön (1983); and (c) empathetic relationships that call educators to remain calm when confronted with student behaviours that are challenging, and engage with them empathetically in transcultural dialogues (Keating, 2007). These transcultural dialogues challenge us to examine our pre-conceived beliefs and commonly accepted worldviews to identify the socio-cultural-political-economic inequities that may have been the underlying reasons for such student behaviours, and to work towards dismantling these by engaging with students, parents, and wider communities. In the next section, we inquire into our own journeys of becoming (trans-multi)culturally responsive educators through dialogic encounters.

Dialogic Encounters: The Tensions

To facilitate readers’ engagement, we frame our dialogue(s) through the three key tensions emerging from our data analysis: teaching in a sea of faceless names; learning to live without a voice; and heartfelt fatigue.

Teaching in a Sea of Faceless Names

We describe this tension as the call to reimagine learning communities in the face of disembodied teaching and learning.

Kathy: In a recent discussion with a colleague, they shared that not much about their teaching had changed as a result of the pandemic. This disclosure gave me pause. Did they mean that they have always engaged in small group discussions (now enacted as breakout rooms), used white boards and other collaborative tools (now replaced by electronic whiteboards and other online collaborative tools like Padlet, Google slides, etc.), and perhaps even organized students in a circle to share in an equitable manner (now replaced by a gallery of faces with mute/unmute capabilities and a blue hand that can function like a talking stick)? Or, did they mean that they lecture now as they did before?

I seldom draw on lectures as a teaching approach because I value student voice and active participation within a community of learners, which I consider to be important characteristics of a responsive and justice-oriented pedagogy. Elsewhere (Nolan, 2009), I write about how social justice in/and mathematics can be discussed through *content* considerations (as is common in the research literature), but also through *context* considerations, that is, working toward a context where “a social justice-oriented mathematics classroom ... begins by challenging the often invisible normative and regulatory aspects of schools and mathematics” (p. 214). It seems, however, that decisions I have made over the years to be more inclusive and responsive to students and their learning in a face-to-face context are viewed as inappropriate in the remote virtual teaching environment. For example, during my first class this past semester, I shared a few “Zoom guidelines” which aimed to create an environment similar to that of a face-to-face offering. One of my guidelines was to keep the students’ video on, if at all possible. As I explained to my students, with videos on we could see each other, making facial and body cues visible, and we could be like

one big *Brady Bunch* family. Recently, however, I was informed during a research conference presentation that such a request for video was not only violating student privacy, but it was an example of how we police their bodies. I am beginning to understand that trying to duplicate features of a face-to-face classroom for use in a virtual environment is not moving me forward as a culturally responsive educator.

Latika: Keeping the cameras off may contribute towards environmental sustainability because it greatly reduces carbon footprint according to a recent study. Highlighted in a CTV news article, this study suggests that “turning off the camera during Zoom or video meetings helps reduce a person’s carbon footprint of the call by 96 per cent” (Rodriguez, 2021, para 1, Obringer et al., 2021, p. 2, Figure 1d). Moreover, by requesting that students keep their video on, we may contribute to perpetuating inequities as not all students have home environments that they are comfortable in sharing. Many may not even have a designated “place” for learning. This is reflected in the experiences of one of my students of secondary science curriculum class that I taught during the fall of 2020. During virtual class sessions, when I invited students to share their perspectives, a student messaged in the chat that they were unable to turn on video and unmute because they were sharing the room for study with their daughter who was also taking an online class. I asked this student if they have headphones to listen with and if they could contribute through chat. But how engaging is such an experience? Only students can tell!

I asked my daughter who is doing undergraduate biology honours degree: “So, how are your virtual classes?” She replied: “How do you like staring at a black screen and someone talking to you continuously without taking account of what you are understanding?” She shared that most of her classes reflect black screens, muted students, a square boxed appearance of an instructor with pre-recorded lectures or the monotonous live lectures that are presented with instructions not to

interrupt because the instructor is recording the lecture. I wonder if this is because of the pressure to cover the content in these mainstream science classes or is it the awkward newness of virtual learning that is creating such alienating learning spaces? I attempt to transform these lonesome, undifferentiated virtual spaces into communal places of learning by inviting students to contribute to knowledge co-construction. As such, I often engage students in interactive class discussions in whole group settings or through Google Jam Boards in their Zoom breakout rooms. But some students find it difficult to engage with peers they can not see.

Kathy: I can see that your daughter's experience of her online biology class is similar to what I described above about my colleague's pedagogy not really changing in response to the shift to virtual, remote teaching. It strikes me that aiming for a CRP is not really a professional goal for some instructors. So, whether they teach face-to-face or online, the key tenets of CRP are likely to be absent if an instructional practice is [centred] on a lecture approach. Perhaps I am being overly judgemental, but the view rings true with Donovan et al. (2021) who offer "that many best practices in online teaching are also best practice in culturally responsive and inclusive teaching" (p. 76).

Latika: Invisibility of students' faces was discomfoting for an administrator of K-6 schools who joined us in one of the elementary science methods virtual class sessions. As I engaged in the conversational interview with this guest speaker, most students kept their videos off and only a few asked questions. In the follow-up discussion, the guest speaker asked: "How do you know if your students are *actually* there"? I apologized for the discomfort that they may have experienced while sharing their perspectives to the mostly black boxed screen and I tried to assure them that the students were there and were eager to learn directly through the experiences of a practicing educator. But I also know that this assurance is partly hollow because at times I have seen

students' names active, long after the class session has ended. The follow-up emails that I have sent to such "name-only appearances" on more than one occasion have come back with apologies stating that they went to use the washroom right before the class ended, or that their pet or child needed their attention, and they did not see that the class had ended.

Informed by this dialogue and shaped by our experiences, we wonder: How shall we move forward in this remote/online environment to reimagine learning communities that are equitable and participatory, and which also respect privacy in this sea of faceless names?

Learning to Live Without a Voice

We describe this tension as the call to rethink students' funds of knowledge within a mute/unmute discourse.

Latika: One key tenet of CRP is inviting students' voices. However, the voices of many culturally diverse students often remain "unspoken," especially in science and mathematics classrooms (Raisinghani, 2016, p. 185). The expectations of "one person speaking at a time" that are usually a norm in most Canadian classrooms and the mute/unmute discourse of virtual Zoom environments may further silence these voices. As Rychly and Graves (2012) observe, such behavioural norms are contradictory to the cultural modes of communication in many non-Western cultures, which "call for communication that is active, engaging, and participatory" (p. 47). I wonder how such communal modes of communication could be encouraged in virtual settings. Drawing upon Lisa Delpit's (2006) work, Gay (2018) emphasizes the need to teach all students cultural codes of power, which include teaching students the language of instruction and implicit/explicit rules that may play a key role in determining the power dynamics in classrooms. In current pandemic situations, these "cultural codes of power" may need a new definition/expansion to integrate the intricacies of technological efficiency that one may need to learn effectively in technology-dependent virtual learning environments. One may argue that technology is already a part of

contemporary educational environments, and most students are tech savvy. Well, this could be true for many standard classrooms that may mostly consist of Gen Z students who are frequent technology users (Kasasa, 2021). However, in teacher education programs, the student population is much more diverse, both culturally and in terms of life-experiences. The internationally qualified students, who may have come from a cultural context where education and technology are still distant cousins (who only meet sometimes), add another dimension. Moreover, using technology for academic purposes has its own learning curve which may require new skills from all students, regardless of their prior exposure to technology. This is confirmed in the experiences of many students in elementary science methods and environmental education classes that I taught in the winter of 2021. In these courses, I designed video-based assignments to promote multi-sensory learning and to develop technological skills among students. Considering the inequitable and limited access to library resources and economic disparities that became greater during the pandemic, I created online reading lists to ensure that all readings and audio-visual resources are accessible with no additional cost to the students. To empower all students in technological “codes of power,” I strive to embrace choice, collaboration, communication, critical thinking, creativity, and caring, the 6Cs that I consider crucial for inviting (trans-multi)culturally responsive education (Raisinghani, 2019, p. 28). However, navigating technology required a lot of consultations while planning, designing, and creating these learning experiences, and a lot more time to provide one-on-one support to individual students. At times, I wonder if my efforts to meet diverse students’ needs and invite their funds of knowledge were technically sustainable and culturally responsive.

Kathy: It sounds like you came up with creative adaptations to your assignments out of respect for student voice and choice. I also adapted my undergraduate mathematics methods assignment expectations to encourage students to video record their presentation in advance so that they would, for example, have greater agency in timing, without me having to wave my hand, write in

the chat or, worse case scenario, unmute myself to interrupt and inform the student that they had now gone over their allotted presentation time. In a face-to-face environment, somehow, I feel more lighthearted, not so heavy-handed, in applying the time limits. In the online environment, it comes across so regimented and rude, even though I know that the reasoning behind my imposed time limits is out of respect and equity considerations.

Voice is intriguing and challenging to explore, both metaphorically and in the real world of virtual classes on Zoom. Maybe this idea relates to what you wrote about cultural contexts where educational (voice) and technological (voice) are still distant cousins. Unfortunately, the mute/unmute discourse on Zoom brings to my mind the idea of surveillance and normalization. I wonder if by implicitly imposing these “normalized” expectations in our virtual classrooms, we are “muting” the communal modes of communication that are encouraged in many cultural contexts.

Informed by this dialogue and shaped by our experiences, we wonder: In this remote/online environment, how could we deepen our understandings of culture and diversity, and embrace pedagogical practices that are culturally responsive, by listening to student voices and embracing their funds of knowledge?

Heartfelt Fatigue

We describe this third and final tension as the call to be responsive amidst compassion fatigue.

Latika: I often wonder about being “present” for all students during their discussions in Zoom breakout rooms. I feel anxious as I find that I can only join one breakout room at a time and can not see and hear what other student groups are doing. In face-to-face classrooms, I often walk around and try to listen to the conversations and *read* the body languages of students to see who is engaged and who may need a little help to get refocused on the topic. I wonder if it is these moments of on-the-spot interactions and reflections with(in) my teaching that I am missing in

these virtual environments, or if it is the “sense of control” that I am craving as a teacher. This sense of urgency to be “present” reflects Foucault’s (2008) “panopticism”, which refers to the automatic functioning of power and includes a constant, but invisible surveillance that imposes a state of consciousness and an oppressive self-regulatory form of control among people who may feel that they are constantly being watched. I feel that this Panopticism is omnipresent in contemporary modes of schooling, which explicitly or implicitly demand a constant and visible teacher presence to “discipline” students’ learning, as evidenced in the experiences of a teacher in Barrett’s (2006) study.

Kathy: I think my desire for presence manifests quite differently than yours in my virtual classrooms. I generally inform my students that I will “pop in and out” of the breakout room, without microphone (muted) and without video (faceless). I prefer this approach because then I can exhibit fluidity in moving from one small group discussion to the next without noticeably disappearing while a student is in mid-sentence. It also serves to lessen their perception that the “expert” has now entered the room (at least that is my theory on the matter). This silent and invisible presence has, however, resulted in a few awkward moments. In one situation I can recall, a student did not notice that I had appeared as an extra black box in the breakout room and so they carried on with their complaints about the course, the assignments, and how unclear my instructions were. I think eventually someone else in the group noticed my presence and notified the student because they abruptly changed directions and began contributing to the assigned topic of discussion. This felt very much like I had deliberately chosen the “panopticon” approach, as opposed to your approach to being present for your students. Sometimes, I feel as though my attempts at responsiveness completely backfire and instead, I appear totally detached and unavailable to my students.

Latika: The feelings of being detached and unavailable bother me when I see the humongous number of emails that I receive. I often wonder if these emails reflect unclear instructions or the need for human connections that are harder to establish in virtual environments. Therefore, in my courses, I especially created a peer support and feedback forum where students were encouraged to post questions and initiate conversations with their peers about specific course topics. I also designed course assignments to promote collaborative engagements. One example is the use of curriculum resource packages where students designed, in groups, virtual cross-curricular science and environmental education lessons with considerations for student diversity. These lessons include integration of Indigenous ways of knowing (Aikenhead & Elliott, 2010) and learning through nature, in addition to place-based and art-infused pedagogies that reflect a shift from STEM to STEEM/STEAM — where an additional E reflects environment and the letter A reflects art and aesthetics —, to create possibilities for challenging Eurocentric, acultural modes of engaging in science. The presentations of these collaboratively designed assignments in whole-group and breakout room settings created “mini-conference-style” professional development opportunities for students, as they engaged in learning through their own and their peers’ contributions and, hopefully, empowering self and others which is a crucial aspect of CRP!

Kathy: I am impressed by the creative, technology-centred assignments you designed for your students! The key question (or perhaps dilemma) is how, or if, one can create empowering learning experiences for the “other.” In my experience, some B.Ed. students simply want to get through their program to become a teacher or, in our mathematics education certificate or M.Ed. programs, to complete courses so as to move up a step on the salary scale. This situation can be quite discouraging for me as I frequently receive signals of ambivalence along with questions that ask me, for example, “what do you want for this?” Couple that ambivalent disposition with the already detached nature of joining class from their own bedroom, wearing their slippers, and

sipping a cup of tea — it all makes me wonder if (virtual) class is just an aside in students' lives, whereas a (real) face-to-face class tends to include so many more deliberate actions on their part that it cannot help, but become a focal point in their day. I try to remain positive and ponder how I can be more responsive to students, but it can be challenging when, in return, they do not demonstrate responsibility toward authentic connection and participation. But then, as soon as I write this, I catch myself and think: What if this is the best they can do, under the circumstances?

Latika: Yes, the dynamics of power versus privilege is often hidden within societal idiosyncrasies and there might be specific situations the students may face. Like Leacock and Warrican (2020), who investigated the issues faced by the Eastern Caribbean teachers as they attempted to adopt technology-mediated education during the pandemic, the issues of internet connectivity and device inaccessibility in home settings were evident in the experiences of students in my classes. In addition, specific health and well-being issues also affected students' full participation and performance in pandemic-imposed virtual settings. For example, one of the students stopped showing up for the synchronous sessions in the environmental education course. I sent multiple emails to inquire, with no response, and I was ultimately able to hear back from the student only through the help of Student Services. The student shared that they could not join the virtual classes due to changed living situation with no access to any digital device. I connected the student with the Library Services who, fortunately, were able to provide a computer and learning space, enabling this student's successful participation in the remaining sessions of the course. Another student reported having limitations in sitting and typing due to a physical injury, but assured that they would be able to complete the assigned tasks with the support of the accessibility unit of the university. I gave the student the option to submit audio files but, despite multiple extensions, no assignments were submitted. Other than the occasional presence and a few verbal contributions in virtual sessions, this student's overall engagement was missing. In consultation with Student

Services, this student was given a deferral. Regardless of all these efforts to accommodate the student, they never responded back and did not complete any assignments, even after extending the deferral for another term.

Kathy: It sounds like you consistently reached beyond what is expected of a responsive instructor in “normal” times, let alone in these times where we also need to take good care of ourselves. Perhaps the way forward for teacher educator responsiveness is community responsiveness — where we are *all* asked to look out for everyone else within the community. In other words, the responsibility to recognize and respond to structural (and other) inequities within a community of practice rests on the shoulders of all those in the community. Of course, as Barrett (2021) reminds me, “[i]f community is what is required to make online learning successful for all, the infrastructure and resources need to be provided to make that community available to all” (p. 114).

Latika: I agree that there needs to be a communal spirit. The extra time and effort that I took to reach out to students in these distant virtual landscapes — with no way of knowing if I am successful in sharing my concerns through emails as there were often delayed or never responded to— and most of all, the emotional work involved, made me feel overwhelmed. Noddings (2012) mentions that just by engaging in the act of caring as a “carer” does not ensure relational care, because authentic relational care requires a reciprocal acknowledgement by the person who is being “cared for.” Thus, I am not sure if perhaps the heartfelt fatigue that I felt was because of the lack of reciprocity. I also wonder if, by having this desire to receive such an acknowledgement by my students, I am fully embracing “6Rs: respect, responsibility, reciprocity, relevance, relationality and reverence for diverse cultures” (Raisinghani, 2019, p. 31). I also feel that while I envision and strive for creating (trans-multi)culturally responsive educational spaces, there are many marginalized places where we are unable to reach as teacher educators. One example of such

unreachable places are the homes of some students. These students shared that they did not have enough physical space and quiet environment in their homes from where they could participate in virtual class sessions. These complexities were more challenging for many female students who shared that often the culture-imposed gender(ed) roles expect them, as females and mothers of young children, to fulfill their household responsibilities first, and these seem to never end. Thus, the issues of gender disparity, equity, and care are at the heart of the heart-felt fatigue that I feel. These issues are not new, but the current COVID-19 pandemic has further exacerbated these for many students who are traditionally marginalized, such as females and the students who belong to low socio-economic status.

Informed by this dialogue and shaped by our experiences, we wonder: What are the ways forward that could help us traverse this path of “thinking” in a culturally responsive manner as we strive towards “enacting” and “embracing” (trans-multi)culturally responsive education in the midst of this pandemic perplexity and compassion fatigue?

Concluding Thoughts

In this chapter, we engaged in a duoethnographic inquiry to share our experiences of teaching mathematics, science, and environmental education in a teacher education program and the tensions that arose in remote, virtual modes of teaching during the COVID-19 pandemic. In these dialogical interactions, rather than taking a pedagogical or teaching stance, we have tried to adopt a learning stance as we attempted to inquire: What does it mean to be a culturally responsive educator while teaching in virtual learning environments amidst a pandemic? Informed by the (trans-multi)culturally responsive education framework, by reflecting on and within our moments of teaching, we have traced the connections between our thoughts and actions which have shaped our efforts at embracing cultural responsiveness. These connections can be seen in the three critical tensions that surfaced through our dialogical interactions: teaching in a sea of faceless

names; learning to live without a voice; and heartfelt fatigue. As we move forward, we wonder: How could we be intentional and focused on building responsive relationships with our students in virtual environments when there are many societal inequities that we may not be able to address remotely? How could we care for our students who may be less privileged and feel further marginalized in virtual learning spaces? How are our “virtual” efforts the same/different from efforts in face-to-face environments? Are the tensions perceived by us imagined or real? How might these tensions arise due to our desires to RE-TURN to NORMAL? How and in what ways can we define NEW NORMAL? Would returning to “normal” face-to-face practices be “NORMAL” or would it be a LOST chance as we deny the opportunities to re-imagine education in the (k)new hybrid spaces? Which approach is more restorative and responsive? With heartfelt fatigue that we presently (and may continue to) experience, how do we care for our own well-being as we strive to become (trans-multi)culturally responsive teacher educators?

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Section 3: Online Learning & Teaching in Higher Education

Chapter 14

Taking Forward and Leaving Behind: What Lessons Can We Draw from Post-Secondary Student Voice?

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Abstract

In looking back, we are cognizant of emergency pandemic shifts made by instructors and teachers. To ascertain the impact of these pandemic shifts on student learning, we studied the student voice utilizing two cycles of action-research methodology. In Cycle 1, we examined how the inclusion of pandemic-teaching shifts in the areas of pedagogy, content, and connection impacted student learning. Student voice was solicited by surveying first- through fourth-year education students in March 2021. Utilizing their responses, we adapted our fall 2021 courses, incorporating some of the student-identified impactful pandemic teaching strategies. In Cycle 2, we examined similar concepts but focused on the impact on student learning from the continued inclusion of pandemic shifts in the areas of pedagogy, content, and connection, and what teaching and learning adaptations arising from our pandemic shifts should be carried forward and which should be left behind. To gain student voice on these concepts, we re-surveyed our students in November 2021. After thematically analyzing the student voice regarding the impact of each adaptation, we discovered that students wanted us to take forward: (a) alternative pedagogical approaches, (b) strategies to create and maintain meaningful connections, and (c) mindful adjustments to course content. They wanted us to leave behind: (a) excessive screen time, (b) extraneous workloads, and (c) reliance on lecture-centred learning. As we enter a post-pandemic era, we are cognizant that new paradigms can and should be woven into a reimagining of education.

Résumé

En regardant en arrière, nous avons pleinement réalisé les changements provoqués par l'urgence de la récente pandémie. Afin de déterminer l'impact de ces changements, nous avons sollicité l'opinion étudiante et en avons fait un objet d'une étude, recourant à deux cycles de la méthodologie "recherche-action". Au cycle 1 de cette méthodologie, nous avons examiné l'incidence des modifications apportées aux modes d'enseignement pour faire face à la pandémie dans les domaines de la pédagogie, du contenu et de la connexion sur l'apprentissage. Les étudiants sollicités pour cette étude étaient inscrits en Éducation, de la première à la quatrième année, en mars 2021. À l'automne 2021, nous avons adapté nos cours en incorporant certaines stratégies d'enseignement. Au cycle 2, nous avons repris ces concepts, mais en nous concentrant cette fois sur l'incidence pédagogique des changements occasionnés par la pandémie dans ces trois domaines, afin de comprendre parmi les mesures adoptées celles qui s'avèrent le plus efficaces. Au terme d'une analyse thématique des entretiens menés avec les étudiants en novembre 2021, nous avons retenu que ces derniers souhaitent voir se poursuivre: (a) les approches pédagogiques alternatives, (b) les stratégies susceptibles de créer et de maintenir des relations enrichissantes, de même et (c) l'adoption d'une approche sensible dans toute modification de contenu de cours. Par ailleurs, ils souhaitent l'abandon : (a) des temps d'écran excessifs, (b) des charges de travail superflues et (c) de la dépendance à l'apprentissage centré sur les cours magistraux. Les nouveaux paradigmes peuvent et doivent être intégrés dans une réinvention de l'éducation.

Taking Forward and Leaving Behind: What Lessons Can We Draw from Post-Secondary Student Voice?

After COVID-19 was declared a health pandemic on 15 March 2020, our small western Canadian community college dealt with a multitude of teaching and learning adaptations in our four-year collaborative education degree program. Like educators at all levels, we became cognizant of the need to adapt courses but wanted to keep any shifts focused on having a positive impact on student learning. Thus, we initiated a two-cycle, action-research study to determine impact on student learning. To begin, Cycle 1 strove to ascertain from student voice how pandemic shifts would impact student learning. We chose to define student voice as the expression of values, opinions, and perspectives of individuals and groups of students with the goal of increasing student engagement and improving instruction (Benner et al., 2019; Clark-Gardner & Campbell, 2019). We sought input of our adaptations by surveying first- through fourth-year education students in March 2021 (Cycle 1 Survey). Drawing on Community of Inquiry (CoI, n.d.; Garrison, 2017, 2019; Garrison & Akyol, 2015; Garrison et al., 1999; Xin, 2012) as a theoretical framework, we discovered benefits and drawbacks of our pandemic-inspired shifts in the areas of pedagogy, content, and connection (Andjelic et al., 2022). Utilizing these discoveries, we then adapted our courses during the fall term of 2021 by incorporating some of the pandemic teaching strategies identified as impactful. This led to Cycle 2 of the action-research study where the following specific research questions were asked: What impacts on student learning result from the continued inclusion of pandemic shifts in the areas of pedagogy, content, and connection? Which teaching and learning adaptations arising from our pandemic shifts should be carried forward and which should be left behind? To answer these research questions, we surveyed our students once again in November 2021 (Cycle 2 Survey). After analyzing the data, Cycle 1 and 2 comparable results were cross-referenced, and the impact of each adaptation was examined

individually and collectively as an education team. What we will take forward now and leave behind from a pedagogy, content, and connection standpoint, is the focus of this chapter (see Figure 1 for complete action-research timeline).

Figure 1

Action-Research Timeline



Background to Study

Due to necessitated COVID-19 shifts beginning in March 2020, the need to adapt our courses on multiple levels became paramount. Situated in our research-based theories and practices, we made pedagogical, content, and connection adaptations for the online fall 2020 course delivery (Dweck, 2010; Flynn, 2020; Hege, 2011; Kiernan, 2020; Lock & Redmond, 2021; Mohammed et al., 2020; Openo, 2020; Wolfe & McCarthy, 2020). Pedagogical adaptations included designing effective synchronous classes (Nilson & Goodson, 2018; Vaughan et al., 2014), using new technologies to enhance synchronous time (Lambie & Law, 2020; Nilson & Goodson, 2018; Vaughan et al., 2014), and providing engaging synchronous and flipped

classroom experiences (Awidi & Paynter, 2017; Jeong et al., 2018; Kirschner, 2002). Content adaptations consisted of modifying the number of topics covered, depth of each topic, and experiential learning opportunities for each course (Coman et al., 2020; Hege, 2011; McGowan, 2021; Marinoni et al., 2020; Ruth, 2006). In terms of relationship-building or connection, we created opportunities for synchronous instruction and small group collaboration through our learning management system (LMS) (Dolan et al., 2017; Martin, 2019).

First Cycle of Action-Research Study 2020–2021

After making these shifts, we became curious as to how our changes impacted student learning. In our situation, student voice is viewed as a valid contributor to our educational decisions (Cook-Sather, 2002, 2006; Fielding, 2010; Kehler et al., 2017; Lodge, 2005; Matthews et al., 2018; Mihans et al., 2008), without which, we felt, the full picture of the impact of our adaptations would be incomplete (Darling-Hammond, 1996; Healey et al., 2014). Given this view, a formal analysis of these changes ensued, utilizing action research as the methodology in addition to Community of Inquiry.

Action-research methodology, developed originally by Kurt Lewin in the 1940s, is characterized as a spiral approach which focuses on small scale, individual practices, which, when researched, follow the cycle of continuous planning, action, evaluation, and replanning (Adelman, 2006; Arnold, 2015; Clark et al., 2020; Guedes, 2012). This methodology supported the pragmatic nature of our study which focused on change and improvement of our practice while also generating new insight (Arnold, 2015). To frame this two-year study we utilized action-research steps, which include: (a) focusing research, (b) identifying research questions, (c) establishing theoretical framework, (d) collecting data, (e) analyzing data, (f) reporting findings, and (g) enacting an action plan for continuation of the cycle (Janse & Van Vliet, 2021). In the fall of 2020, we began the first action-research cycle when faced with unprecedented shifts in our post-

secondary teaching due to COVID-19. To begin, we focused the Cycle 1 research on the impact these shifts might have on student learning, seeking to determine how our adaptations would be perceived through the student lens.

To investigate these impacts, we adopted, as mentioned, the Community of Inquiry theoretical framework. This model focuses on online and blended educational environments and describes how learning takes place at the intersection of social, teaching, and cognitive considerations/engagement, which creates a vibrant and worthy educational experience (CoI, n.d.; Garrison, 2017, 2019; Garrison & Akyol, 2015; Garrison et al., 1999; Xin, 2012). This theoretical model resonated with our work, and we mirrored its triadic interconnection of pedagogy (teaching), content (cognitive), and connection (social) in the framework for our survey questions and data analysis. To ascertain the impact of adaptations on student learning in these three areas, we first collected data by surveying first- through fourth-year students. The survey consisted of anonymous Likert scale and open-response questions, and was conducted at the end of the first year of pandemic teaching in March 2021. We thematically coded our data both as individual education instructors and as a six-person team, using Hattie's concepts of visible learning and mind frames of impact (Hattie, 2011, 2012, 2015; Hattie et al., 2015; Hattie & Yates, 2014; Hattie & Zierer, 2018), in addition to Kitchen's (2005a, 2005b) concept of relational teacher education. Hattie's work allowed us to situate our adaptations within evidence-based influences on post-secondary student achievement (Hattie, 2015), while Kitchen's work supported the necessity of respecting student voice (Kitchen, 2005a). In our analysis, we found student response to the adaptations understandably mixed (Andjelic et al., 2022). Overall, the data revealed that most students preferred face-to-face teaching and learning, with very few students responding otherwise. From a pedagogical perspective, if classes could not be face-to-face, students strongly preferred synchronous online learning over asynchronous. From a content point of view, it was

revealed that there was a need for instructors to identify and focus upon deep and essential learnings and avoid perceived busy work. Finally, from a connection perspective, results highlighted that intentionally building class community is a *must-do* for a full educational experience. These results reflected similar themes from current studies focusing on student perception of shifts made by instructors in the 2020–2021 academic year (Coman et al., 2020; Kiernan, 2020; Lambie & Law, 2020; Lock & Redmond, 2021; Marinoni et al., 2020; Mohammed et al., 2020; Openo, 2020). Continuing with the action-research framework, we reported these findings to our local colleagues and administration as well as to a wider audience through a Canadian Association for Teacher Educators (CATE) polygraph publication (Andjelic et al., 2022). This sharing helped us solidify our action plan to continue researching the impact of our teaching practices as COVID-19 continued.

Second Cycle of Action-Research Study 2021–2022

As action-research studies are wont to do, its cyclical nature persisted and saw us starting Cycle 2 by reintroducing the seven steps of this methodology for the 2021–2022 academic year. Step one involved focusing on how the continued inclusion of pandemic adaptations in pedagogy, content, and connection impacted student learning. From this focus we developed the following research questions: What impacts on student learning result from the continued inclusion of pandemic shifts in the areas of pedagogy, content, and connection? Which teaching and learning adaptations arising from our pandemic shifts should be carried forward and which should be left behind? To maintain comparative consistency across the three presences (pedagogy, content, and connection), we continued to use the Community of Inquiry as our theoretical framework, and once again, to fulfill step four of data collection, we re-surveyed the students. We conducted the survey in November 2021, using the same anonymous Likert scale tool and open-response questions. Questions that solely addressed online learning were changed from the original survey

to reflect the in-person course offering format during the fall of 2021. Questions that were the same on both surveys were utilized for any comparisons of student response. Comparisons were considered not as a statistical method per se, but as a technique towards a synthesis of our data with the aim of revealing the existence of regularities or changes across the two studies (Cooper & Hedges, 1994; Fernandez-Duque, 1997; Gurevitch & Hedges, 1994). We situated this Cycle 2 survey under the same three presences of pedagogy, content, and connection as we did in the initial Cycle 1 survey. The student responses and comparative data grounded the decisions we made about what to take forward and leave behind from the pandemic shifts.

The ensuing sections in this chapter include the analyses and findings from the Cycle 2 Survey based on the changes we, as instructors, made for the fall of 2021. The reported findings relate to pedagogy, content, and connection. Positive and negative student perception of adaptations will be discussed with a synopsis of what we will take forward and leave behind in our future teaching. Each section concludes with lessons that we have drawn from students' perspectives and how these lessons will influence future teaching decisions.

Pedagogy

Pedagogy: What We Took Forward and What We Left Behind

Our Cycle 1 survey in March of the 2020–2021 academic year taught us many things about effective pedagogy in an online learning environment. The following discussion outlines significant lessons we learned from the student voice.

Adaptations Made for Fall 2021

Course Structure

In terms of course structure, the Cycle 1 survey indicated support for a flipped classroom approach utilizing pre-class work or recorded lectures, so that in-class time was spent in hands-on engagement with content (Berrett, 2012; Galindo-Dominguez, 2021; Ng, 2018). In the fall of

2021, individual instructors adopted a flipped classroom approach on a single-class or single-topic basis. A partial flipped classroom approach was also used by posting pre-class assignment-explanation videos, then by dedicating in-class time to fielding questions. Our 2020–2021 students also appreciated hearing from guest speakers: the silver lining to a global pandemic was increased virtual access to speakers (Price, 2020). We took advantage of this during the fall term of 2021 by inviting multiple online guests to our classes.

Engagement

Amidst the pandemic-induced online learning environment, the integral role of student engagement in learning was underscored. Students reported that strategies with high-effect sizes (Hattie, 2015), such as class discussions and group work, were vital for ensuring learner comprehension and success. In the fall of 2021 we focused on the most purposeful use of in-person class time possible; we were attuned to our students' insistence that in-person class time spent collaborating and completing hands-on activities was exceptionally valuable in terms of their success while any perceived ineffective use of this treasured time was intolerable.

Digital Elements

Teaching during a pandemic required instructors to brace for a steep digital-skills learning curve. While hiccups inevitably accompanied online classes, our 2020–2021 students commended instructors for their dedication to trying new digital tools to engage students virtually, and for their support in this sometimes-uncomfortable learning environment (Bedenlier et al., 2021). We took this idea forward, continuing for the bulk of the 2021 fall term to use digital whiteboards (e.g., Jamboard), online collaboration tools (Google Meet/Blackboard Collaborate, shared docs, etc.), and varied other digital applications. Student voice in Cycle 1 criticized using more than one LMS, so instructors carefully considered this in their fall 2021 planning.

Assignments and Learning Support

Many assignment styles and assessment strategies instructors were accustomed to using before the pandemic were impractical for online courses. Necessity sparked creativity as we worked to design feasible and meaningful tasks for students to demonstrate their learning in an online environment. In the fall of 2021 instructors adopted a variety of digital-based assignment types and submission formats as well as alternative assessment styles, such as oral exams (Ozbasi, 2019) and projects. Additional instructor support was provided to students by offering flexible digital office hours and, to reduce student workload fluctuations, several instructors coordinated assignment schedules to ensure assignment due dates did not overlap.

Findings and Takeaways: Student Feedback on Pedagogical Approaches

Our Cycle 2 Survey told an interesting tale, as we learned much from the voices of our education students regarding our pedagogical adaptations and approaches.

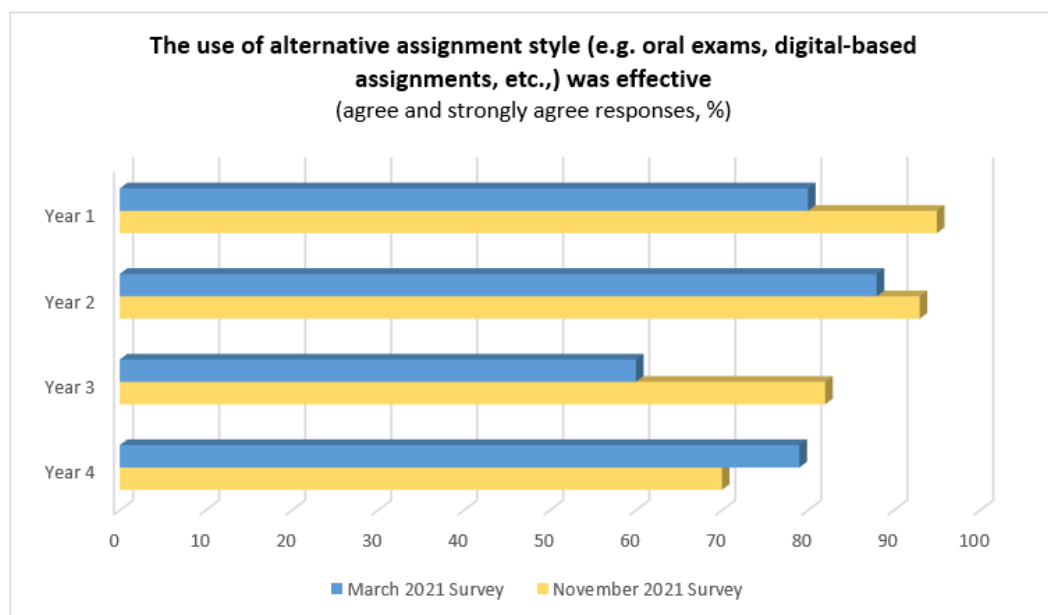
Applause, Please!

In terms of engagement, 87% of students responded “agree” or “strongly agree” that seeing their fellow classmates in person was important to their learning, an increase from 67% in the Cycle 1 survey. Third-year students responded most favourably with 95% agreement; these results also showed the largest increase (40%) over third-year student results from the previous survey. We assume these results stem from the fact that in the 2020–2021 academic year, these students’ classes were fully online, while in fall classes of 2021 students were in person. Strategies used by instructors in the fall 2021 to facilitate in-class student collaboration also scored highly (87%) over the results from the Cycle 1 survey (67%). A second-year student wrote: “[the] class offered ... lots of opportunity to work with table groups and partners.... We got to test out some of the things we were talking about together this way”.

Students appreciated instructors' efforts to continue and/or increase use of digital-based assignments and alternative assignment styles (see Figure 2). In the Cycle 2 survey, 85% of all students responded "agree" or "strongly agree," a marked change from 77% in Cycle 1.

Figure 2

Student Responses on the Effectiveness of Alternative Assignment Styles by Year of Program



A fourth-year student wrote: “the variety of assignment styles this semester was a welcome change.” Both first- and second-year students responded most favourably; this may reflect appreciation for the inclusion of short oral exams in these classes, instead of multiple-choice tests or papers. Though several students paired high stress with oral exams, many also found the stress comparable to traditional exams, calling the experience of an oral exam much more meaningful. A first-year student summed up this sentiment: “the oral midterm was scary but I felt that it helped me develop in the way that is necessary for this class.”

Stuck in Limbo

The reliance on learning management systems (LMS) for our courses did not diminish in the fall of 2021 with the return to in-person classes. However, our fall 2021 adjustments based on

feedback from the students in 2020–2021 failed to meet expectations. Though no instructor used more than one system in a class (as occurred occasionally the previous year), instructors were free to use the LMS they preferred, either Blackboard or Google Classroom. Like the previous year, students expressed displeasure over having to navigate two systems. “I disliked how different classes used different online learning management platforms” (first-year student). “Blackboard and Google Classroom were always set up differently depending on the professor, causing confus[ion] when trying to figure out assignments and due dates. This, overall, led to more stress than there needed to be” (fourth-year student). This is an area requiring further program level reflection.

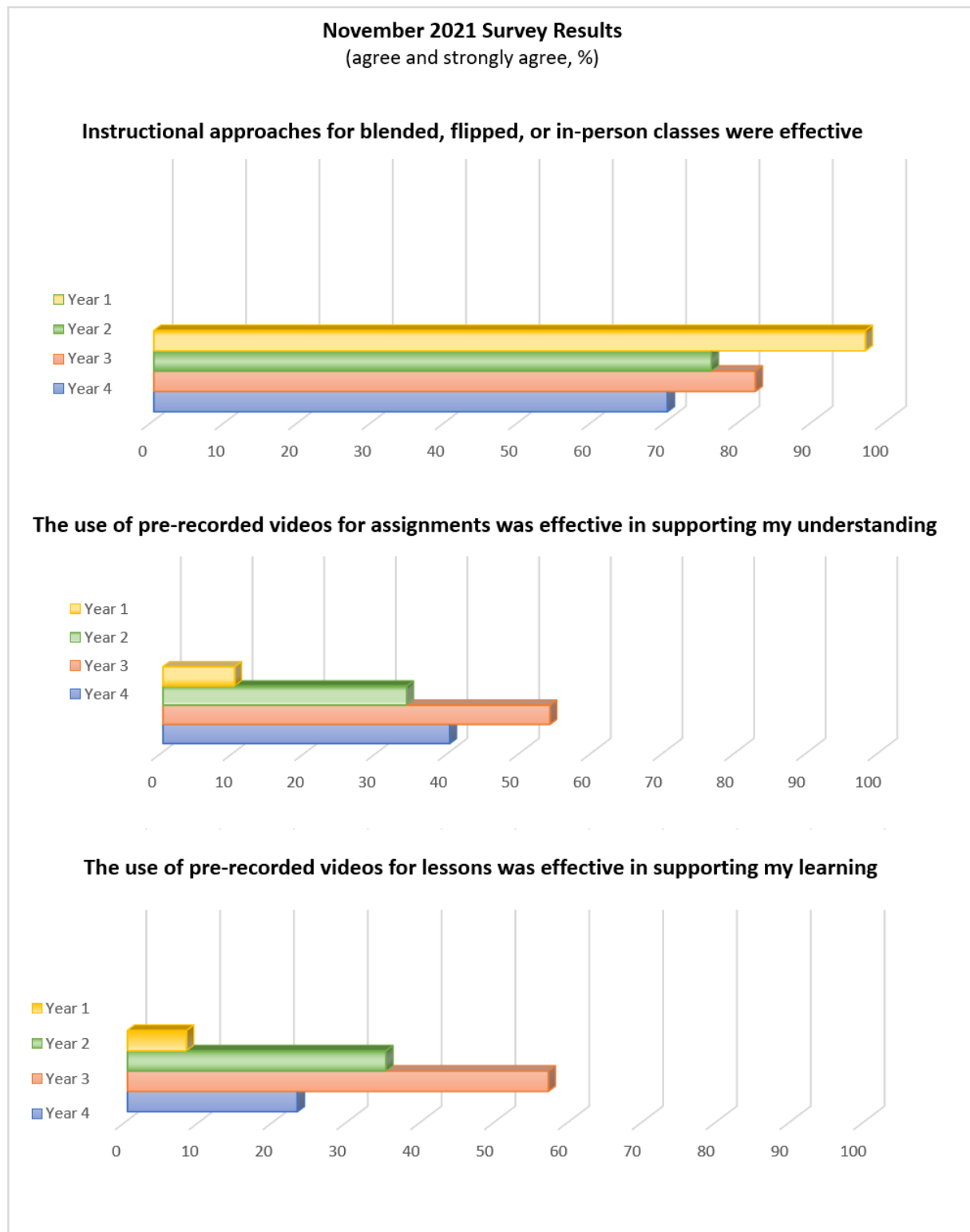
Mixed Reviews

Some of the pedagogical adaptations we continued in the fall of 2021 garnered varied levels of support (see Figure 3). First- and third-year students applauded instructors’ use of blended or flipped approaches to learning, with scores of 97% and 82% respectively, while second- and fourth-year students’ responses were more lukewarm at 76% and 70%. Of significant note, when asked later in the survey if pre-recorded videos for assignments or lessons effectively supported their learning, students collectively scored these strategies poorly, with an average of 35% supporting pre-recorded videos for assignments and 30% supporting the use of pre-recorded videos for lessons. While these percentages may indicate some lack of clarity on the students’ part about the meaning of terms like flipped or blended learning, when the data is coupled with student comments, we begin to understand how mixed student views are on this strategy.

Some appreciated it: “the ability to view a breakdown of an assignment ... in video format was greatly appreciated where it was done” (fourth-year student). Others disliked it: “I wasn’t a big fan of having to watch videos and do extra content online before class” (third-year student).

Figure 3

Student Responses on Blended or Flipped Classroom Approaches



Other students' comments were mixed: "I felt that the pre-recorded videos took up a lot of my time ... although they helped my understanding when I came to class" (third-year student).

The inclusion of guest speakers in our courses was met with moderate support (66%). Second-year students experienced the fewest guest speakers in the fall of 2021, possibly explaining their low support (41%) alongside the highest N/A score (24%). First- and third-year students experienced numerous guest speakers in the fall semester of 2021, and these were met with strong support at 84% and 96% respectively. Fourth-year students' support for guest speakers was low (43%); however, comments from this group explained that a key issue was the perception that some guest talks were ineffective. "Most of the guest speakers were very engaging and presented information that is pertinent for us ... but some felt slightly disconnected from the education field, which made it difficult to glean important information [for] our teaching practice" (fourth-year student). Also, there was some overlap in topics addressed by guest speakers across fourth-year courses: "the guest speakers ... came with very specialized messages, and often were cross-covered by other classes or guests" (fourth-year student).

Pedagogy Trends

Most of the pedagogical adjustments we made were fully or partially supported by our fall 2021 students, because, mindful of student feedback from the Cycle 1 survey, we had thoroughly explored this data beforehand. However, some questions remain: To what extent are students' responses a result of pandemic learning stress? How can we streamline our flipped classroom pre-recordings to reduce the perception that they are overwhelming or additional? Is it feasible and/or appropriate to use a single LMS within our education program? To what extent is the learning of pre-service educators helped or hindered by virtual access to classes?

Lessons Drawn: Pedagogy

Given both the data and comments provided by students over the past two years, several key points stand out, prompting the following observations for post-secondary educators to consider:

- Explore the value of using pre-recorded videos for assignments and lessons as ways to leverage flipped classroom approaches in a meaningful manner. Shorter videos, along with time-markers to simplify access to specific segments, may help minimize student impressions that pre-recordings are additional to normal course expectations.
- Develop a collective list of guest speakers for all education classes to ensure overlap is avoided. Where appropriate, provide more structure to guest speakers to clarify purpose and avoid presentations that are self-aggrandizing and/or incongruent with course goals.
- LMS user skill and confidence is important. Continue to consider what LMS is best for our students, both as undergraduates and future teachers.
- Continue the use of alternative assessments such as oral exams, projects, and digital-based assignments. Further exploration into varied assignment styles and assessment techniques for post-secondary educators is recommended.

Content: What We Took Forward and What We Left Behind

A crux of our students' future success in the teaching world is the content of our courses. Content is a thread that is deeply interwoven in learning experiences and teaching pedagogies. How could we, as instructors, use the students' perspectives on course content to improve and emphasize student learning, skills, and knowledge for their future?

Our Cycle 1 survey results regarding course content presented two main themes. Firstly, many students felt overwhelmed with too much course content. "We had to cover a lot of content. With everything being online it made it a struggle to keep track of everything" (fourth-year

student). Although this was a recurring sentiment from approximately one-quarter to one-third of first- to fourth-year students, the prevalence of students choosing to comment in the open response section on this topic was significant. Even though the course content had not been increased by instructors, students consistently reported feeling overwhelmed with too much content and were unable to fully engage and internalize the concepts. Secondly, students felt that there were too many assigned course readings, with some questioning their importance and value. One third-year student reported that the number of readings detracted from the content learning. These sentiments in the student survey results correspond to pandemic research. Mundy and Gallagher-Mackay (2021) talk about “slimming back the curriculum to ensure a balance between mastery of the essentials and in-depth opportunity for social and emotional learning” (p. 25). As instructors, we could identify with Bartolic et al., (2021) and the “tension between the diminished quality of the learning experience faculty felt they were able to offer and their sense of staying true to their original goals in the face of the pandemic” (p. 12). These are aspects that instructors felt an immediacy to consider and respond to in pandemic times. Admittedly, to maintain content integrity, adjustments could not be made haphazardly, nor could we change everything as there are transferability, course design, and specific program requirements, but some adaptations and curriculum agility can be and were made (Brink et al., 2021). We can say with certainty that our academic standards, although more flexible during this pandemic experience, were consistently high with slight adjustments to the what, when, and where of the course content (Bartolic et al., 2021).

Adaptations Made for Fall 2021

Breadth Versus Depth of Content

We situated changes to the breadth and depth of course content within Hattie’s concepts of visible learning (Hattie, 2011, 2012, 2015; Hattie et al., 2015; Hattie & Yates, 2014) and Julian

Kitchen's relational teacher education (Kitchen, 2005a, 2005b; Kitchen, 2016). Instructors revisited their course content by consciously and purposefully evaluating what they considered to be the most important outcomes and topics (Brown & Krzic, 2021; Khuhlane, 2021). Doing this allowed us to focus on how to help students develop richer and deeper connections to the content. Instructors identified essential understandings; these were the outcomes instructors felt were crucial for success, mastery, and internalization. Although broad course outcomes remained intact, not all had equivalent depth of study; instructors also assessed if students had the knowledge, skills, abilities, and attitudes to adeptly put their learning into practice. Considering the context of the fall 2021 students, instructors spent more in-depth time on slightly fewer topics in their courses. They also opted for greater depth of understanding, exposure to, and practice with the content, providing multiple student experiences with these important concepts.

Course Readings and Pre-Class Work

Course reading adaptations included removing some of the course readings, updating some readings for currency, adding in a video to watch instead of a reading or utilizing an online text companion resource that integrated the assigned text readings with student responses and activities. Instructors analyzed readings or pre-class work to determine what they felt would generate the most value for students, within a reasonable timeframe outside of class.

Other Content-Related Adaptations

To support depth of content as well as opportunities for review, instructors created two-page summary handouts with essential course learnings and shared them with students. Also, in the fall 2021 instructors presented mandatory content review sessions for core and complementary subjects before the students' final practicum. A shared Google drive was created for education students as an additional way to consolidate and share course-related resources.

Findings and Take-aways: Student Feedback on Course Content

After these content adaptations were made in fall 2021 and the survey data was collected, definitive student perspectives emerged.

Positive Progressions

Students' Cycle 2 survey responses relevant to course content were overall more positive, in comparison to the Cycle 1 responses. Instructor adaptations implemented in the fall of 2021 would indeed be one important factor; however, other considerations may have impacted the results such as students returning to in-person classes and navigating the evolving COVID-19 context.

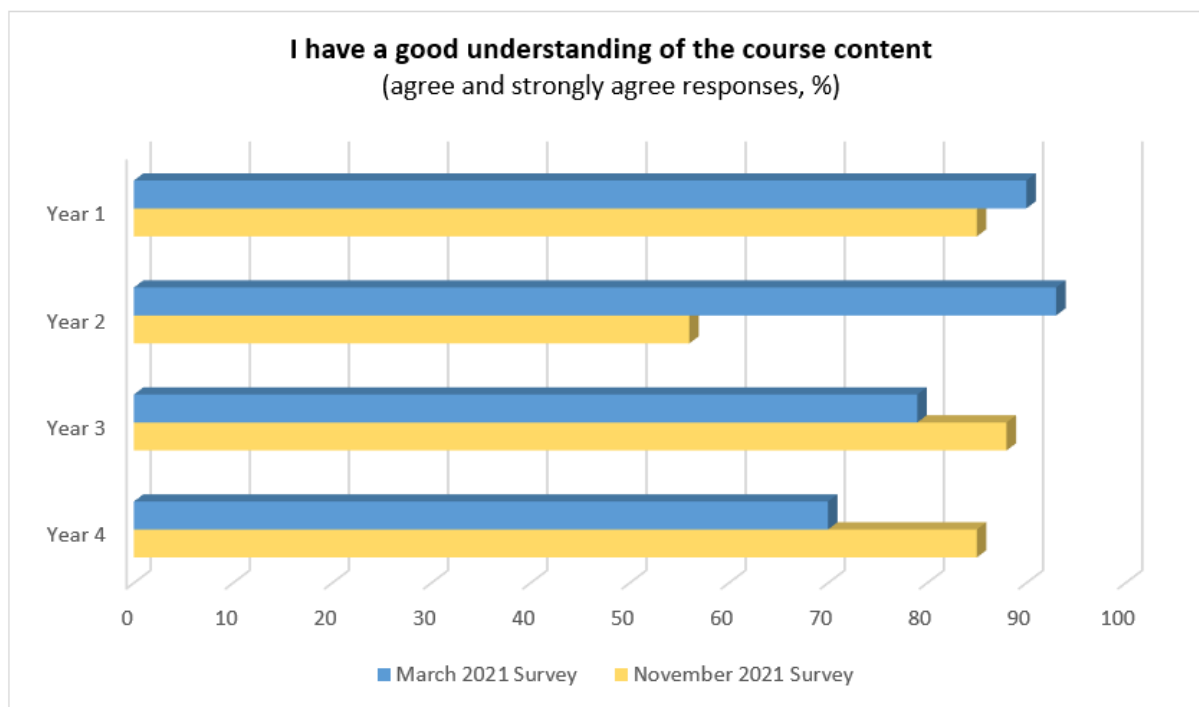
In terms of their “agree” and “strongly agree” responses, first-year students responded most favorably for the expected (87%) versus the appropriate amount (93%) of course content, in contrast to the fourth-year students' responses of 63% and 63% respectively. Third-year students — who faced in the fall a compressed course term with the completion of four courses in 10 weeks before proceeding to a 5-week practicum — seemed to focus their comments on this condensed frame: “at first it felt a little overwhelming with how little time and the amount of content thrown at us. However, after getting into routine and the feel for all of the classes, everything felt right and appropriate” (third-year student).

The most favorably answered content question in both the Cycle 1 and Cycle 2 surveys was “I have a good understanding of the course content” with 80% of students in Cycle 1 and 83% of students in Cycle 2 answering “agree” or “strongly agree” (see Figure 4). Overall, students felt the way in which content was presented promoted deeper understanding of the topics with an increase of “agree” and “strongly agree” responses from 74% in Cycle 1 to 78% in Cycle 2. An anomaly occurred; some fourth-year students appeared dissatisfied with the depth of content (43%) but were satisfied overall with their content understanding (70%). As one fourth-year

student stated, “each of our [education] courses this semester has made considerable efforts to revise and include student voices in the course work required for students.... I feel as if my understanding of course content in these classes has increased.”

Figure 4

Student Responses on Depth of Understanding of Course Content



Back to the Drawing Board

With scores of 62% (Cycle 1) and 63% (Cycle 2), the question “the amount of weekly reading required was appropriate” was scored least favorably overall. Our first-year students frequently remarked that the course readings were challenging to complete, and they questioned their relevance. “Having big assigned readings was difficult for me to complete in time for class due to other classwork” and “sometimes the reading and class content felt very disconnected” (first-year students). Third-year students in their compressed term commented very strongly against the appropriateness of the amount of readings with only 39% indicating “agree” or “strongly agree.” Continued careful analysis by instructors regarding pre-class work is ongoing.

Content Trends

In terms of all “agree” and “strongly agree” content survey responses, a declining average was seen from first-year students (90%) through to fourth-year students (61%). This progression will be analyzed in the years to come to determine cause and effect and adapt appropriately.

Questions that arise are: Do students further along in the education program feel more knowledgeable, and therefore more empowered, about their individual needs for success and, consequently, feel more confident in sharing this? Is the amount of content and depth of content still too much for a semester-long course? What are the implications for seeking more course content adjustments? How do our current realities in teaching and learning impact course content? It is also significant to recognize that the increase in knowledge throughout the program could be opening up even more personal understandings of how much there is yet to be learned.

Lessons Drawn: Course Content

After thorough discussions about the survey results pertaining to course content, we have consolidated the following recommendations for post-secondary educators:

- Analyze breadth and depth of content in courses. Educators should determine which content areas in each of their courses are vital to the deep promotion of enduring understandings and practical applications of course content.
- Revisit course readings and pre-class work, particularly in demanding or compressed terms, to ensure an appropriate amount of valuable readings and pre-class work with manageable length and time commitment.
- Provide two-page course summaries, host course content review sessions before any final practicums, and promote shared Google drives with content resources.

Connection: What We Took Forward and What We Left Behind

Based on our Cycle 1 survey of students in March of the 2020–2021 academic year, we learned what did and what did not work regarding building connections in an online learning environment. Our students readily shared their thoughts on the importance of building community and collegial relationships as well as implementing effective instructor strategies to facilitate this. The significance of building community and connection within our classes is viewed by students as a must instead of an option. Instructors were seen as responsible for creating an optimal online learning environment for building connections. Students were more supportive of and committed to the varied learning opportunities since instructors effectively used class time to encourage collegial relationship-building.

Adaptations Made for Fall 2021

Building Community and Collegial Relationships

Building relationships with students and focusing on continually finding ways for meaningful connection is vital to creating an optimal learning environment (Lichtenstein, 2005; Martin, 2019; McDonald, 2021). Instructors purposefully created overarching learning communities for students by prioritizing in-class connections in varied ways as well as purposefully planning both academic and non-academic student check-ins. In addition, to support instructor-student relationships, instructors increased their availability outside of posted online office hours.

Instructors Set the Stage

Shifting back to in-person learning permitted instructors to continue to utilize a learner-centred perspective (Dewey, 1916), with the use of teaching strategies and structures that promoted collaborative work to support connections during classes; instructors highly emphasized setting the stage for this connection-building. These strategies included dedicated time for table

conversations, varied seating arrangements, small group work, and whole class discussions as well as cross-course collaborative assignments for some classes. Instructors also initiated a second-year orientation for returning students without campus experience given the online learning in the previous year. To build community with students who could not attend in person, a webcam was used in most classes.

Findings and Take-Aways: Student Feedback on Connection

The results of the questions related to connection in the Cycle 2 survey are telling and unique. They fall into four notable findings, each of which is discussed below.

Importance of In-Person Learning

Looking at the Cycle 2 survey results showed that 77% to 93% of first- to fourth-year students agreed or strongly agreed that seeing their fellow classmates in-person positively impacted their connection to peers and instructors, as showcased in Figure 5. One first-year student reported that “there were many class discussions among peers and as a large group that positively impacted my overall education.”

Collaboration

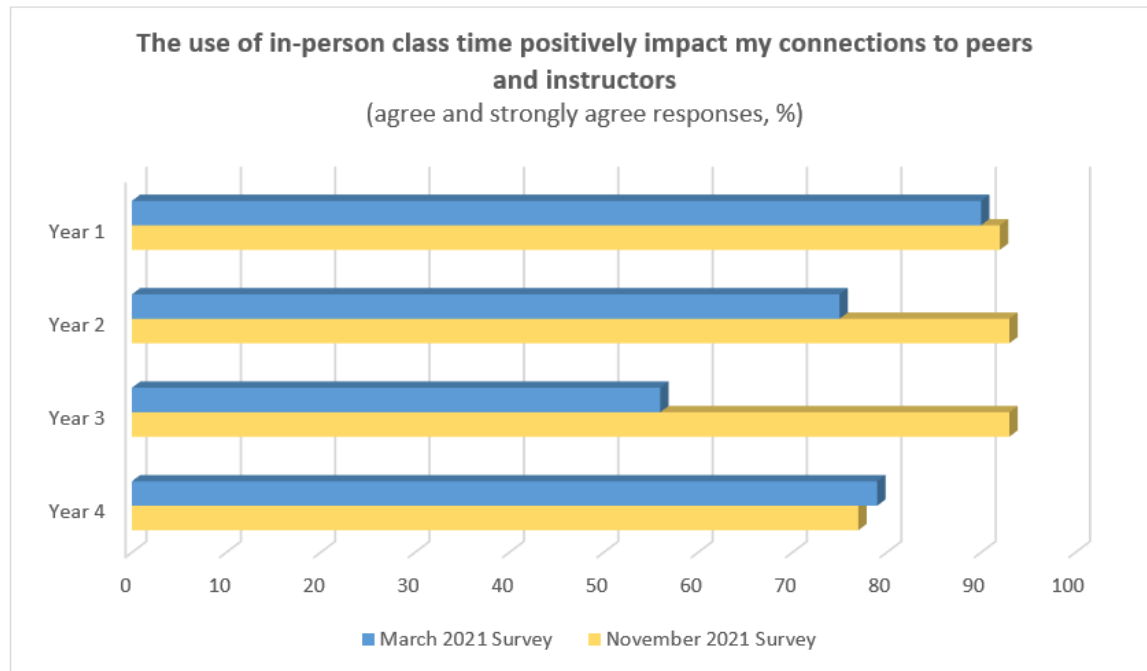
Collaboration is an essential element of the teaching pedagogy that our education instructors utilize in all of their classes. This could not be more obvious as a resounding 99% of all students indicated “agree” or “strongly agree” to the survey prompt, “the instructor created opportunities for me to collaborate with my peers.” This is supported by a second-year student who stated:

In my [education] class, I made really good and positive connection among my peers. We were supporting each other and I think that is really important in building positive relationships. My instructor from [education class] was incorporating lots of different

activities (small or big), and I found that really helpful because it makes me connect and relate to other students in my classroom.

Figure 5

Student Responses on the Impact of In-Person Class Time



Instructor Availability

Given that during the 2020-2021 online school year where instructors created virtual office hours through Google Meet, phone calls, Blackboard Collaborate, or emailing, our Cycle 2 results showed support for continuing this amount of instructor availability. With an average of 90%, first- through fourth-year students applauded instructors' availability outside of class time. Students showed appreciation for the flexibility and frequency which instructors showed in terms of extra support over regular office hours. A third-year student commented: "I really appreciate that the instructors always made themselves available outside of class time. They were always very quick to answer any questions that were posted in email."

Cameras On, But ...

While students and faculty alike were relieved to be back to in-person classes, things were not yet back to “normal.” Student absence due to illness or other circumstances was an ongoing and present reality. Thus, instructors brought portable webcams so COVID-symptomatic students could attend from home safely, yet still feel connected to the class. While no instructor stated they would actively facilitate a hybrid-flexible course design system where students could “choose whether to attend classes face-to-face or online, synchronously or asynchronously” (Beatty, 2019, Beginnings section), instructors’ use of the webcam was varied, some connecting the at-home students more than others with the in-person classroom environment. Though accounting for only one question on the total survey, this topic dominated some of the written comments. Some students were pleased the webcam allowed them access to class: “I think it was great to have a camera set up for people who were sick or for COVID reasons. Missing a day of school can be a lot and having the option to watch online lectures helped” (fourth-year student). Moreover, students felt they could still connect while attending virtually; one fourth-year student stated, “even while online I was regularly encouraged to connect with my classmates which assisted my learning.” In contrast, other students were critical that more was not done by instructors to actively connect virtually-attending students with the class: “I think instructors went as far as turning on the camera and microphone for people attending online — that is not enough. Instructors need to have more for students at home to do while in class” (third-year student). A fourth-year student stated, “the online camera option never felt very connected to our in-person classes. Students online were often excluded or forgot about during class lectures.”

Connection Trends

In the Cycle 2 survey of student voice, the highest percentages of “agree” and “strongly agree” appeared in the connection section, underlining the importance students placed on this for

their overall learning experience. The need to create opportunities for collaborative learning for our students, including when they are attending virtually remains important. As well, students felt seen and valued when they could contact instructors with questions and/or clarification when they needed it. This ability to connect outside of class time positively impacted their learning inside the classroom. Survey results confirm that teaching must include building relationships with peers, instructors, and the community to create engaging and thoughtful learning opportunities (Hill, 2002). Questions arising from these results include: Now what? As we move forward, can instructors do more for at-home students? Should they? What role does a webcam play in the culture and community of our future classrooms? In what other creative ways could instructors build community in their classrooms?

Lessons Drawn: Connection

In terms of connection, we found that several key elements arose as important for post-secondary educators to consider:

- Continue to be available for student questions and/or concerns. The ability to reach out to instructors with questions, comments, clarifications, and/or support remains an important part of creating a culture of connection for students.
- Consider having the camera to remain an option for those students who need to access a class online. Educators should be explicit with students that webcam access is an avenue for staying connected, but it cannot fully replace the impact and value of face-to-face learning.
- Maintain student check-ins. Although check-ins may look different depending on course or educator, purposefully reach out to students in varied ways.

- Continue to create opportunities for students to collaborate through dedicated time for table conversations, varied seating arrangements, small group work, whole class discussions, and cross-course collaborative assignments.

Conclusion

Student responses to our research question focusing on continued inclusion of pandemic shifts in the areas of pedagogy, content, and connection were understandably mixed. For example, students responded favorably to in-person classes and the ensuing increase in level of engagement, as well as to alternative assignments being widely used in numerous courses. There was also a positive trend in student feedback towards a deeper and more thorough understanding of the content. Nevertheless, there was also an air of frustration about the continued use of different learning management systems between education courses, the overwhelming demands outside of class time, and the amount of content, readings, and assignments that distracted students' perception of optimal learning. In both the Cycle 1 and Cycle 2 surveys, it is noteworthy that having the ability for students to connect in person was consistently viewed as having a positive impact on their learning.

What We Will Take Forward and Leave Behind

Pedagogy

Based on student voice, we will take forward a revived sense of advocacy for in-person classes as a pedagogical necessity. We will also strive to implement alternative assessment and assignment styles, develop a centralized guest speaker list, revisit the rationale behind the inclusion of different learning management systems, and utilize pre-recorded videos as an educational support while being cognizant of honoring student time. What we will leave behind will be pre-recorded lessons that are overly time-consuming and detrimental to student learning as well as overlapping guest speakers and topics throughout the program.

Content

From the content results, we commit to ongoing analysis of the breadth and depth of course content as well as purposeful pre-class work. We will continue to offer content review sessions, disseminate short course summaries, and centralize access to essential education documents for students. We will leave behind the temptation to expand course content and pre-class work without considering the impact on student learning.

Connection

Our students indicated in-class collaborative opportunities and student check-ins were highly impactful from a personal and educational standpoint; we will continue to incorporate these opportunities in our classes purposefully and explicitly. We will also maintain our increased availability to students, since an important part of creating a culture of connection is students' ability to meet with us on a more flexible schedule. Going forward, if classroom webcams are to become a more permanent feature of in-person teaching, we will leave behind inconsistent usage and create a programmatic mandate outlining realistic expectations and limitations of this online tool, with the goal of fostering relationships via virtual classroom access.

The impact of our research questions and decisions around teaching and learning in pandemic or non-pandemic times will always be felt by our students. Having the flexibility to make adaptations and then assess their impact helps us to continually improve and enhance our education program. In the future we will take forward these relevant and pertinent ideas from student voice while happily leaving behind those practices which thwarted learning. As we enter a post-pandemic era, we are cognizant that new traditions can and should be woven into a reimagining of education. We look forward to continuing our mobilization of this knowledge with future students to make impactful changes in the areas of pedagogy, content, and connection.

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Chapter 15

Developing Mathematics for Teaching With Online Modules: Opportunities and Challenges

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Abstract

This research focuses on the field of mathematics for teaching and supporting the growth of this essential and specialised knowledge in elementary pre-service teachers. Teacher education programs have limits on the amount of hours dedicated to mathematics education, and they often have the dual duty of supporting mathematics for teaching development as well as instructing on how to teach the subject. To gain more time in teacher education programs, an online, video-based intervention was used in this research. Although the video-intervention showed modest gains in mathematics understanding, the limited number of participants in this study (only nine completed some modules) made it difficult to make generalizations. In exploring the individual responses, it is also unclear if mathematics for teaching itself was improved or just the ability to answer mathematics problems correctly. Through the Technological Pedagogical Content Knowledge framework (Koehler & Mishra, 2005), new opportunities for exploring technological pedagogical knowledge suggest the need to adjust the program in support of the development of mathematics for teaching in pre-service teachers.

Résumé

Cette recherche porte sur l'enseignement des mathématiques et sur les efforts mis en œuvre pour assurer son développement comme matière spécialisée essentielle chez les enseignants en formation au primaire. Les programmes de formation des enseignants ont un nombre limité d'heures consacrées à l'enseignement des mathématiques, alors qu'ils ont souvent la double responsabilité de développer les connaissances mathématiques pour l'enseignement d'une part, et la pédagogie de cet enseignement, d'autre part. Afin de contourner la contrainte de temps que confrontent les programmes de formation d'enseignants, l'approche de vidéos en ligne fut adoptée dans le cadre de cette recherche. Bien que l'usage de vidéos démontre des gains plutôt modestes au niveau de la compréhension des mathématiques, le nombre limité de participants à cette étude (seulement neuf ont complété quelques modules) empêche toute généralisation. À l'examen des réponses individuelles, il n'est pas certain non plus si c'est la pédagogie des mathématiques elle-même qui a bénéficié de cette approche ou simplement la capacité de répondre correctement aux questions mathématiques. Grâce à la Technological Pedagogical Content Knowledge framework (Koehler & Mishra, 2005), de nouvelles manières d'accéder à la connaissance sous l'angle technologique permettent de suggérer que le programme appuie le développement de l'enseignement des mathématiques chez les enseignants en formation.

Developing Mathematics for Teaching With Online Modules: Opportunities and Challenges

This research focuses on using online video-based modules to support the development of mathematics for teaching in future teachers. The optional online modules were implemented to add extra time to a pre-service program in order to address possible gaps in understanding of mathematics for teaching. For this chapter, I focus on one specific aspect of mathematics for teaching, which, has been called “conceptual understanding” (e.g., Holm & Kajander, 2020). The focus of conceptual understanding is on developing models, alternative algorithms, and understanding why mathematics works. These areas of mathematics for teaching support guiding all learners in different ways to solve mathematics problems designing lessons that are conceptually based (as opposed to rote memorization or lecture-based); and evaluating student conceptions or errors. This research project design was inspired by the knowledge and experience derived from video interventions that have been used in other contexts and other ways, including the ever-popular Khan Academy in mathematics. Our teacher education program has a limited number of hours (60 hours of contact time between two courses) dedicated to mathematics, and they must focus on all aspects of mathematics teaching, including pedagogy, and therefore cannot fully centre on the conceptual understanding portions of mathematics for teaching knowledge, which the majority of pre-service candidates are missing upon entry to the program. This research examines the success of video-based, online intervention to guide future development in mathematics education.

Literature Review

Mathematics for teaching has been identified as an understanding of mathematics content which “bridges content knowledge and the practice of teaching” (Ball et al., 2008, p. 389). This knowledge includes an understanding of models, manipulatives, alternative algorithms, student errors and misconceptions, and curriculum as well as many other ideas (e.g., Ball et al., 2008) that

a teacher would need, but not necessarily someone studying mathematics (Ball et al., 2005; Baumert et al., 2010; Hill, 2010; Ma, 1999). The mathematics for teaching knowledge required by teachers also differs from the knowledge a mathematics student would need or gain during a classroom learning experience (Chamberlin et al., 2008; Davis & Simmt, 2006; Kajander, 2010). Baumert et al. (2010) discuss three aspects of pedagogical content knowledge in mathematics: knowledge of mathematics instruction; knowledge of students' understandings, prior knowledge, and experiences; and the ability to connect different concepts in mathematics as well as construct multiple solution paths. Baumert et al. maintain that pedagogical content knowledge is an extension of knowledge of mathematics and is essential for effective mathematics teaching. The knowledge necessary to teach mathematics requires a flexible conceptual understanding of mathematics instead of a simple procedural understanding, which is more limiting (Silverman & Thompson, 2008). Some studies have indicated that a teacher's conceptual knowledge of mathematics positively impacts student achievement outcomes (e.g., Baumert et al., 2010). It is important to increase this knowledge in pre-service programs, as research has pointed to a lack of these understandings when entering programs (e.g., Kajander, 2010). This is problematic since Bray (2011) discovered that teachers with weaker knowledge of mathematics had difficulty identifying student errors in the course of their teaching. This supports the importance of developing this knowledge in pre-service programs before teachers enter the field of teaching. This research project specially targets a sub-portion of mathematics for teaching, termed "conceptual knowledge," and focuses on the flexible and expanded understandings of mathematics beyond the simple use of formulas to find correct answers.

More research, especially in the past few years due to COVID-19, has been conducted on using online as a platform to teach without specifically considering video interventions. Mulenga and Marbán (2020) examined pre-service teachers and their engagement during an online

mathematics course and noted that the ability to personalize the program supported development, although attitude related to mathematics and technology impacted performance. Vlasenko et al. (2020) studied the use of Massive Open Online Courses (MOOCs) with Master's students and high school teachers, concluding that the content must be interesting and correspond to students' interests to encourage motivation. They further stress the need for students to evaluate the quality of the materials in order to detect gaps and collect feedback. Walters et al. (2018) considered US pre-service teachers incorporating digital stories during the problem-solving process in order to increase mathematics understandings. They noted how the use of technology supported making mathematics more visual and the integration of literacy and writing was beneficial to the users.

Currently, there is limited evidence on the gains of video interventions with pre-service or in-service teachers with respect to specific areas of mathematics for teaching, although there is research in the use of video in K-12 contexts (e.g., Kelly & Rutherford, 2017). Anwar et al. (2020) focused on the use of PowerPoint-based video in junior classrooms and how it improved learning outcomes by encouraging students to learn independently. Seago et al. (2018) described the use of videos of teacher's classrooms in professional development to unpack the complex relationship between mathematics content, pedagogical decisions, and student thinking. The bulk of pre-service teacher-specific research follows this type of video intervention through the use of classroom observation videos for prompting discussion of teaching and learning practices (e.g., Borko et al., 2008). In these interventions, teachers are often shown short videos of active classrooms and asked to observe teacher practices and student behaviours. Barth-Cohen et al. (2018) used video analysis with the intent of increasing the reflective practices of the pre-service teacher. Barth-Cohen et al. also pointed out how video is an underused and understudied form of professional development. Johnson et al. (2019) examined the use of virtual teaching playgrounds with a video component in supporting pre-service and in-service teachers and determined there was no difference between the

in-person and the virtual learning outcomes. Watt (2019) examined the use of student-created videos with pre-service teachers in order to increase understanding of using this practice in their own elementary classrooms. They determined that the use of video creation should be the focal point of student inquiry, and also for pre-service teachers, in order to learn how to decentre their own practice. The research project discussed in this chapter adds to the current scholarship on the use of online, video interventions to support teacher development of mathematics knowledge for teaching, specifically conceptual understanding.

Context

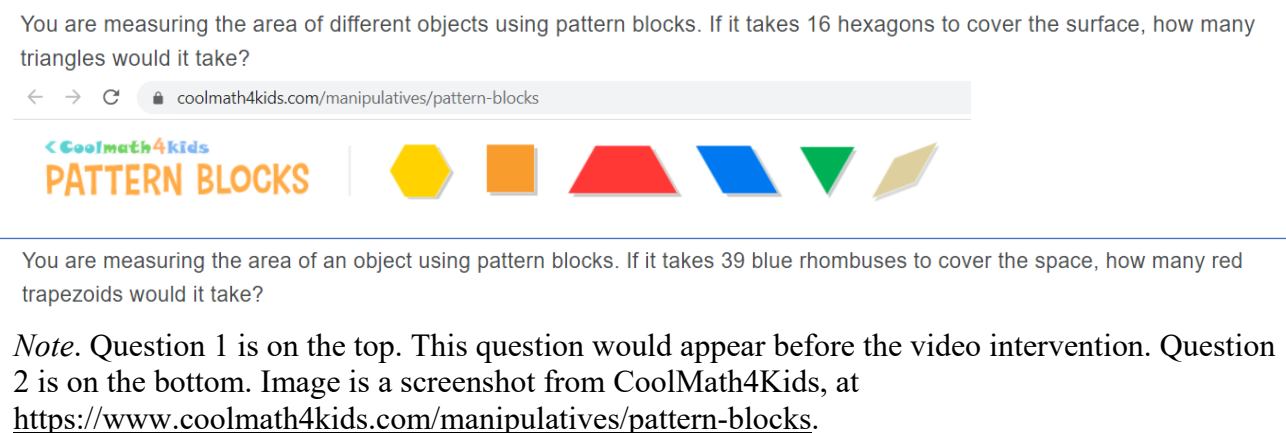
The research was conducted at a university in Ontario. In Ontario, the teacher education program is a two-year degree that occurs after the completion of an undergraduate degree. In other words, pre-service teachers may have degrees in mathematics, science, humanities, etc. Less than 1% of the total student population enrolled in the faculty of education at our university have previous mathematics degrees, and only slightly more have taken courses in mathematics beyond the compulsory courses in secondary school. To meet our teacher education program requirements in mathematics, there are two mathematics methods courses (one in each year of the program) offering a total of 30 hours of contact each year, for a combined total of 60 contact hours. I previously made observations that indicate that pre-service teachers enter the program with difficulties in mathematics, not just mathematics for teaching. A diagnostic was administered at the start of the program in order to capture incoming knowledge. The preliminary scores from the diagnostic have shown particular areas of difficulty that are common amongst pre-service teachers: measurement, fractions, and algebra. To address the needs of the pre-service teachers, online modules using videos were created in these three areas in order to add more time and practice for conceptual understanding of mathematics.

Methodology

This research project collected data from pre-service teachers who have agreed to participate in a voluntary, additional program around developing their knowledge of mathematics. Three modules were completed in the research project: measurement, algebra, and fractions. At the time of the data collection for this chapter, only measurement and algebra were open to participants. Each of the modules contains sub-modules related to different areas of the content strand. For example, the measurement module contains sub-modules related to volume of rectangular prisms and area of triangles. The sub-modules vary between modules and are ordered based on complexity determined by the Ontario curriculum up to Grade 8 inclusively (Ontario Ministry of Education, 2020).

Figure 1

Questions From Area with Manipulatives Sub-Module



Each of the sub-modules follows an identical pattern to allow participants to move through the course with familiarity. A sub-module is set up where a participant answers an initial problem in the content area and submits it to the site. Upon submission, they are able to both view videos that offer different ways to solve the problem and to see an answer to the mathematics problem. The videos show multiple solution methods ranging from concrete representations to reasoning to

formulas to increase the conceptual understanding of participants. Next, participants are given a second problem to solve and a survey to answer some questions about their experience in the sub-module, including rating of the problem's difficulty, what resources they used to solve the problems, and feedback on what was missing from the module. The participants would finally submit a solution method to the second problem. Figure 1 shows the first and second question in the measurement sub-module on area with manipulatives. There are three solution videos that are part of this sub-module.

First solution	https://www.youtube.com/watch?v=BiS5ejxHkpU&t=2s
Second solution	https://www.youtube.com/watch?v=TOGqLSaIsso&t=41s
Final solution	https://www.youtube.com/watch?v=I5yI4v5BC6Q&t=2s

The first solution uses triangles and hexagons to build the picture and then solve the problem. The second solution uses triangles to build one hexagon and then uses multiplication to solve the problem. The final solution uses ratios to solve the problem. The goal of the different solution methods is to increase a flexible understanding of using manipulatives to solve area problems. The data collected for the entire project consist of the solutions to both sets of problems and the information provided in the survey. For the purposes of this chapter, only the solution methods and answers were analyzed to focus on whether or not the videos showed changes in the attempted solution methods or increased the conceptual understanding of participants.

The videos and questions in the program were designed to be completed on the participants' own time; since they are elective, the participants can also choose which problems to do and to what extent they wish to complete them. At the time of writing, 19 participants have volunteered to be part of the project; however, only nine have completed the work in the modules. Data collection is ongoing, and the number of questions that the participants have completed

varies between the participants. Since only one participant completed the sub-modules in the algebra modules and no one worked on the fractions module, only measurement will be discussed in this chapter. Data were collected through the online learning management system of the university, and ethics approval was obtained through the university Research Ethics Board.

Results

In the measurement module, there are 12 sub-modules: area using manipulatives, rectangles, triangle area, quadrilaterals, time, time elapsed, irregular shapes, volume of rectangular prisms, area, volume, volume comparisons, and right circular cylinders. In reviewing the data collected from the 12 sub-modules in measurement, only two participants completed all 12. One participant completed 10 of the modules, and the other participants completed at most four modules, with the majority only completing one or two. In creating an aggregate score for measurement combining all of the modules completed by all participants, 64.44% answered the first question correctly and 69.77% for the second question. See Table 1 for a breakdown.

Table 1

Percentage of Correct and Incorrect Solutions Before and After the Intervention

	No. Correct (% of total)	No. Incorrect (% of total)
Question 1 (pre-intervention)	29 (64.44%)	16 (35.56%)
Question 2 (post-intervention)	30 (69.77%)	13 (30.23%)

The sub-module on volume of rectangular prisms first asked “The box below has a volume of 6.3 m^3 . You are shipping the box to your grandma but need to pack foam around the outside of the box to protect it. If the foam is sold in cubes that are 27 cm^3 , what are the smallest dimensions of the box that you would need to fit your package to be sent?”, and then it gave participants a rectangular prism with two sides labeled (150 cm and 420 cm). In this question, participants would need to apply an understanding of volume to figure out the last side length, as well as to understand the conversion between m^3 and cm^3 . The second question presented similar challenges.

This is the only sub-module where no one got the initial question correctly, and neither did anyone give a correct response to the second question. It should be noted that only three participants even attempted this sub-module. The area with manipulatives (see Figure 1) and the area with sub-modules were the only two sub-modules that all participants got both questions correctly. The area sub-module initially presented the following question: “A gardener has a 1.5 m^2 garden where she will plant flowers. She decides to plant bluebells on an area that is 0.6 of the total garden area. On how many total square meters can she plant bluebells?” Only three participants attempted the area sub-module and eight completed the area with manipulatives sub-module. The other nine sub-modules had a mix of correct and incorrect responses on both questions. In looking at the individual participants separately there was no observable pattern either, in so far as some participants gave a correct response to the first question and then an incorrect response to the second and vice versa.

Since the goal of the online modules was to increase mathematics for teaching, specifically conceptual understanding, two sub-modules were chosen for further exploration in this chapter. These two questions were chosen since they had multiple solution methods in the videos, but also because four individuals completed both questions in the sub-module. These two sub-modules were irregular shapes and triangles area.

Irregular Shapes Sub-Module

The initial question in this sub-module gave participants a question related to finding the area and perimeter of an irregular shape. Of the four participants, only two were able initially to complete the question correctly. Table 2 shows a breakdown of the four participants as a summary for the observations. Figure 2 shows a correct solution and an incorrect solution from the original question. Two participants created a bigger shape to determine the area and removed the excess, a

third attempted to cut the shape into smaller rectangles, and a fourth made a list of numbers but did not complete the problem.

Table 2

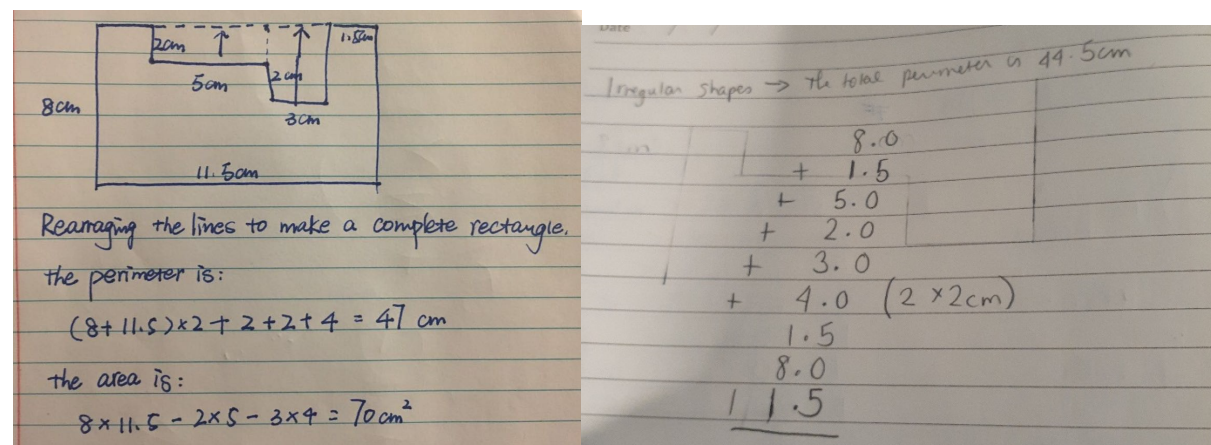
Summary of Participants for Irregular Shapes Sub-Module

	Question 1	Question 2	Difference?
P1	Correct	Correct	Yes, video
P2	Incorrect	Incorrect	Yes
P3	Incorrect	Incorrect	Yes
P4	Correct	Correct	No

Two videos were provided in the intervention to show participants different ways to solve the area and perimeter. The first video (<https://www.youtube.com/watch?v=nYODUsBF8MM>) looked at adding space to the shape in order to determine the area by subtracting the smaller amounts, and the second (<https://www.youtube.com/watch?v=nsCNkHUx37Q&t=2s>) showed using a grid to help determine the area and perimeter as well as unknown side lengths.

Figure 2

Solutions for Question 1 in Irregular Shapes Sub-Module



Note. The solution on the left by P4 is correct and the one from solution video 1; the solution on the right by P3 is incorrect.

Following the intervention, a new question was presented where participants were asked to find the area and perimeter of a new irregular shape. At this time, the same two participants were

correct. A third participant was mostly correct but made a calculation error in determining the area of the shape. One participant used the same solution method as the first time, and the other three tried something new.

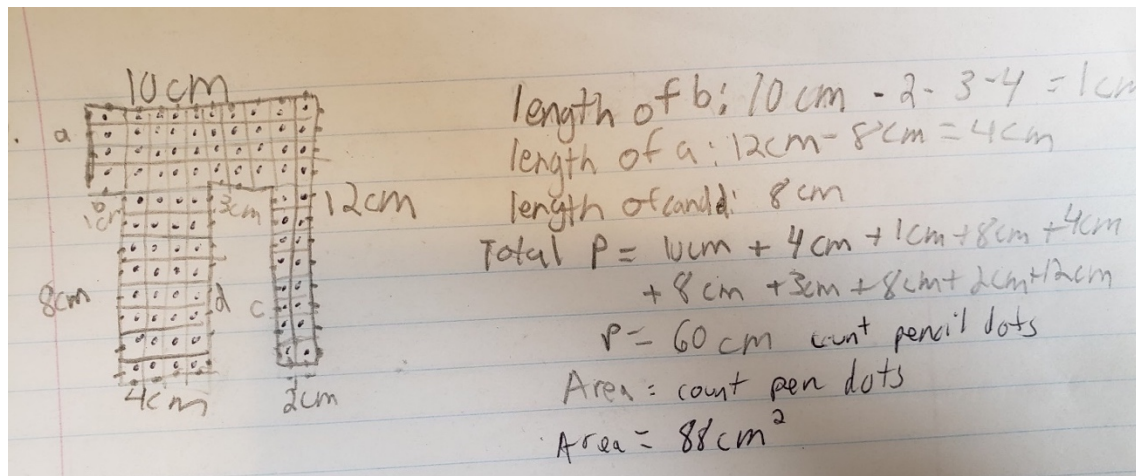
In reviewing the solutions of the second question for evidence of change related to the videos, three of the participants used a different method to calculate the area. One of the three participants used one of the mathematics for teaching strategies in the video of creating a grid. This participant presented one of the correct solutions and had initially been correct before the intervention. Figure 3 shows this participant's work on the second question. P4 was the only one to use the same strategy for both questions, but it should be noted that the initial strategy was one that was shown in the video intervention.

Triangles Area Sub-Module

The triangles area sub-module gave participants a perimeter for an equilateral triangle and the height and asked them to determine the area.

Figure 3

Solution for the Irregular Shapes Sub-Module After Intervention for P1



Participants need to know what an equilateral triangle is and how to calculate the area of the shape in order to correctly answer the question. For the first question, three individuals

provided correct solutions to this initial question and two provided incorrect solutions. Table 3 provides a summary of the five participants. In Figure 4, one participant calculated the area of a square instead of a triangle (they missed dividing by two).

Table 3

Summary of Participants for Triangles Area Sub-Module

	Question 1	Question 2	Difference?
P1	Incorrect	Correct	Yes, video
P2	Correct	No submission	N/A
P3	Correct	Correct	No
P4	Incorrect	Correct	No
P5	Correct	Calculation Error	No

Note. The same names were used for the participants as in the previous question in order to link the data.

Figure 4

Initial Solution to Triangles Area Sub-Module

From the instructions, the length of one side of this equilateral triangle is:

$$60 \div 3 = 20 \text{ cm}$$

Therefore, the area of the triangle is:

$$20 \times 17.32 = 346.4 \text{ cm}^2$$

The video intervention consisted of two videos showing ways to determine the side lengths of the shape and to calculate the area. One (<https://www.youtube.com/watch?v=2FrwEJhKDqc>) showed using a procedure and the second (<https://www.youtube.com/watch?v=k-U6znxpfA>) showed how to rearrange the triangle into a square to calculate the area.

While four of the five participants submitted a solution to the second question (see Table 3), three participants submitted correct solutions to the problem. The fourth solution (P5) would have been correct, but the participant made an error in multiplying decimal values. Three of the solutions (including the incorrect solution) used the exact same procedure as the first problem. The

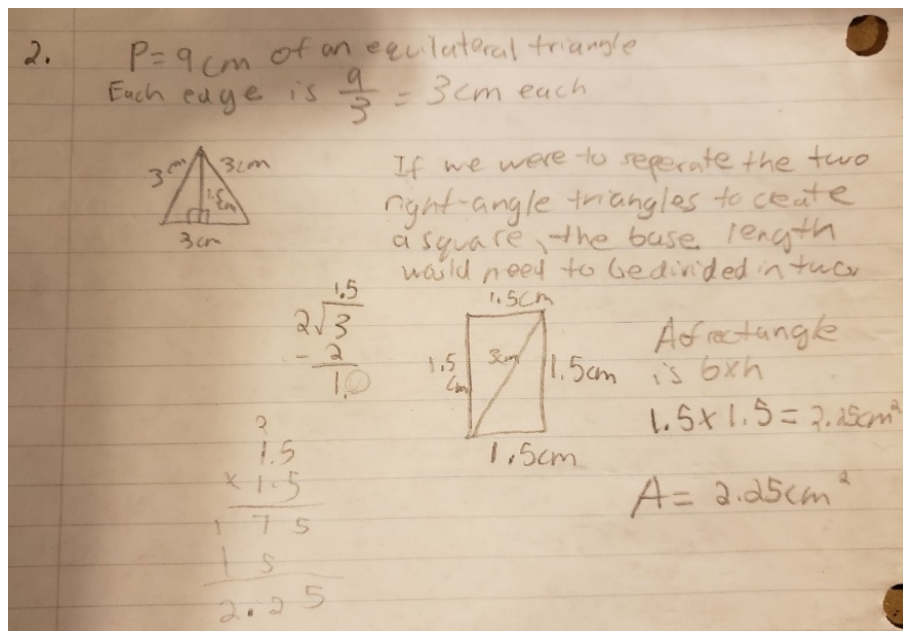
fourth participant, P1, rearranged the triangle into a square to calculate the area as seen in the video (see Figure 5).

Discussion

Although 19 students showed interest in the research, in examining the modules only nine completed any of the sub-modules and only three completed a majority of the sub-modules. In considering the completion rate of the intervention program, the participants enrolled while they were in the teacher education program. During any semester of the program, the participants had to take at minimum four required courses and attend their practicum school, so time to invest in another course was a factor. Participants were ones from my university because the modules were housed in the university learning management system.

Figure 5

Solution Rearranging an Equilateral Triangle Into a Square to Calculate the Area



At the time of the research, this meant a pool of about 140 total possible participants. Unfortunately, the start of the modules also coincided with the implementation of the Mathematics

Proficiency Test in Ontario (Ontario College of Teachers, 2019), which encouraged a focus on answering mathematics questions as a way to study for this test. The modules were created to address the needs observed in pre-service teachers within the program in developing mathematics for teaching, and this external test was focused on simply answering mathematics questions that were not necessarily in the same curricular areas as the created resource. All of these factors likely affected the number of participants who completed the modules.

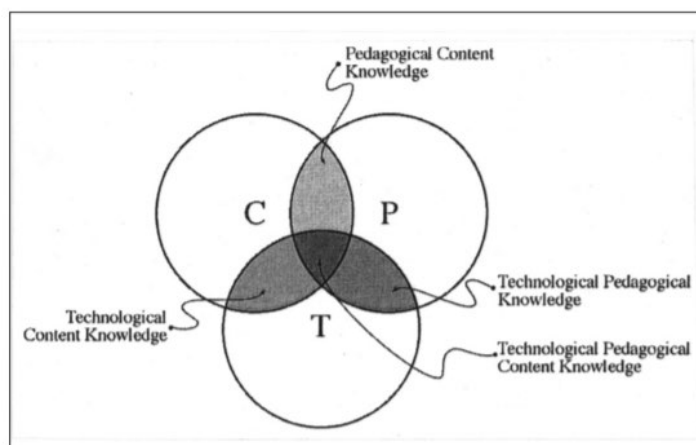
In examining the number of questions that were answered correctly between the pre-intervention question and post-intervention question, the gains were only slight (64% to 70%). Yet, more than half of the questions were answered correctly in the beginning. This raises a point that perhaps the participants already felt fairly confident in their mathematics abilities when they registered for the program. In future research, the goal would be to expand beyond the university learning management system in order to allow for greater numbers of participants. There will also be concentrated efforts on recruiting individuals who may need mathematics support, not just in developing mathematics for teaching. Finding ways to increase the confidence of individuals in mathematics will warrant a future focus in order to expand the number of those who choose to attempt the modules. There were also some comments about the online platform being overwhelming to navigate as more modules and sub-modules were added.

While considering whether the intervention had a benefit, there were gains in correct answers; however, the majority of the questions were answered in the same way from the first question to the second. Very few participants tried another method, and even fewer tried a method that would have been an alternative algorithm or model that would have shown an increase in mathematics for teaching. Both examples shown in the results section were from the same participant who tried new methods. In the end, it is not clear that the online platform had any significant impact on the participants' conceptual understanding.

A review of the research data in this project makes it clear that the full research goal was not accomplished. However, the Technological Pedagogical Content Knowledge (TPCK) framework (Koehler & Mishra, 2005) may give future opportunities for increasing the effectiveness of the project. Koehler and Mishra consider the interactions between content, pedagogy, and technology in order to provide a framework for incorporating technology into teaching (see Figure 6). As they note, simply incorporating technology is not enough. In considering this framework in relation to this project, the content section would refer to mathematics for teaching. The teaching methods in the videos were related to years of personally teaching this knowledge in face-to-face courses. As such, the areas of pedagogy, content, and pedagogical content knowledge were strongly supported through professional practice and research into mathematics for teaching. The difficulties with this research project lie in the technological portions of the TPCK framework. The videos created in the research showed an understanding of technological content knowledge since video-based interventions have shown promise in other research projects in conveying mathematics knowledge (e.g., Kelly & Rutherford, 2017). In so far as the TPCK framework is concerned, it becomes evident that the area of technological pedagogical knowledge, as the “knowledge of how technology can support pedagogical goals” (Koehler & Mishra, 2005, p. 134), needs to be examined further in redesigning this project. Most importantly, the next steps would involve re-examining how the platform and the specific technology used can help support the pedagogy of teaching mathematics for teaching. At present, the learning management system platform provides too many challenges for the pedagogy to be completely effective because of the overwhelming linear nature of the set-up experienced by the participants.

Figure 6.

Technological Pedagogical Content Knowledge (TPCK) Framework (Koehler & Mishra, 2005)



Conclusion

Concerns over the number of hours spent in mathematics method courses in teacher education programs have been discussed for years (e.g., Kajander et al., 2012). The availability of online platforms could provide a unique opportunity to add extra hours in order to improve the to learning mathematics for teaching without significantly changing teacher education programs. From a purely mathematics for teaching angle, specifically from a conceptual understanding, standpoint, in most cases the online intervention did not show positive results. This could be for a number of reasons including the implementation of the Mathematics Proficiency Test for certification which focused solely on answering mathematics questions in any way (Education Quality Accountability Office, 2020). But this could also be related to previous research around beliefs in teaching (e.g., Holm & Kajander, 2020). Past research notes that teachers may simply not believe that anything more than a procedure is needed in mathematics. Since the participants in the study were fairly well-versed with procedures prior to the intervention, it is possible that they did not see the need to practice something different. In future iterations, it will be important to highlight the need for mathematics for teaching in this area. At present, the modules only request a

“solution method” and nothing further, the video interventions include a procedure; therefore, it is possible that with a different lead in, different results would have been observed.

The low numbers of participants also make it difficult to draw any generalizations about the overall effectiveness of the online modules; however, the common concern over the learning management system itself does support a need to consider another online platform. By moving the modules to a different site, and outside of the university system, this would also allow for a greater number of participants to engage in the research and allow for more analysis of the project. The inclusion of a survey in the online platform relates to the results Vlasenko et al. (2020) noted with respect to allowing evaluation and addressing gaps that may be prevalent in the online platform. Although the survey results were not included in this discussion, participants requested extra videos and ideas to be added to the platform in order to make changes as the modules remained open. For example, survey responses found that it would be helpful to include some general videos related to concepts like the formulas for determining the volume and area of shapes. This led to an additional section, in each module, that was not initially in the program. This section contained general knowledge videos open for examination at any time and for use prior to answering questions. The inclusion of this section, although needed, further created a cumbersome platform given the limitations of the learning management system. Pages became too much to scroll through as new sub-modules were added, and it was difficult to keep track of where participants were in completing sub-modules. Another interesting avenue for consideration in recreating the platform is provided by the research of Watt (2019) on video creation as a form of learning. One participant did include a video instead of a written solution method for one sub-module; but the integration of the use of video-creation could be helpful in expanding the content on the site, in addition to supporting greater understanding of how the participants can solve problems. For future opportunities, adding participants’ videos of how they thought through and solved the

problem could allow for more differences in solutions, including how these can be explained. Encouraging participants to use a video to think through the problem would also provide more information related to conceptual understanding gains. Even participants who use the same steps in both solutions may end up explaining their steps differently with a deeper understanding of the content if video was used to capture their thoughts.

In conclusion, the research project has added to the discussion of video-based interventions for learning mathematics for teaching; yet, it has also raised some challenges about how to create opportunities for a better platform for implementation. By themselves, the results of this study might seem like this was not an effective method for increasing mathematics for teaching; however, in examining the data and considering the literature both in mathematics education and technology, it is clear that there are other principles that need to be considered in the future creation of the site. Creating a new platform while considering TPCK principles, as well as highlighting the importance of and the definition for mathematics for teaching, allow for new opportunities in a revised project that could support adding extra mathematics hours to teacher education programs.

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Chapter 16

Designing Professional Learning to Support Practicum Supervisors: A Three-pronged Approach

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Abstract

This chapter examines how a teacher education program can better support practicum supervisors who work with preservice teachers. Based on an earlier cycle of participatory action research that explored the experiences of practicum supervisors supporting preservice teachers with online practicums in the spring of 2020, we identified professional development was needed in multiple areas, including technology use. In response to this research, we designed and implemented a professional development day for practicum supervisors in Fall 2021 that included examination of mentoring versus moulding, difficult conversations, and mentoring preservice teachers with technology use. We evaluated the professional development immediately following the professional development day (using surveys) and then after a 5-week first practicum (using focus group interviews). Results were surprising: technology for instruction was no longer a priority (as K to 12 classrooms had returned to face-to-face instruction with minimal observed technology use). Through analyses, we developed a three-pronged approach to support practicum supervisors that emphasizes professional development that is better aligned with the focus of the teacher education program itself, namely: mentorship skill development, overall university program, and procedural knowledge around practicum. Recommendations for teacher education programs seeking to better support practicum supervisors are included.

Résumé

Ce chapitre examine comment un programme de formation d'enseignants peut mieux soutenir ceux et celles qui travaillent avec les élèves en formation d'enseignants. Sur la base d'un cycle antérieur de recherche d'action participative qui a exploré les expériences de ceux et celles qui travaillaient avec les élèves en formation d'enseignants lorsque leur stage fut complété au printemps 2020, nous avons découvert que le développement professionnel était nécessaire dans plusieurs domaines, notamment la technologie. En réponse à cette recherche, nous avons conçu une journée de développement professionnel que nous avons offert aux superviseurs de stage à l'automne 2021. Cet effort nous a permis d'observer les différences entre les compétences de mentorat et l'approche directive, la manière d'engager des conversations difficiles et le mentorat des enseignants débutants lorsqu'ils utilisent la technologie. Nous avons d'abord évalué ce développement professionnel au terme de la tenue de la journée de développement professionnel (par brefs sondages), puis après un premier stage de cinq semaines (par entretiens avec des groupes de discussion). Les résultats sont assez surprenants puisque l'utilisation de la technologie ne fut plus alors considérée comme une priorité (les élèves étaient retournés dans leurs classes régulières où le recours limité à la technologie fut observé). À l'issue d'analyses, nous avons développé une approche à trois volets afin de mieux soutenir les superviseurs qui travaillent avec les enseignants en formation. Cette approche a d'abord mis en valeur le développement professionnel qui s'aligne plus adéquatement avec l'objectif du programme de formation des enseignants lui-même, à savoir: le développement des compétences de mentorat, le programme universitaire en général et les aspects de la procédure du stage. Cette étude présente enfin des moyens d'action pour les programmes de formation des enseignants qui cherchent à mieux appuyer les superviseurs de stage.

Designing Professional Learning to Support Practicum Supervisors: A Three-pronged Approach

The COVID-19 pandemic required Canadian education to pivot and embrace online or remote instruction in K to 12 schools. Also affected by this pivot were teacher education programs with preservice teachers who were in the midst of completing their practicum. Traditionally, certifying practicum experiences were conducted face-to-face in classrooms as mandated by provincial ministries of education (Crocker & Dibbon, 2008; Despiens et al., 2015; Falkenberg, 2015; Petrarca & Kitchen, 2016). In the spring of 2020, the BC Teachers' Council provided flexibility to those programs whose students had already completed a significant portion of their practicum in classrooms, to complete their certifying practicum in a remote environment. For one small teacher education program in the Lower Mainland of BC, this change meant that practicum supervisors, who had traditionally observed, mentored, and evaluated preservice teachers in classrooms, had to figure out what that would look like in a remote environment. Given that most practicum supervisors are retired teachers and administrators, their experience with classroom technology and online teaching was limited (Barahona, 2019; Burns et al., 2016; Jacobs et al., 2017; Kolman, 2018; Steadman & Brown, 2011). This change posed many challenges for the practicum supervisors with whom we worked. Even when face-to-face instruction resumed the following year, the pivot to online instruction affected how teachers taught, with technology taking on a greater role in classrooms.

At that time, we began a participatory action research project (James et al., 2007) to investigate how to better support practicum supervisors. Participatory action research involves an ongoing cycle of identifying problems, coming up with solutions, evaluating those solutions, and determining the next steps. The first steps of this process involved a diagnosis or examination of the issue (supporting practicum supervisors given the increased technology expectations brought

on by the pandemic) and the development of an action plan. We interviewed practicum supervisors who had experienced this move to virtual mentoring and asked them what the department could do to better support them in the future. One of the key recommendations targeted professional development. This recommendation aligned with results from recent studies involving practicum supervisors (Ardley & Johnson, 2019; Lynch et al., 2021; MacMahon et al., 2019; Theriot et al., 2020). We then acted (the second step of participatory action research) to design and implement a full day of professional development for our supervisors. This chapter shares what we learned from this action. The key questions this chapter aims to address include: (a) What value, if any, do practicum supervisors perceive from a one-day targeted professional development on supporting preservice teachers in the field, including the use of technology in the classroom? (b) How, if at all, were the content/skills shared in a one-day targeted professional development used when mentoring preservice teachers? (c) What would practicum supervisors recommend for future professional development? This chapter outlines the development, implementation, and evaluation of this type of professional development, and provides recommendations for teacher education programs seeking to support their practicum supervisors working to mentor preservice teachers in the 21st century. We begin by looking at relevant literature that already exists with respect to teacher education in Canada and the work of practicum supervisors.

Literature Review

Teacher Education in Canada

Teacher education in Canada combines practical teaching in K to 12 schools with university courses (Crocker & Dibbon, 2008; Despiens et al., 2015; Falkenberg, 2015; Petrarca & Kitchen, 2016). The university coursework tends to include topics such as: educational philosophy and psychology, Indigenizing curriculum and instruction, school governance, as well as methods courses that relate to pedagogies and strategies for use in planning and assessment, teaching

English Language Learners, classroom management, supporting students with special needs, and specific subject areas (e.g., math, English language arts, social studies, science, etc.). The practicum (i.e., teaching experience in the field) lasts anywhere from 8 weeks to 4 months depending on the program. There can be significant differences in program length with concurrent programs running up to five years, and post degree programs that can last anywhere from 10 months to two years.

Practicum opportunities are usually jointly supervised by a K to 12 classroom teacher (or teacher mentor) and a university supervisor (Desbiens et al., 2016). The teacher mentor is responsible for their own class of students, while providing opportunities for the preservice teacher to teach in their classroom. In British Columbia, and depending on the placement, there may be more than one teacher mentor working with one preservice teacher (usually in Grades 8 to 12 classrooms). In many programs, the practicum supervisors are retired school administrators who work on contract with the university. These practicum supervisors may observe the preservice teacher managing the classroom anywhere between one and 20 times.

Practicum Supervisors

When examining the role of practicum supervisors, we found studies that examine the type of work they are involved in, as well as the research outlining the challenges that come with that work. Cuenca's (2010) research posited that a typical observation involved a pre-observation review of a lesson, the observation of the preservice teacher delivering that lesson in a face-to-face environment, and a supervisory meeting to review what had happened. Burns et al. (2016) completed a meta-analysis of 32 studies and concluded that practicum supervisors were primarily involved in supporting preservice teachers, collaborating with teacher mentors and preservice teachers, providing targeted assistance for struggling preservice teachers, offering general curriculum support, and researching possible solutions to challenges experienced by preservice

teachers. Conclusions by Jacobs et al. (2017) aligned with Burns et al. (2016), but they went further to note that practicum supervisors were rarely involved in supporting preservice teacher inquiry or action research. Kolman's (2018) and Barahona's (2019) results also emphasize that there is a greater focus on the clinical aspects of teaching by practicum supervisors, rather than the development of reflective, autonomous, or critical teachers.

Steadman and Brown (2011) used interviews to study the role that practicum supervisors perceived they had played in teacher education in the US. They concluded that practicum supervisors work with a great deal of autonomy which can lead to a great deal of diversity in their approaches to supervision. Variations include whether preservice teachers were required to share their planning or not, whether preservice teachers had to complete weekly reports, or whether practicum supervisors could complete a report based on a single observation as opposed to many observations over time. Beyond these variances, the one consistency is that practicum supervisors perceived a real disconnect between what constituted best teaching practice in the field vs what was taught at the university. Capello's (2020) case study of 27 practicum supervisors and two program coordinators went beyond roles and perceptions to discuss the training that practicum supervisors received (e.g., 1 hour). A key finding of the case study was that practicum supervisors relied almost solely on their own previous technical experiences of teaching in K to 12 classrooms. Given that many of these supervisors had not been a classroom teacher for many years prior to becoming a supervisor, there were concerns regarding the realities of being able to advance the field of education beyond what was done in the past. The authors of this chapter regarded this gap between teaching experience and supervision roles as particularly relevant given the advancement of technology in K to 12 classrooms since the COVID-19 pandemic. In addition, practicum supervisors who were interviewed in Capello's (2020) study shared how they wanted more formal training, while the program coordinators shared that they lacked the resources to support such

training. Responding to this challenge, the present authors sought to implement and study a potential solution.

Methodology

Participatory action research (PAR) is a method that values research and action equally (James et al., 2007); research is conducted around an issue, inequity, or concern that leads to the recommendation of an action that is enacted, then reflected on, and learned from. PAR is part of a pragmatic worldview or paradigm that does not pre-determine the type of data sources; both qualitative and/or quantitative data sources can be used if they are useful in addressing the question under investigation. Our PAR method involved four steps: diagnosis, action, measurement, and reflection. In PAR, the four steps keep cycling as the researchers seek continuous improvement. In this chapter, we report on a second cycle.

Context

The post degree program in British Columbia that provides the context for this PAR is a 10 and-a-half-month elementary and secondary program that involves coursework starting in September, followed by a 5-week school experience practicum in K to 12 schools. This school experience involves observations, co-teaching, and the teaching of a few connected lessons by the preservice teachers. Preservice teachers return for more coursework from mid-November to mid-February, when they begin their 12-week certifying practicum with the same teacher mentors they worked with in the school experience. Preservice teachers are required to teach a minimum of 80% of a regular workload for a minimum of 6 weeks during this practicum. Preservice teachers then return to university for a few final courses and finish their program in mid-June.

There are 14 practicum supervisors who are assigned anywhere from two to eight preservice teachers: 12 of the 14 practicum supervisors are retired school personnel and two are faculty members who teach courses throughout the year, one of whom is a co-author of this

chapter. They observe preservice teachers at least once a week during both practicums. An observation includes a pre-conference to review a lesson plan, an in-class observation, and a post-conference to reflect on the lesson, identify strengths and challenges, and develop a goal for the next observation. It is expected that the preservice teacher leads this post-conference to develop their own reflective capacities. As such, for each question in the post conference (e.g., what worked well, what was challenging, what they would you have done differently and why) the preservice teacher provides their reflections, which are then followed by the mentor's observations.

Participants and Data Sources

After receiving university ethics approval, the authors approached the 13 practicum supervisors regarding what they would like to be covered in a professional development day. The practicum supervisors identified three topics as priorities: (a) having difficult conversations, (b) mentoring rather than moulding, and (c) mentoring the use of technology. Ten of the 13 supervisors were available to participate (that is, four males and six females, three being new practicum supervisors, and three with more than 10 years' experience; comfort with technology in the classroom ranged from very comfortable to not at all). We secured university funding to pay participants for their time (\$100/day plus lunch).

Immediately after the professional development day, we sent all participants information about the study and a letter of informed consent to engage in a survey. All 10 participants agreed to participate and were then sent a link to complete an anonymous survey that asked them to reflect on the three sessions. At the completion of the 5-week school experience practicum in the fall, the same 10 practicum supervisors were invited to participate in small focus group interviews to examine whether and how they had used what was covered in the September professional development day while in the field. All 10 practicum supervisors agreed to participate in the focus

groups. Participants were divided into three groups, one with each co-author, and then they took part in an online focus group that lasted for approximately 1 hour.

Data Analyses

The two data sources were analyzed separately. The participant responses to the survey were analyzed for both prevalence (repeated comments) and salience (unique yet actionable). This survey simply asked participants to rate how valuable each of the three sessions were, what they felt was useful, and how they could have been improved. The second data source, the focus group interviews, involved all 10 participants, and utilized very open-ended questions (e.g.: What did stand out for you from the September professional development day; Did you use anything that was covered that day and, if so, how; What recommendations do you have for future professional development opportunities). Once the transcript of each focus group interview was complete, it was sent to participants for revision and approval. Participants were encouraged to add, delete, or revise how they saw fit. If additional ideas had come to them since they participated in the focus group, they were encouraged to include them. There were minimal revisions to the transcripts, only grammatical ones; no content was added or removed. All three authors then analyzed these transcripts separately using descriptive coding (Saldana, 2009), before coming together to compare codes and decide on themes. These two data sources were part of the *measure* step of participatory action research. Drawing upon the insights and findings gained from the data, the authors reflected on the next steps.

The September Professional Development Day

As noted earlier, there were three topics prioritized for the professional development day — approximately 90 minutes each: (a) mentoring vs moulding, (b) having difficult conversations, and (c) mentoring around the use of technology. We provide more detail on these three topics (our action), including delivery, prior to examining participant feedback.

Mentoring vs Moulding

This session was built on the work of Palmer (2017) entitled “Bringing out their best.” Emphasis was placed on mentoring that helps preservice teachers figure out and become their own best teacher, as opposed to becoming a replica of either the teacher mentor or university supervisor. To accomplish this goal, preservice teachers need an understanding of their own identity as a teacher, as well as the courage to put into practice who they are. Time was spent looking at how probing questions could be used to help preservice teachers think through their own identity in both the school experience and long practicum, as well as how the post conference could showcase these questions as well. Delivery moved between a presentation with example questions (based on the experiences of the program coordinators) to small group discussion around additional arising questions and participant clarification. See Appendices A and B for the handouts used for this session.

Difficult Conversations

The second session was based on the book *Difficult conversations* by Stone et al. (2010). Participants were provided with a copy of the book (cost covered by the program). This session addressed three different types of difficult conversations, as well as the five steps necessary for creating learning conversations. This session included regular opportunities for participants to reflect all the way through, culminating in a scenario for small groups to work through to put the content into action.

Mentoring Around Technology

This third session introduced participants to the SAMR (substitution, augmentation, modification, recreation) model (Puentedura, 2006). The goal was to assist practicum supervisors in designing questions to move preservice teachers forward in their use of technology. This session was delivered via PowerPoint with discussion questions and opportunities for conversation

throughout. While emphasis was placed on provoking preservice teachers' knowledge and skill development, rather than practicum supervisors learning how to implement specific technologies, the session did include the use of Padlet software. Participants played with Padlet as a tool to support learning; it was hoped that this activity would also help to minimize some participant fears around technology.

Having reviewed the three professional development day topics and session goals and activities, we now turn our attention to the results of the survey and the focus group interviews.

Results

Survey

Seven of the 10 participants completed the brief survey immediately following the professional development day. Participants ranged in experience (2/7 were new practicum supervisors, 3/7 held between three and six years of experience, 2/7 had been practicum supervisors for more than 6 years). We wanted to determine participants' initial reactions to the day before they engaged with preservice teachers in the field for school experience. Table 1 summarizes how participants rated the usefulness of each of the three sessions.

Table 1

Professional Development Usefulness Survey Results

Session	Very Useful	Somewhat Useful	Not Very Useful
Mentoring vs Moulding	4 (57%)	3 (43%)	
Difficult Conversations	3 (43%)	3 (43%)	1 (14%)
Technology*	3 (50%)	2 (33%)	1 (17%)

* One participant had to leave prior to the technology session (only 6 participants)

When asked how the day could be improved, a few respondents noted more discussion time would be appreciated (“I always learn from opportunities for small group discussions, so although we had time for that, I suggest more”). The topics were recognized by most respondents as “pertinent to the performance of university supervisor duties.” When asked what they had learned and hoped to use during school field experience (5 weeks in the fall), their responses varied but they mentioned topics from all three sessions.

Finally, when asked about future topics to address, many participants noted they wanted to continue learning more about the three topics covered in September. One participant listed several topics directly related to the role of the university supervisor (e.g., how to establish a positive relationship with the teacher mentor or to provide critical feedback, and the best environment for post-conferences), while another noted that they would like to learn more about what was taught in the university courses. These responses may be reflective of the range of university supervisor experience amongst the participants.

Focus Groups

Three focus group interviews occurred AFTER participants had worked with preservice teachers in the field for 5 weeks (introductory practicum rather than certifying; working up to teaching three-to-four connected lessons). Our goal with the focus groups was to examine whether and how the 10 participants had used information addressed in the professional development day. Three independent focus groups were held with an author with three to four participants in each; the same questions were asked in each focus group. Meetings were held via Zoom shortly after all 13 practicum supervisors had completed their debrief meeting from school experience. The focus group interview protocol invited participants to discuss each of the three sessions’ benefits, uses, and challenges as well as the future professional development they sought prior to the 12 week certifying practicum in the spring. While this final question repeated a survey question, we were

curious whether the participants' perception of need would have changed after working with preservice teachers in the field. We organize responses by session and future need. All participant names are pseudonyms.

Mentoring vs Moulding

All participants discussed how this session was helpful, not so much because of a specific incident, but because it remained present in their minds throughout their school experience: "it's kind of a little seed in the back of my mind" (Elmo). Two sets of comments were repeated by several participants, and we identified these as codes for the first session.

There is a Balance. Several participants noted that moulding was a personal tendency they were working on. As Mary explained, "I think something that I've always been concerned about is that I am moulding more than mentoring so I do need to come about it in a different way." Participants recognized they needed to really think about how, and if, they were mentoring: "I really tried to discern the moments when they needed me to be supportive and when they needed me to be evaluative because a former coordinator always said these were our two key roles" (Becky). However, as Becky noted, there are times when practicum supervisors need to be directive in their feedback; thus, there needs to be a balance. As Maurice shared,

What I thought of particularly in this practicum, was that preservice teacher knows what they know but they don't know what they don't know. And so sometimes you must step beyond that mentoring part and you come more from the experience part.

Alex built on this dilemma of balancing between feedback that focuses on having the preservice teacher figure out the type of teacher they are becoming, with needing to provide directed feedback to address a concern with practice that the preservice teacher may not yet realize.

[The preservice teacher] didn't really identify that as a concern and the teacher mentor never identified that. So, I did give them some very detailed feedback. And it did shift the way that they perceived how different parts of the lesson went. And so, I think that it was useful, but just to find that balance between, you know, I'm not trying to suggest that they be me, I want them to be them, but also, they have to have a realistic appraisal of how they did.

Mike shared the reverse problem: "I've had one [preservice teacher] in my group each time, say more or less exactly, just tell me what you want me to do, and I'll do it." In this instance, the preservice teacher wanted the university supervisor to mould them rather than figure out the teacher they were becoming. In both situations, the university supervisor was working to figure out the right balance between mentoring and moulding.

Asking Questions to Know Them. To assist them in striking the right balance when giving feedback, participants noted how critical it was to start with questions rather than advice-giving: "tending to put more questions out to them, whether it's in my observation notes, or whether it's in the post conference, just more questions, and letting them expound on that" (Maurice). The power of asking questions enabled practicum supervisors to figure out, "how [preservice teachers] might develop in a way that is reflective of who they are as people and as teachers" (Elmo). Becky felt these questions were critical to helping her figure out "how best to help them really explore their personal identity as a teacher and help them really understand that." By asking questions, Mike believed he would accomplish his primary goal as a university supervisor.

It was very clear to me that no I'm not here to just give you individual behaviours, do this and you'll be fine. I'm not here to tell you there's one best way to teach

and it happens to be the way I've always taught. But I am here to do what I can to help you become the teacher only you can be.

Difficult Conversations

Rather than being something in the back of their mind throughout school experience, participants talked about using the difficult conversations session content to have specific discussions. There were two different codes we perceived from reading participant comments that frame this section.

We Need Strategies. Difficult conversations, by their very nature, involve conversations that may be challenging to engage in. Mary provided a specific example of how she used the session strategy of starting with a question to begin a difficult conversation.

I went back and looked at [my session notes], because I knew I was going to have to have that difficult conversation.... Then when I approached him, I just started with a question, what was going through your head as you seemed very quiet during [describing a classroom management situation; removed details at request of Mary]? What was going through your head? He just opened right up and he was very honest.

Another strategy, discussed by Peter, was thinking through why a conversation may or may not be difficult.

I think that it's always the awkward moment when you want to go in and be there, be supportive, but being able to handle the difficult conversations ... is it difficult for you or for them? When you don't want to have that conversation, is it because you don't want to have it, or do you think they don't want to hear it?

Participants shared that they were looking for even more strategies: “how do we support someone who is highly defended? How do we support someone who is closed minded? You know, those are all the challenges” (Mike).

Ethical Conversations with Teacher Mentors. Several participants also discussed difficult conversations involving teacher mentors. They knew it was important to be supportive and recognize the expertise of the teacher mentor, but they also needed to find a way to have conversations around what effective teaching for preservice teachers looked like.

My sort of challenge ... this time around that I’ve never had before, was having those ethical conversations with a fellow teacher, with the teacher mentor ... that takes thought ... the discussions with the teacher mentor are a little bit delicate. (Becky)

Given that the school experience is happening in the teacher mentor’s classroom, and they have expectations/beliefs around what good instruction looks like, it could be challenging for both practicum supervisors and preservice teachers to negotiate opportunities for the preservice teacher to utilize different strategies. Maurice discussed the challenge and the need for sensitivity when approaching this (whether directly with the teacher mentor themselves or, in this case, helping the preservice teacher approach the conversation).

Some teachers have particular things that they want done in a particular way and that’s where some of the preservice teachers find themselves a little bit handcuffed and then they say, well this is exactly how they want it, and you have to say: well, look for avenues, where you can put in a little bit of your own flavour. And surprisingly, maybe your preservice teacher will see that it has some positives that they may find are useful to them.

As such, in reference to difficult conversations, participants noted that not only did different strategies need to be developed, but they needed to be equipped to have these interactions with both the preservice teachers and teacher mentors.

Technology

In post-PD survey responses, participants noted the value of learning how to question and support preservice teachers regarding their use of technology. In contrast, after school experience, participants noted very few places in which they could put what they learned into action. This led to one code in relation to technology.

Lack of Technology Use in Classrooms. Almost every participant noted that there was very little use of technology for teaching in the classroom. Aside from the use of a document camera/computer, very little else was observed. As such, this aspect of the professional development day was not as prioritized at this time by participants. The exception was one university supervisor that observed a preservice candidate in a secondary classroom “use the tablet connected to a projector instead of writing on a whiteboard” (Mike). Participants’ experiences in relation to technology could be summed up best by Alex: “I didn’t find that there was a big technology component. I mean, they had smart boards, but they didn’t really use them.”

Future Need

When participants were asked during focus groups for topics they would like to see at the next professional development day, responses differed from the survey responses they gave right after the PD day. There were four topics that were shared by most participants during focus groups. Both **Indigenization** and **Social Justice** were shared as important topics. While some participants discussed this in relation to their own interests (e.g., “On my own, I’ve been researching Indigenous ways of learning and thinking and being in the world. I’d welcome a workshop on incorporating these sensibilities practically into my work as a university supervisor”

[Elizabeth]). Others connected it to understanding what was being taught in university courses (e.g., “I’m thinking, I’m pretty sure [faculty member] wouldn’t have taught that. So, would it be useful? I don’t know. But if we knew more about that, what did she teach about that” [Mike]?). In relation to these topics, Elmo also shared that, “the preservice teachers are really quite aware of it and are conscious of trying to implement social justice into their lessons and it’s exciting to see.”

Looking ahead to the certifying long practicum in the spring, participants also discussed the importance of looking at what **Certification Readiness** is in relation to the goals of the program (e.g., classroom management, effective teaching, inclusive and individualized teaching practices, strong connection with students, etc.). By the end of the long practicum, preservice teachers need to have demonstrated that they are certification-ready in all goals to successfully complete the program. Given there is a great deal riding on this outcome, it makes sense that this is critical to the preservice teachers, teacher mentors, and practicum supervisors. Mike summarized it well:

What does independent functioning look like? What is that level in ways that you could provide specific details? I’ve also had the experience of someone saying, “well, I think they’re fine” and another person saying, “well, I’m not too sure,” so there’s room in there to reflect upon and work towards common understanding.

The fourth and final topic related to technology, however, is not for teaching but **Technology for Administration**. In the final week of school experience, the Fraser Valley was hit by widespread flooding. As a result, the last week of practicum, including the signing of final reports, had to be completed remotely. Based on this switch to remote teaching, several participants shared that they would like in-service around “Microsoft and iCloud” (Elizabeth), as well as sharing files and signatures on PDF documents.

In addition to the four topics listed above, participants also provided direction on the types of activities they would like to engage in during the next professional development day. Paul shared that, “if it’s possible to allow more time for focussed discussion because there’s so much expertise within the group: to hear from people’s experiences or to be bouncing ideas.” Elmo expanded on this, suggesting “role play ... I think that’s really a useful thing to do with the feedback and also lots of opportunity for conversation.” Participants recognized the value of listening to each other’s experiences and using those insights to work towards common understandings.

Having overviewed participant reflections in relation to the surveys and, in more depth, the focus group interviews, we now discuss both our take-always from this participatory action research study, along with the next actions we plan to take.

Discussion

After sharing and finalizing the codes from this study, we spent time discussing the data, and importantly, what was missing from the data. Our questions focused on evaluating the professional development day. This led to very concrete actions; however, during the PD day, participants discussed little in relation to technology. Why? Our observations and questions have implications for the next steps in this cycle of action research that we will discuss, but also in our own reflections on whether our department has (or more importantly, has not) supported practicum supervisors for the past 14 years. Given that there is little research on professional development in relation to practicum supervisors, we focus our discussion section on understanding the data we received, but also the data we did not receive, rather than trying to connect the data to previous research. In essence, we are sharing the progression of learning we went through that ultimately resulted in a conceptual framework for going forward in our work with practicum supervisors.

What Is Missing and Why?

This chapter focuses on the second cycle of participatory action research we have undertaken with our practicum supervisors. The first cycle gathered information related to practicum supervisors' experiences when having to mentor during a remote practicum. One of the key results from this cycle was the need for professional development, especially around the use of technology in schools. We expected that the needs are still present; however, our participants did not prioritize learning about how to mentor preservice teachers around technology. Given that the final week of school experience required a pivot to online for the signing of final reports, they did note the need for some professional development around technology for administrative purposes. The reason as to why they did not prioritize technology for teaching and learning related to their direct observations of little or no technology use by preservice teachers during school experience. We interpreted these pieces of data as follows: if technology is currently being observed in schools, it is prioritized; if it is not being observed in schools, it is not a priority. As a teacher education program, this finding is at odds with the purpose of teacher education.

Our department views the purpose of teacher education as preparing preservice teachers to advance the field, bringing about changes in schools themselves, both through practicum and by having these new teachers working in their own classrooms after graduation. This purpose is common to teacher education programs across Canada (Thomas & Hirschhorn, 2015; Wideen, Mayer Smith, & Moon, 1998). As discussed by Fitchett and Moore (2021), the practicum is critical to enabling preservice teachers to adopt the progressive practices of teacher education to be implemented in the field: if preservice candidates can teach what they have learned in their university coursework during their practicum, they are more likely to adopt those practices as part of their repertoire going forward. Given the challenge faced by teacher education programs to find strong, progressive teacher mentors for preservice teachers, we see the university supervisor as

having a key mediating role; the university supervisor can support preservice teachers as they try to implement strategies they learned in their coursework, even if the teacher mentor is hesitant. Given the importance of the university supervisors' mediating role, it is even more critical we focus on professional development that aligns with what is being taught on campus; in this way, we have a responsibility to build the capacity of the program's practicum supervisors.

However, participants also shared how they wanted to align with the university faculty. When asked about future professional development, they referenced Indigenization and social justice, which are key values and commitments of the department. These values are front and centre, and they are communicated regularly. We reflected that perhaps our department is not as clear about other strategies and foci. This reflection led to, perhaps, the largest epiphany for us: do we take time with our practicum supervisors to educate them on what is happening in the university courses? We concluded that no, not really ... we have done very little to enculturate practicum supervisors to the entire preservice program over the last 14 years.

Over a given year, the department brings the practicum supervisors together five times for half a day (before and after school experience; before, midway, and after long practicum). During these brief meetings we spend 90–95% of the time on procedural information (e.g., timelines, expectations, criteria for assessment, FAQ, etc.). Our data illustrates what our meetings seem to prioritize. This is the locus of our problem.

What Was There?

Topics that were of regular interest to participants related to mentoring skills: mentoring vs moulding, having difficult conversations, knowing and negotiating certification readiness, working ethically with teacher mentors, and so on. All these topics recognize that these practicum supervisors are seeking more knowledge and skills around mentoring itself. Given that these mostly retired principals and teachers are experts in teaching as opposed to mentoring (Capello,

2020), it makes sense that mentoring skills are being prioritized. However, once again, little time has been spent during our five meetings a year on developing university supervisor mentoring skills. Our increased awareness from this action research caused us to really question how we use the time we have with these practicum supervisors.

A Conceptual Framework

Our analysis, reflections, and discussions led us to conceive a three-part conceptual framework for working with and supporting the important work of practicum supervisors. For each meeting where we bring together the practicum supervisors, we plan to spend equal time on three different aspects:

1. **Procedural:** Establish timelines and expectations that are new or specific to that particular year.
2. **Mentoring Development:** Develop individual mentoring skills and time to discuss and role play different scenarios. Over the course of a year, these sessions may involve presenting one or two strategies at the first meeting, then role playing and discussing/sharing expertise over the next four meetings.
3. **University Alignment:** Increase the awareness of what the university faculty are teaching in their courses to build the capacity of the practicum supervisors. These sessions should focus on sharing key strategies/expectations and sharing ways in which these should/could appear in lesson plans, unit plans, and actual instruction. Sessions may involve watching videos prepared by faculty ahead of the meeting, and then using the valuable meeting time to discuss and share understandings.

For the last 14 years, the time we spent with practicum supervisors has mainly focused on procedural aspects. As any school administrator will tell you, procedural aspects, expectations, and timelines are important. However, we have several supervisors who have been with us for the

entire 14 years we have been running the program. That means they have heard the same things 14–42 times (as some things are repeated at different meetings in the year). While this information is critical for new practicum supervisors, our experienced supervisors do not need it repeatedly; experienced supervisors only need the procedural information that is new or specific to the year in which they are mentoring. This means that, to support this model for university supervisor meetings in the future, a separate workshop for new hires would need to be developed. Any experienced supervisor who would like a refresher will always be welcome to join (perhaps even present part of it); however, it would not be required that they attend.

Next Steps

The last step of participatory action research is to make an action plan going forward: how will we implement what we learned? Implementation will be followed by gathering additional feedback so the cycle of improvement can continue. For us, the following next steps are critical:

1. Implement three-step conceptual model in remaining university supervisor meetings this year.
2. Discuss what we learned from this study, including the conceptual model, with all practicum supervisors. Seek input from practicum supervisors to help us put together a five-year plan of development.
3. Share what we learned from this study with the rest of the faculty in the department. Seek their input on where they would like to see alignment in the future and use that to help develop a five-year plan of development. Given the fluctuations in relation to COVID-19, supporting appropriate technology use will remain critical. Seek support from faculty on key aspects to share with practicum supervisors regarding technology in relation to teaching and learning.
4. Develop a workshop for new practicum supervisors to acquaint them with the procedural aspects of the year. Record this workshop so that it can be referenced by practicum supervisors throughout the year.

5. Develop a FAQ handout for practicum supervisors to support the procedural aspects of the year. While we already have a mentor handbook, this would be a quick-reference guide for when they are asked questions by teacher mentors and/or preservice teachers.
6. Work with department faculty to create sessions that focus on working towards university alignment. Ensure these sessions are video recorded so that they can be referenced by different practicum supervisors from one year to the next.
7. Continue to evaluate this cycle of professional development and feedback.

Recommendations for Teacher Education Programs

Our first recommendation for teacher education programs is to examine what you currently do with your practicum supervisors. How do you provide support? What topics do you focus on in that support (e.g., procedural, university alignment, mentorship development)? Second, survey or question your practicum supervisors regarding their needs and wants for future support. In our experience, practicum supervisors are eager to continue learning and welcome opportunities for professional development. Third, and in relation to this book's focus with respect to online teaching and learning, recognize that most practicum supervisors, as retired school personnel, did not work in online classrooms, nor did they have much experience with technology use in the classroom. This experience gap with online teaching and learning makes it a key area to target with professional development if the goal is for the university coursework in the program to be maximized in the field. We have truly entered a new world of opportunities (and necessity) in education unlike any other before. Because practicum supervisors are key stakeholders in this transformation, it is important that their role be supported with timely, targeted, and tailored professional development.

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Bringing out THEIR Best: Mentoring rather than Moulding

Key Ideas

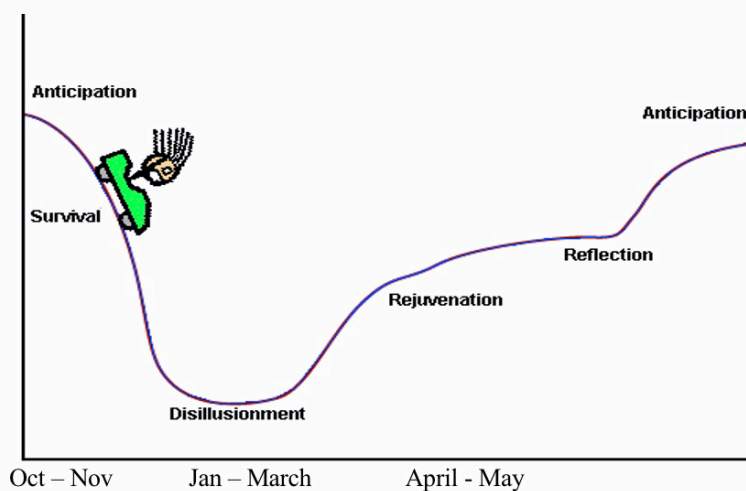
- *Effective teaching requires a deep understanding of three elements: students, curriculum, and self.*
 - The first two are often the focus of many discussions, ideas, and observations
 - The third is often undervalued ... this needs to be a focus for candidates and mentors alike to bring out their best teacher
- *A deep understanding of self as teacher involves two components ([Palmer, 2017](#))*
 - Identity
 - What kind of teacher do you want to be?
 - What are your priorities in your classroom?
 - How are these priorities visible?
 - When planning, what are the key things you are considering?
 - What kind of a learning experience do you want students to have?
 - What is the role of the teacher in achieving those learning experiences?
 - Integrity
 - The courage to put into practice who you are ... a showcasing of self and one's experiences
 - The courage to bring self into the classroom
 - The courage to teach who you are
 - The courage to be yourself rather than trying to be someone else
- *To develop a deep understanding of self as teacher requires scaffolding.*
 - Mentor needs to get to know the candidate to scaffold this development
 - Connecting with the candidate
 - Learning and recognizing the candidate's strengths
 - Observing what is planned and what happens in the classroom
 - Asking purposeful questions to make visible what the candidate may not be noticing (or able to put into words or action)

Appendix B

Contrasting Mentoring and Moulding

Mentoring	Moulding
Asking questions	Telling answers
Focus on the purpose behind decisions. Why did you choose to do this? What happened? What evidence do you have that it worked or did not?	Focus solely on technique...what worked or should have been done in this one situation. <i>Sharing what you would have done.</i>
Focus on learning from the immediate to apply that to future decisions ... what is important to consider for the future ...	Focus on the immediate ... <i>this is what you needed to do ...</i>
As candidate reflects on a lesson, asking questions such as how do you know, why do you think, why did ...	Telling the candidate what happened before the candidate reflects
Asking candidate about their passions ... how are they bringing that into the classroom	Sharing what a successful classroom looks like and what to include when teaching
Asking candidate about their strengths ... and how they brought that into the classroom	Sharing what the candidate did well
Asking for evidence in relation to their reflection	Correcting the candidate
Others?	Others?

When and how does this apply?



<https://study.com/academy/lesson/first-year-teacher-tips.html>

Chapter 17

“Stressed out and Zoomed out”: Well-Being, Teacher Education, and the Online Space

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Abstract

This chapter draws on an emerging well-being program at the School of Education, Trent University, where I teach, to investigate how autoethnographical reflections correspond to theory and pedagogy relevant to teacher identity, intersectionality, and care in the digital space. Blending autoethnography with feminist, cultural, and pedagogical research, I argue that the online space can be a site for communal connection and well-being, even and especially when it can also be a source of stress and disconnection. Autoethnography brings together voice and experience to forge connections between individuals and communities in a sometimes lonely world and, in particular, in communities that are increasingly structured online (Atay, 2020; Calzati, 2020). We are just beginning to understand the interstices and confluences of subjectivity, the digital landscape, and communal connections. I explore the creation and sustainability of a well-being program at the Trent School of Education that, due to the COVID-19 pandemic, was suddenly shifted online. I bring together my own autoethnographical reflections during the pandemic, including my own struggles with well-being while leading well-being sessions for teacher candidates. At a time of unprecedented stress and concerns over health and well-being (Hamilton & Gross, 2021), I found that our well-being program fostered a space for reflection and connection. Further, I realized that using the online space, while creating stress for other kinds of work, was effective and even preferable for well-being work and community connections.

Résumé

Cette recherche universitaire, s'appuyant sur un programme émergent sur le bien-être à la Faculté d'Éducation à la Trent University (Ontario), étudie comment les réflexions autoethnographiques correspondent à la théorie et à la pédagogie se rapportant à l'identité, à l'intersectionnalité et aux soins des enseignants dans l'espace numérique. Alliant l'autoethnographie à la recherche féministe, culturelle et pédagogique, ce chapitre soutient que l'espace en ligne peut être un lieu de connexion et de bien-être collectifs, même et notamment lorsqu'il s'avère une source de stress et de déconnexion. L'autoethnographie entremêle la voix et l'expérience pour tisser des liens entre les individus et les communautés dans un monde parfois solitaire, particulièrement dans des communautés toujours davantage structurées en ligne (Atay, 2020; Calzati, 2020). Nous commençons à peine à comprendre les interstices et les confluences de la subjectivité, du paysage numérique et des connexions communautaires. Ce chapitre explore la création et la pérennité du programme de bien-être à la Trent School of Education qui, en raison de la pandémie de COVID-19, a soudainement été mis en ligne. Dans ces lignes, je rassemble mes propres réflexions autoethnographiques affectuées au cours la pandémie, y compris mes propres luttes avec mon bien-être au moment même où je dirigeais des sessions de bien-être pour les candidats enseignants. Au cœur d'une époque marquée par un niveau de stress sans précédent et les préoccupations reliées à la santé et au bien-être (Hamilton & Gross, 2021), j'ai pris nettement conscience du fait que notre programme de bien-être favorise un espace de réflexion et de connexion. J'ai de même constaté que le recours à l'espace en ligne, bien que s'avérant une source de stress pour d'autres activités liées au travail, est efficace et même préférable pour le travail du bien-être et les liens avec la collectivité.

“Stressed out and Zoomed out”: Well-Being, Teacher Education, and the Online Space

In the 2019–2020 year, I began an initiative to help foster well-being amongst teacher candidates (TCs) at the Trent School of Education, Ontario. Drawing on internal university statistics that stress levels were exceedingly high, as well as the Ontario Ministry of Education’s report on Well-Being (Government of Ontario, 2017), colleagues and I wanted to ensure TCs had meaningful support during their own preservice education, as well as the knowledge and skills to be able to help meet Ontario’s objectives towards better well-being for students. In late 2019, the Trent School of Education became a pilot site for the Teachers of Tomorrow program, an initiative of Shelly Russell-Mayhew and other teacher educators who had been offering programs in Alberta Faculties of Education (Russell-Mayhew et al., 2016). Their research suggests that if TCs learn the skills, tools, and habits of well-being in their preservice education, it will (a) help them achieve success during the demanding process of becoming a teacher; (b) help them build habits that will serve them in teaching, leading to less absenteeism, less burn out, fewer stress/health leaves, and fewer teachers leaving the profession; and (c) help them become successful models and pass on habits for health and well-being to their students (Atkins & Rodger, 2016; EdCan Network, 2019).

Faculty and staff in the Trent School of Education wanted to adopt a holistic approach. Our department identified goals for promoting health, broadly understood, through the lens of mental and physical health, ecological health as tied to human well-being, and Indigenous approaches to well-being. In early 2020, as I was beginning to draw up plans to launch a well-being program, these were, of course, disrupted in March of 2020 due to the COVID-19 pandemic.

In terms of my own relevant biography, I am a faculty member at the Trent School of Education, a mother-scholar, and a rabbi. All these identities correlate and sometimes conflate in the autoethnography. While investigating how to promote well-being amongst TCs, I also had to consider how to keep myself well enough to stay in the work. The results were discovering how

much self-care relies on community care, how intersectional identities impact well-being, and how we can use digital tools for communal connection and well-being even, and especially, when they are the source of stress and disconnection.

Methodology

Supporting TC well-being during a global pandemic was a challenge. I began to keep a journal of my own experiences of the pandemic, and how my work in the well-being program related to my own experiences as a teacher, a parent, and a member of the Trent University community. This convergence of identities gives rise to autoethnography as a research methodology. I have previously done ethnographical studies on South Africa (Handlarski, 2009) and on Judaism (Handlarski, 2020a), and learned from ethnographers in the fields of gender studies and literacy/language (Gaunt, 2006; Mendoza-Denton, 2014; Bucholtz, 2011).

Ethnography is a way to capture the ethos of a particular culture and/or community: “Ethnography is a qualitative research method in which a researcher — an ethnographer — studies a particular social/cultural group with the aim to better understand it. Ethnography is both a process (e.g., one does ethnography) and a product (e.g., one writes an ethnography)” (Allen, 2015, p. 33). While typically I would not consider the Trent School of Education a “cultural group” per se, during the pandemic we became one. We were a group of people who were suddenly moved from one set of circumstances to another. In my Jewish cultural community, similar examples are various exoduses, expulsions, and communal catastrophes. These are stark examples, but they are shared experiences that serve to bind a community. At the School of Education, we were in the middle of a global emergency with our shared work and goals interrupted, and I was responsible for helping support the well-being of a community that was struggling amid the flux. I was struggling, too. When I began to bring together considerations of the well-being group as a sort of cultural

community, and the journaling I was doing as part of that program, I realized I was creating autoethnography, which Bochner and Ellis (2016) describe as:

an autobiographical genre of writing and research that displays multiple layers of consciousness, connecting the personal to the cultural. Back and forth autoethnographers gaze, first through an ethnographic wide-angle lens, focusing outward on social and cultural aspects of their personal experience; then, they look inward, exposing a vulnerable self that is moved by and may move through, refract, and resist cultural interpretations. (p. 739)

The research methodology of autoethnography allows me to use my own personal reflective writing, a central practice of Teacher Education (Shandomo, 2010), as a means of understanding the well-being program, especially as it pivoted to an online format due to the pandemic: “The intent of autoethnography is to acknowledge the inextricable link between the personal and the cultural and to make room for nontraditional forms of inquiry and expression” (Wall, 2006, p. 146). In each section, I share some of my own autoethnographic reflections and then I pair them with research on autoethnography, well-being, and beyond. The autoethnography and research pairing tells the story of how teacher/researcher and teacher candidates used the online space to form meaningful connections and engage in sense-making during a global pandemic, realizing that digital platforms can be exciting and important for community building and well-being work, even during times of overall digital overwhelm.

Teacher Identity and Well-Being

Autoethnographical Reflections

March 2020

Suddenly the world is upside down. I have just returned from the conference in New York, and I am sick. Very sick. At first, I thought it was strep throat but I’m on antibiotics now and I’m

not getting better. They keep talking about this virus and how it restricts your ability to breathe. I feel like I can literally breathe, but in a deeper sense I'm finding it hard to catch my breath. It seems like it has been one thing after another. And now schools are closed for two weeks. And now I am sick and not getting better.

At Trent we are ending practicums for our students — the year suddenly over. Everyone is frustrated and worried about all the plans, lesson plans, unit plans job plans that are not coming to fruition. When I speak to students, their fear is palpable. Some are grateful for a much-needed break. Some are angry the year is suddenly over. I am aware that I have promised to help care for these teacher candidates and their well-being. I'm not sure how to do that when I feel like I can barely take care of myself right now.

Later in March 2020

It seems things shift every day. I am watching them put up a field hospital in Central Park. I think of all the things I did only a week or so ago that feel unimaginable now: riding the New York subway, eating at a salad bar, sharing meals in large groups. I am still very sick. I now believe I have coronavirus but can't get a test. In addition to being a teacher, I am a rabbi. Through this time I am trying to support people, many of whom are older and vulnerable to illness. I feel stretched and squeezed all at once.

My students report feeling the contradiction of being bored but also stressed; I begin to offer well-being drop-in sessions for us to connect with each other through the isolation. Even though we aren't together, being online is a blessing. We get together for check-ins each week. I'm also continuing our well-being workshops, now more starkly needed than we'd realized.

One of the things we noticed during our session was that some of us were struggling while navigating the line between our professional and personal identities. As a faculty, we had instilled a sense in our TCs that *becoming* teachers was, indeed, an act of becoming. Who are we without

our classrooms and our students? Who am I when I am suddenly mother/partner/professor/rabbi all at once and all the time?

Note, I intentionally reference “our” in these journal reflections because this is how I wrote the original ethnography. “Our” refers to the work of the faculty at the Trent School of Education, and it is more appropriate than “my.” I consider it a tenet of feminist scholarship to refer to collectives and networks where work is shared, rather than to take credit as an individual.

Self and Other in Writing and Research

One of the functions of autoethnography is making sense of difficult moments, including times of transition (Ellis & Bochner, 2000). The pandemic is certainly both. I began keeping these notes to center myself during a time of extreme shift. I wanted to be a pillar of strength for my TCs. Instead, I found that the more vulnerable I could be in sharing my own struggles, the more the TCs felt seen. Our shared experiences resonated with each other.

In some ways, this resonance is no surprise. We know that one of the functions of autoethnography is to reach beyond the self to emotionally move another and, conversely, to better understand those around us by reflecting on shared circumstances and emotions (Reed-Danahay, 1997). I found that my professional identity had to shift to meet the moment, and my TCs reported that they felt the same; their burgeoning professional identities were just beginning to take hold and then everything changed. Keith Berry’s work on autoethnography as “spinning reflexivity” (2000) resonates with my own autoethnographic reflections, because I felt like I was writing myself into a new future at a time when the future was so uncertain. This work helped me guide TCs who were also facing an uncertain future and, together, we were able to write about our shifting lives and the melding of personal and professional roles.

Autoethnography and self-narrative practices are crucial to negotiating and adopting a teacher identity (Hayler, 2011). I shared my writing with the TCs and encouraged them to write as

well. Of course, our time at the faculty had prepared TCs for this as we do a huge amount of journaling and reflection as part of program requirements. The online well-being program gave us a structure to create and share similar reflections. This time, the reflective writing was not part of course credit or program requirements; rather, we were drawing on research and intuitive knowledge that the act of writing is itself therapeutic (Kiesinger, 2002) and aids greatly in “reframing” experience. In addition to reframing our experiences and identities, reframing reflective work itself as part of well-being work and self-care gave us a practical bridge between our professional and personal identities; the process of reflective writing as *becoming* teachers shifted to allow TCs to absorb and reconfigure their teacher identities when, suddenly, schools were closed.

This was a very stressful time. Like me, many students were ill, and any sickness took on much more fear than it normally would. We were locked down, some isolated terribly for many weeks. We were all living with the reeling feeling of having the world change overnight. There is research in fields like medicine that when a researcher uses autoethnography, they can bolster their own well-being, thus allowing them to help foster the well-being of others (Six, 2020). This was certainly true for me. I was being sucked under by the weight of it all and the process of reflective writing helped to ground me enough to continue offering well-being workshops and drop-in sessions for TCs who were similarly struggling.

The pandemic truly offered the opportunity to consider how we lead when things are globally difficult. Many educators had to grapple with how to continue to occupy the mindset and position of educator while negotiating internal feelings of distress, grief, and loss, and many turned to autoethnography to help them do it (Gates et al., 2020). Some used autoethnography as a teaching practice to help their students (Markham & Harris, 2021). I, of course, did not know about this parallel work on autoethnography when I started my own. This confluence of work

arises out of a shared need to engage in “sense-making” during this time and to negotiate our shifting identities.

Autoethnographical Reflection: April 2020

The well-being program was featured in an article on the university website (Trent University, 2020). Some of the students are quoted:

It was a relief to hear that I wasn’t the only one in need of some ideas to keep moving forward in my career during these uncertain times, and others had similar questions about the abrupt end of our school year. (Molly Klintworth)

Trent’s wellness session on Zoom was a welcome breath of fresh air during an unprecedented and stressful time. It was an uplifting experience and comforting to see faculty’s and TC colleagues’ familiar faces. (Brittney VanDersel)

We’re all scared of what is to come but connecting in whatever way we can alleviates some of that fear and brings back a little bit of perspective. (Allison Snobelen)

The article in Kveller about the pressures of pandemic parenting comes out during the week of both my kids’ birthdays. I am struggling to offer a happy birthday experience with no friends, no parties, and nowhere to go. Things feel heavy and sad and it’s hard to show up for my kids right now — how much to reveal about my own struggles. I ask the same question about my students. Sometimes it is hard for me to show up for them; and I, as a teacher, am unsure how much to share to remain authentic while not taking up too much space. I am struck by how grounding it is for me to show up for the TCs. I too am gaining quite a bit by seeing familiar faces. And yet sometimes the energy it takes, not to mention the planning to occupy the kids, is exhausting.

Intersecting identities: Feminism, Judaism, and Well-Being

Autoethnographical Reflections

April 2020

I am feeling better, physically. Mentally I’m drained and exhausted. Schools keep being postponed and I am beginning to wonder how long my children will be here. I feel like I barely start working before I’m interrupted. Charlie (my partner) is a teacher and is trying to reach

students with developmental disabilities. While I can do my work online, for him it's a struggle. He is taking up a lot of space and I feel like I'm shouldering a lot of the burden. I am starting to feel like an imposter, running well-being sessions when I am not feeling that well myself.

June 2020

I am leaving my position as a congregational and in-person rabbi. There are too many people to support, and I don't have enough support of my own. Suddenly there is no childcare, no way or where to blow off steam. There is grief all around, my own grief feels eclipsed by the collective grief, particularly in the aftermath of the murder of George Floyd. Our students are grieving the loss of their normalcy, such as graduation, and keenly missing the ability to come together to talk about Black Lives Matter. What we do have, what we continue to rely on, is the internet. As a rabbi, I am shifting from my previously in-person community to my online community. Having served both, I am starting to more deeply understand the ways in which an online community, pandemic notwithstanding, can help create meaningful connections across time zones and differing identities.

July 2020

In this time of not knowing what to expect, we now have clarity that we will be teaching online this coming year. This means the well-being program is also entirely online. I am struck by both the potential for building community in the digital space and the many limitations of same. So much of how we foster a sense of belonging in a classroom is in the in-between moments: the chatting as people begin to sit down, the transitions between classes when people catch up, walking to the bus stop, and debriefing the day.

I recently published an article (Handlarski, 2020b) about the mental load for mothers as the gendered sphere of the home becomes enmeshed with the differently gendered sphere of the workplace. Things are shifting for us at home as we work out our own schedules and issues, and I

can't help but wonder how many of our teacher candidates are having similar conversations. The lines between our private and public lives are blurring in so many ways. Is a well-being program an appropriate place to discuss our familial responsibilities and the dynamics between partners/parents? If not, how do we meaningfully address these tensions which are, now and possibly well into the future, some of the largest barriers to self-care and well-being?

September 2020

In the midst of settling into online teaching, I received some startling information. A historian from Ottawa, Jan Grabowski, has been in touch with my family. Some of the research he is doing turned up new information and insights into my grandparents and their immediate families during the Holocaust. We learned that my grandfather witnessed his family being murdered. We learned about court documents where it's clear the family sought justice to no avail. My father rarely talks about his family and their experience in the Holocaust. Like many children of survivors, he prefers to stay quiet about the experience and the impact on himself and his family (Wilson, 1985). The intergenerational trauma is apparent in how he moves through the world. I am now wondering ... how much does it impact me in ways that I am not consciously aware of?

How bizarre to be running a program on well-being when these revelations have me spinning out. I have days when I can't get off the couch. It's a kind of intangible and complex grief that has no locus but feels ever-present. I recognize that I am experiencing "ambiguous loss" (Berinato, 2020), and that I am essentially grieving for family members I never met and for the intergenerational impacts of the violence they experienced. I try to return to writing gratitude journals and it feels like a mix between impossible and trite and deeply valuable and nourishing. I am finding it useful to move my body. I am finding it useful to be outside. It is hard to settle the monkey mind.

I have 80 TCs who are also working through their own ambiguous losses, their own inability to settle even while bored. My being in a leadership role helps me stay grounded. During this difficult time, the TCs are truly helping me more than I am helping them. However, knowing that we are part of a team, each doing our daily walks or meditation, even while afar, is providing immense comfort. People keep talking about being “alone together,” but it is clear that each of us focusing on our individual well-being is also enhancing our collective well-being in surprising ways.

October 2020

I am thinking about Judaism in new ways. As a result of serving my online community (the members of which are stressed out and down) and of my family’s history underscoring the connection between Judaism and trauma, I am turning to Jewish ritual. Each week I am making Shabbat a priority. During this time, when the days blend together, it is so meaningful to mark time with a weekly practice of Friday night blessings, challah, and family togetherness. Each Saturday, I try to take a tech break. Yes, technology is affording us so much in the way of connection but/and it is also a way to distract from looking inwardly. My community is speaking with Tiffany Shlain, author of *24/6: The Power of Unplugging One Day a Week* (2019). Shlain, a secular Jew who began the practice of a full 24 hours of no screens, draws on the Jewish teachings of Shabbat and applying them to everyday life. I bring this teaching to students. We are all exhausted from staring at the screen, even just at the start of a school year being conducted entirely online. We need to unplug sometimes to stay mentally plugged in the rest of the time.

Intersecting Identities and Connecting Self/Other

So much of my autoethnography from the first six months of the pandemic centres on my identities as a woman, mother, teacher, and Jew/rabbi. The uncertainty and sweeping shifts due to the pandemic has caused many people to confront and question their identities (Bowles, 2020).

Autoethnography helped me wrestle with my own shifting identities and their connections with community and culture, particularly as a woman and as a Jew. This is a dynamic found across autoethnographic research: “autoethnographers intentionally *highlight* their relationship of their experiences and stories to culture and cultural practices” (Holman-Jones et al., 2013, p. 22). Robin Boylorn and Mark Orbe point out in *Critical Autoethnography: Intersecting Cultural Identities* (2013) that autoethnography is often the place to make sense of intersectional identity (p. 16), and that identity and culture often rely on exchange (p. 124) and, in their discussion and expression, they grow and help shape each other. This is how we find our authentic selves (p. 184) in connection with others, within and across communal lines.

Such identity and community-based reflections helped me frame my experiences and so, ultimately, I can theorize them. Here began a merging of my own critical thought and pedagogical processes with the sense-making of my own identities, experiences, and expression during this tense time. Using story to connect outwardly and theorize experience, critical autoethnography (Holman-Jones, 2016) is a process “that links the concrete and abstract, thinking and acting, aesthetics, and criticism” (p. 23). In this process of creating critical autoethnography and bridging identities as well as the gap between teacher/student in my work, I turn to feminist analysis where exploding binaries such as public/private and self/other are deeply ingrained in ways of knowing, writing, practicing, and connecting.

My article about leaving my job as rabbi (Handlarski, 2020b) centred on researching the impact of the pandemic on women. During the lockdown, working parents needed to be full-time caregivers and workers simultaneously, and we know that the brunt of the labour fell on women (Leclerc, 2020). In addition, professions like teaching, which are, like all caring professions, comprised mainly of women, meant that it was the exact moment that more was extracted from women’s labour both in the workplace and at home, with the demands compounding each other

(Westheimer & Hagerman, 2021). Several surveys of Canadian teachers (Alberta Teachers' Association, 2020, 2021; BC Teachers' Federation, 2020) highlighted that mental health and well-being were being severely impacted by the demands of the pandemic, and the gendered elements are clear. Like me, many teachers were juggling many caring roles simultaneously, without adequate support both in the public and private spheres.

Well-being needs to consider elements like gender. So much of our well-being program tries to distance the concepts and practices of wellness from the overwhelmingly monetized and gendered world of the wellness industry, where women are often the targets of advertising and trends that are rooted in diet culture (Jovanovski & Jaeger, 2022), misogynistic and racist beauty standards (Gamby & Burns, 2021), and the coopting and appropriation of spirituality (Burton, 2020). While these problematic links between what people call "well-being" and gender were clear to me, I had not yet considered the impacts of gendered labour in terms of well-being in a fulsome way until the pandemic. Many of the women in our cohort of TCs were caretaking for children, people who got sick, elderly family members, and without childcare, medical, or other supports available, self-care fell to the bottom of a long list of priorities.

Autoethnography gave me the tools to bridge my own gendered experiences with those of the TCs who were trying to foster their own well-being in impossible circumstances. In much of feminist theory and thought, naming our gendered experiences bridged the divides between public/private and self/other in myriad ways. One of the early writers on writing and feminist connection, Trinh Minh-Ha (1989) writes that, "in writing close to the other of the other, I can only choose to maintain a self-reflexively critical relationship toward the material, a relationship that defines both the subject written and the writing subject, undoing the I while asking 'what do I want to know, you or me?'" (p. 76).

The links between self/other also came through in my reflections about the Jewish experience and antisemitism. When I learned of my family's experience in the Holocaust — something I had known fragments of, but without these new pieces of information concerning the violent and traumatic experiences my grandparents endured — I found myself in a deep trauma response. I turned to Jewish tradition and teachings to help, and I decided to bring some of that Jewish practice into the well-being program. So much of my own reflection centred on Jewish experiences, both regarding oppression and ritual, and culture as tools for holistic well-being. While most TCs were not Jewish, the lessons I was learning about self-care and community-care from my Jewish experience and community were relevant to our collective focus on well-being. Of course, one must be wary of cultural appropriation when trying to access rituals or teachings from a culture/religion outside of one's identity for individual betterment. However, I am a Jew and felt able to share some teachings with students to empower them to use them appropriately. In this instance, it was not appropriative to share cultural teachings.

One of the features of autoethnography is turning to personal reflection and writing to understand oneself, and using that understanding to reach out to others and grow cultural experiences:

Autoethnography is an approach to research and writing that seeks to describe and systematically analyze personal experience to understand cultural experience. This approach challenges canonical ways of doing research and representing others and treats research as a political, socially-just and socially-conscious act. A researcher uses tenets of autobiography and ethnography to do and write autoethnography. Thus, as a method, autoethnography is both process and product. (Ellis et al., 2011, abstract)

I was using my Jewish communal connections to bring the well-being program into a sense of meaningful community. The lines between my rabbinic work in holding space for communal betterment and my education work in holding space for classroom and our program's collective betterment began to blur. Never before have my rabbinate and my role as teacher educator been more aligned.

Our well-being program draws on Indigenous understandings of well-being, including using the medicine wheel as a framework for wellness, and reconciliation as a practice towards individual and communal/national wholeness and wellness (Bell, 2014, 2016). We already had a basis for including spirituality and culture in the teaching about well-being. Still, I had not expected to bring Jewish teachings into the well-being space. My autoethnography reminds me that in exploring self/other and using individual experience to connect with the community, it makes sense that I would draw on my Jewish communal teachings and sites of belonging in my faculty teaching to create a sense of belonging and wholeness in this group. We spoke about managing technology via the lens of Shlain's 24/6 framework (2019), talking about "the power of unplugging" (p. 1) especially during this time of Zoom classes and a well-being program done online. We are so lucky to be connected via digital technology and, at the same time, this can lead to a profound disconnection from self. I was using tech to numb out from feeling the impacts of my family's generational trauma. Unplugging helped me and, in speaking with TCs, helped them as well.

Technology, Community, Care, and Well-being

Autoethnographical Reflections

October 2020

Corresponding with my Jewish community's discussion of what we call "tech Shabbats," breaks from phones, email, and social media for rest and reflection, I ran a workshop for our

faculty's well-being program called "Are you managing your tech or is your tech managing you?". We spoke about research on multitasking; how we aren't good at it or even really doing it (Rosen, 2008). Of course, this workshop happening over Zoom provides rich opportunities for immediate feedback. About halfway through the session I asked for an "honesty moment" from the TCs and asked: "during the half-hour we have been together talking about managing tech, hands up if you have checked email or social media at least once?" Almost every hand went up. I then said, "no judgement at all but I am inviting you to consider what it means that we compulsively check these sites even when discussing the impacts of compulsively checking these sites." Many of us giggled.

We have been doing school online for over a month now and despite knowing about the "myth of multitasking" we are so drawn in by technology. The addictive notifications and beeps. The call to get back to people right away. The sense of connectedness that social media and even email provide, when many of us are lonely, is hard to resist. And yet we know that this constant distraction and type of "multitasking" detract from our happiness and well-being (Mogilner, (2019). It's so striking to me that the very tools that are currently aiding our sense of connection and community are also stressing us out.

Many of us began our year with asynchronous learning, based on data that many of our TCs, especially those in rural areas, did not have the technology to connect in real-time. However, we have been inundated in our program with student requests for synchronous learning, more time with faculty and one another in real-time, and a shift to using technology to promote togetherness rather than content delivery. If we are truly to manage our tech, we need to focus on the ways it can bring us together. The well-being group is flourishing online, which is, for me anyway, unexpected. We are in a time when we are desperate for ways to connect with each other. Focusing on our own self-care in a communal setting is much more impactful than trying to do it

alone. On the days that my only interaction with our TCs or faculty is via the well-being program, I am so thankful we have the technology to do this work together while apart.

November 2020

We are speaking about meditation in our well-being group and someone raised the interesting point that so many wellness influencers take the idea of mindfulness and turn it into a kind of “mine-fulness” (Forbes, 2021). There is a sense that well-being is a personal achievement rather than a communal effort. I led a loving-kindness meditation with the group to emphasize that our focus inward is also about outward love and kindness. The backdrop of all this is, of course, a global pandemic in which we are realizing more and more how interdependent we are. To protect medically vulnerable people, we all need to do our part. For any of us to be safer, we need the community to wear their masks, social distance, and limit gatherings. We also need systemic changes like paid sick leave, a robust health system, and a value on all types of labour that keep society moving.

I value loving-kindness meditations because although they originate from the concept of *metta*, originally a Pali word that has made its way to Sanskrit and Buddhist teaching, means something akin to loving-kindness. It is also a Jewish concept: our word *chesed* is best translated as loving-kindness. It can be in acts of service, an overall way of treating people, and a stance in terms of how we move through the world. *Chesed* is a cornerstone of how I lead Jewishly; my community’s mission statement says that Judaism fosters “two-directional goodness.” We use Jewish teachings and practices to better our lives so that we can better the world.

The intention between meditation is not only to boost individual well-being but also to boost collective wellness. We know that when we take care of ourselves, we can better show up for others. There is an increasing focus on community care instead of self-care (Eromosele, 2020). This is my work in Judaism, and this is the work in the well-being program: in the face of systemic

barriers and violence, we can't *self-care* our way to healing and wholeness. We need to work together to challenge those systems. The *why* of self-care is not mine-fullness. It's moving inwardly to connect outwardly; it's taking care of ourselves so we can take care of each other.

Care, Technology, and Well-being in Research and Practice

My reflections gave voice to the paradoxes of the digital space: technology connected us but sometimes left us lonely; we offered thoughts of loving-kindness to each other to reinforce our sense of interdependence and connection, and in doing so online, we underscored how isolated we all are. There is interesting research emerging on digital autoethnography (Atay, 2020; Calzati, 2020) and we are just at the beginning of understanding how digital tools impact the autoethnographical, which then impacts the communal. What became clear for me, writing in and about the digital space, is how our interactions and our care for each other may expand with the technologies we use to foster connection.

Trent's well-being program is designed to help TCs build habits and practices around mental health and physical health, by drawing on Indigenous ecological understandings of well-being. We conceived of the program this way because we know that our human health depends so much on the health of our planet (O'Brien, 2016) and that Indigenous approaches to well-being inherently link self, community, and nature (Bell, 2016). The pandemic has made us more aware of how interconnected we are in terms of health; for we are seeing that even though it is the most marginalized communities that are most likely to get sick, wealth does not guarantee health when dealing with a highly transmissible virus. We cannot get out of this pandemic without protecting all members of our communities.

Of particular importance is my changing understanding of self-care and its reliance on community care, which is also being borne out in research (Dockray, 2019; Sambile, 2018). This new understanding also resonates with the above research and analysis about gender, Judaism, and

the links between self/other. In an education system designed to train students into thinking of themselves as individuals and pursuing their own individual achievements, a focus on the collective can push us in exciting pedagogical directions.

Educational theorist Nel Noddings is known for her work on what she calls “the challenge to care in schools” (2005). Noddings argues that school is not simply a place to learn facts and acquire workplace-related skills, but is a primary place of belonging and a centre for students to experience care and connection. She asks us to consider that the goal of education is not employability or productivity but, rather, happiness (Noddings, 2003).

Our well-being program shares similar goals that are rooted in an ethic of care. We offer our TCs more than training about lesson plans and assessment strategies; we also want to offer them teachings on how to be well in a holistic sense, how to foster well-being in others, and how their wellness can lead to a happier, and more fulfilling, career and life.

I had never anticipated trying to find ways to offer this kind of care, this community care, to support self-care online. When Trent University wrote about our program in a piece called “Creating Spaces to Stay Connected in Uncertain Times” (2020), they noted that we were creatively using technology to provide “wellness check-ins” for our TCs. The one quote from me in that piece is: “The Bachelor of Education at Trent is more than a professional education program. It’s a community in which we care about, and for, each other” (Trent University, 2020) At a time when we were all isolated physically, we came together in a caring space. This is a radical transformation of how technologies like Zoom are often used; we were not coming together to *do business*, but rather to be *in connection*. This transfer from doing to being is hugely important when it comes to care work. So much of online school became about content delivery. But so often in schools we talk about how we don’t teach content, we teach students. The whole individual sometimes gets lost as we interact via disembodied heads on screens. The well-being

program helped revive and reify a sense of the whole person. Care took on both new approaches and new meanings in our digital educational setting.

Towards Some Possible Conclusions and Next Steps for Exploration

Autoethnographical Reflections

March 2021

Here we are, a year into the pandemic. We are coming to the end of our school year and hence an end to the well-being program for this year. Students are reporting being completely zoomed out and stressed out. I feel the same. The only thing that has really felt good during this time is the well-being sessions. While I feel like I can't face another Professional Development session or family gathering over Zoom, I am looking forward to these workshops and seeing my TCs.

During practicum, I post asynchronously and we do not get to be connected in real-time. Still, we are feeling the impacts of doing our work together. I posted a guide to quick and nourishing food preparation for practicum and one of the TCs sent me a photo of their delicious looking rice bowl and said: "Just thought I'd let you know that it was definitely beneficial being a part of the wellness program you offered so thank you!" I couldn't help but laugh as I was eating such a similar burrito bowl and feeling exactly the same way. Even when we couldn't connect in real-time over Zoom due to the pressures of the practicum experience, we were still using the resources of the digital space to keep cementing our habits for well-being. We were doing it completely apart and, yet, at the same time, together.

Over the course of this year, I have felt as *zoomed out and stressed out* as our TCs. The combination of teaching online, parenting and working simultaneously, encountering a traumatic familial history, and navigating a year of pandemic stress has left me, like all of us, reeling. I had no idea what it would be like to run a well-being program online. I discovered that the tools of

burnout are also the tools of our redemption. We can manage our personal technology and allow it to better our lives, or we can let it run our lives. Our well-being program used the digital space to advocate taking breaks from the digital space. We came together when we were physically distanced, in real time and in our own time, to work on our self-care for the betterment of the community and to work on communal caretaking as a benefit to everyone who was struggling. Embracing these paradoxes is not only part of living, parenting, teaching, learning, and mentoring in a pandemic, but is essential for managing the complexities of our world moving forward.

One of the surprising findings from this autoethnography is that the online format for the well-being sessions and program, which was due to social distancing and the closure of our university, became the preferred format. Even though our TCs, our faculty and staff, and I (as the one coordinating the well-being program) were all stressed out and zoomed out, the acts of coming together online to talk about our wellness was exceptionally supportive. Our well-being program had begun online as a necessary *pivot*, but we will continue to run it online even when our classes resume on campus. The digital space, connected to the themes of teacher identity, intersectionality, forging and sustaining community, care, and well-being, turns out to be a rich site of connection, moving online education from what can be transactional to a transformational experience, rather than a mere transactional one.

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Chapter 18

Open Educational Practices Create Conditions for Developing Research Skills in Graduate Education

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Abstract

In this chapter, we describe the evaluation of a master's level program in education that was designed and delivered using open educational practices. Students developed research skills through layered assignments and multiple rounds of peer review, edits, and revisions of their work. Students engaged in self-reflection and idea-sharing using collaborative online spaces and social media. One research question guided this study: How do open educational practices support the conditions for student learning of research-based skills? Interview and survey data gathered from participants in year 1 and year 2 ($n = 13$) provided evidence that the use of open educational practices (OEP) created the conditions for graduate students' research-based skill development. We identify three key conditions that supported students with their learning, development, and continual improvement of research-based skills: (a) design of layered assignments, (b) formative feedback, and (c) peer learning. Study findings inform instructors and institutions on open educational practices, specifically how to create high quality, online learning experiences and design conditions that support graduate students in research skill development in post-secondary programs. Study findings contribute to the growing field of open educational practices.

Résumé

Dans ce chapitre, nous décrivons l'évaluation d'un programme de maîtrise en éducation qui a été conçu et dispensé au recours de pratiques éducatives ouvertes (PEO). Les étudiants ont développé des compétences en recherche grâce à des pratiques d'évaluations échelonnées, d'évaluations en boucle par les pairs, de révisions et de corrections de leur travail. Les étudiants se sont engagés dans l'autoréflexion et le partage d'idées en utilisant des espaces collaboratifs en ligne et les médias sociaux. La question centrale qui a guidé cette étude est de comprendre comment les pratiques éducatives ouvertes soutiennent les conditions d'apprentissage, tout comme les aptitudes à la recherche chez les étudiants aux cycles d'études supérieures? Les données tirées d'entrevues et d'enquêtes recueillies auprès des participants de la première et de la deuxième année ($n = 13$) d'un programme de maîtrise permettent d'établir que l'utilisation de pratiques éducatives ouvertes crée les conditions nécessaires pour le développement des compétences fondées sur la recherche. Nous identifions trois conditions clés qui soutiennent les étudiants dans l'apprentissage, le développement et l'amélioration continue des compétences basées sur la recherche : (a) la conception de tâches évaluatives conçues par étape (b), la rétroaction formative et (c) l'apprentissage par les pairs. Les résultats d'analyse offrent aux instructeurs et aux établissements postsecondaires des enseignements précieux sur les pratiques éducatives ouvertes. Tout particulièrement, cette étude démontre comment créer des expériences d'apprentissage en ligne de haute qualité et de concevoir des conditions qui soutiennent les étudiants dans le développement des compétences en recherche dans les programmes postsecondaires. Les résultats de cette recherche contribuent ainsi au domaine croissant des pratiques éducatives ouvertes.

Open Educational Practices Create Conditions for Developing Research Skills in Graduate Education

Demand for high quality online education and engaging learning experiences in post-secondary institutions is on the rise. During the pandemic, the number and type of online course offerings significantly increased, and many post-secondary institutions embraced online programming for academic and professional graduate programs that will likely continue to expand in the future. The quality of online education and the conditions for success are important considerations for students when making decisions and selecting programs and institutions. In professional graduate programs, practicing teachers and school leaders can develop research skills and become scholars of the profession (Brew, 2010; Jacobsen et al., 2018; Willison, 2014; Willison & O'Regan 2006/ 2019). Open educational practice (OEP) is a promising collaborative approach to teaching and mentoring for research-skill development and for designing high-quality online learning experiences in graduate teacher education contexts.

In this chapter, we describe a fully online graduate certificate, which was designed in 2017 as part of the graduate program. The program focuses on educational technology through four courses intentionally sequenced to develop students' research skills. OEP was integrated throughout the program design. In one course, students drafted a chapter that they continued to develop in a subsequent course. After completion of the certificate, students' chapters were published in a collaboratively developed open educational resource (OER). In this chapter, we describe a study that revealed three conditions that support research skill development: layered assignments, ongoing feedback, and peer learning. We learned from our study how OEP is a teaching and mentoring approach that supports students in developing research skills. We highlight the relevance of our research to the field of teacher education at the graduate level.

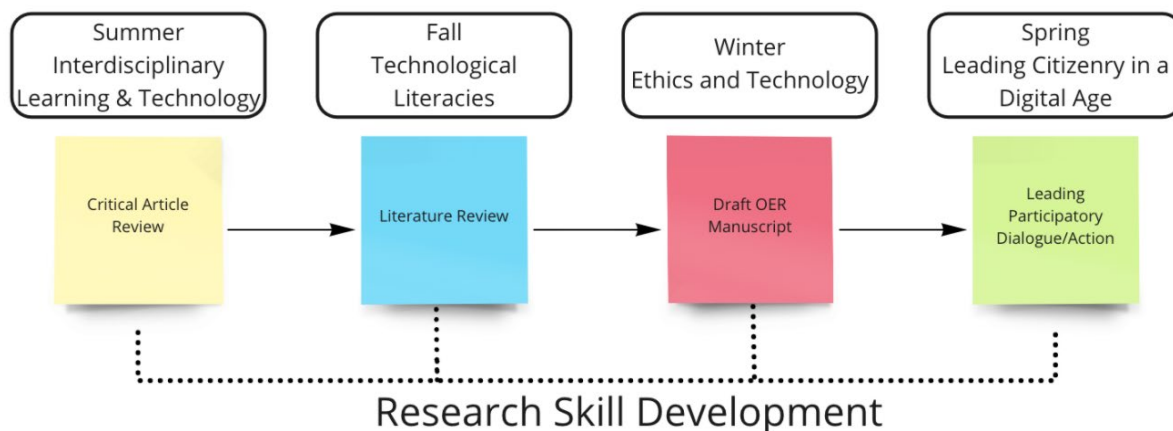
Research Context

Leading and Learning in a Digital Age is a four-course graduate certificate and stackable credential that can lead to a Master of Education degree. Instructors adopted the following definition of OEP in courses: “collaborative and pedagogical practices that involve the creation, use, and reuse of OER as well as participatory technologies and social networks to interact, learn, create knowledge, and empower learners” (Cronin, 2017, p. 18). This definition of OEP guided the design of each course and the learning tasks. Work students were asked to do focused less on content and learning via knowledge *borrowing*, and more on learning in collaboration with peers, course instructors, and external experts through knowledge *building* (Schwartz & Fischer, 2003).

The learning tasks in all four courses focused on students’ developing research skills (Figure 1) and “were designed as a layered and supportive pathway to provide students with multiple opportunities to share their ideas and to receive ongoing and continual feedback” (Brown et al., 2021, p. 3). In contrast to disposable assignments that are often thrown away by the learner, renewable assignments are improved versions and valuable to audiences outside of the class through open publication and access (Wiley, 2016; Wiley & Hilton, 2018). Learning tasks were intentionally designed as layered and renewable assignments that spanned across courses, required multiple feedback loops with knowledge-building communities both inside and outside of the academic classroom, and resulted in openly licensed artifacts accessible to the broader community (Tietjen & Asino, 2021). Students had the option to remix and build on previous work and assignments as they progressed through the four courses in the program (layered). Students continued to build on and use their own openly published work during subsequent courses and beyond the duration of the program (renewable). Each of the courses provided students with opportunities to personalize the assignments to their professional contexts and interests (knowledge building).

Figure 1

Assignments in Four-Course Program



We drew upon Willison and O'Regan's (2007; 2006/2019) six facets for research skill development as a framework to connect the desired skills for scholars of the profession to the design of assignments students completed throughout this graduate teacher education program. The six facets shown in Table 1 enable research skill development. Table 1 maps the facets for research skill development to the layered, renewable, and knowledge building assignments in the program at the time of our study.

Our study draws upon data collected from student participants after they completed the four courses in the graduate certificate. Students were asked questions about the development of the OER manuscript during the third course of the certificate. This assignment was mapped to all six facets of research skill development. By design, the assignments in the first two courses lead up to the development of the manuscript in the third course. The assignments in the final course were interconnected and they leveraged the earlier learning tasks; thus, it was important to conduct our study only after the students had completed all four courses.

Table 1*Research Facets Mapped to Assignments in the Program*

Facets Willison & O'Regan (2007; 2006/2019)	Learning Tasks Designed to Develop Research Skills
Facet 1: Embark on inquiry and so determine a need for knowledge/understanding	• Critical Article Review • Literature Review • Draft OER Manuscript
Facet 2: Find/generate needed information/data using appropriate methodology	• Literature Review • Draft OER Manuscript • Leading Dialogue/Action
Facet 3: Critically evaluate information/data and the processes to find/generate them	• Critical Article Review • Literature Review • Draft OER Manuscript • Leading Dialogue/Action
Facet 4: Organize information collected/generated	• Visual Synthesis • Literature Review • Draft OER Manuscript • Leading Dialogue/Action
Facet 5: Synthesize/analyze new knowledge	• Graduate Student Colloquium • Visual Synthesis • Literature Review • Draft OER Manuscript • Leading Dialogue/Action
Facet 6: Communicate knowledge and understanding, and the processes used to generate them	• Graduate Student Colloquium • Draft OER Manuscript • Leading Dialogue/Action

Literature Review

In this section, we discuss the literature that informed our study. Traditionally, open learning has focused on the integration of Open Educational Resources (OER) which are “teaching, learning and research materials in any medium — digital or otherwise — that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions” (United Nations Educational, Scientific and Cultural Organization, n.d., para. 1). We examined the literature related to instructional approaches to co-creating an OER with students, such as OER-enabled, open pedagogy, and open educational practices.

OER-Enabled, Open Pedagogy

Wiley and Hilton (2018) emphasized the need for a common definition of open pedagogy that integrates OER as an essential component of the learning process, thus OER-enabled pedagogy. This often-cited approach has been characterized by using an open textbook in a course, creating assignments that can be used as exemplars after the course, and otherwise rethinking the assignment design process to consider sustainable assignments that are remixed and adapted beyond a course (Wiley & Hilton, 2018). Eight attributes of open pedagogy highlight the following actions: using participatory technologies; developing an openness for working with others; encouraging innovation and creativity; openly sharing of ideas and resources; participating in a connected community; facilitating learner’s contributions to open resources; engaging in reflective practice; and contributing to peer review and open critique (Hegarty, 2015).

Open pedagogy is also characterized by “three pairs of explicit values: autonomy and interdependence, freedom and accountability, and democracy and participation” (Paquette, 2005, para. 4). In addition to a focus on individual accountability, open education is connected to early references to open learning (Rogers, 1969, as cited in Rogers & Freiberg, 1994) that suggest open

learning exhibits “common value directions which are of such kinds as to enhance the development of the individual himself, of others in his community, and to contribute to the survival and evaluation of the species” (p. 49). Examples of OER-enabled pedagogy or open pedagogy include teachers demonstrating pedagogical transformation by using and remixing OER (McGreal, 2017), increasing student empowerment through the creation of open digital content (Tonks et al., 2013), and enhancing understanding of instructor-led open learning design in digital contexts (Conole, 2013). Current examples of open pedagogy include engaging students as partners to update and add interactive features to an open textbook, as well as developing a Wikipedia-editing course where medical students improve the quality of entries on health-related topics (Guyen et al., 2020; Sharma et al., 2021).

Open Educational Practice (OEP)

A contemporary construct of open educational practice (OEP) integrates ideas from multiple perspectives of open and networked learning in which learners can find, consider, and share knowledge for themselves and be part of a broader sharing community (Barth, 1969; Couros & Hildebrandt, 2016; Cronin, 2017; Jordan et al., 2017; Paquette, 1979). OEP can foster a connection between individual accountability and community responsibility that emphasizes a shared participatory culture in which “members believe that their contributions matter, and feel some degree of social connection with one another (at the least they care what other people think about what they have created)” (Jenkins et al., 2016, p. 4). While OER has been identified as an essential nexus for OEP, there are other influences that help students engage and actively participate in open learning processes in personally meaningful ways without emphasis on OER.

Consistent with Gee’s (2004, 2005) principles of learning design, the learner can be an active agent who builds knowledge within the learning process rather than a passive recipient of knowledge. Some argue that when people recognize that open knowledge can be enriched by

individual academic experience, they will feel more motivated to know and participate not just as an audience member but as a protagonist (Jordan et al., 2017). As protagonists of their learning, learners can become producers instead of consumers of knowledge (Schwartz & Fischer, 2003). In knowledge-building communities, the collective work of a group of learners and teacher(s) is focused on “improving the knowledge itself, rather than the contents of students’ minds” (Scardamalia & Bereiter, 2010, p. 8). Scardamalia and Bereiter’s (2014) knowledge building in community helps to describe the connections between social interactions, access to resources (content and people), and the participatory and collaborative learning opportunities with OEP.

Within an OEP approach, instructors and students are often co-designers in the learning process (Barbera et al., 2017). Jahnke et al. (2020) described co-design as a way for students to become active agents with the support of their instructor in using participatory pedagogies. In the literature, examples of co-design are emerging (Barbera et al., 2017; Paskevicius & Irvine, 2019; Sharma et al., 2021). DeRosa and Robinson (2017) described co-design as a combination of authentic, student-centred learning and open teaching practices. Studies in higher education demonstrate increased student engagement in connection to co-design experiences in a course or program, such as co-designing a course syllabus, a pressbook, a Wikipedia entry, or a video (Paskevicius & Irvine, 2019; Wiley & Hilton, 2018;). However, research is only starting to emerge that demonstrates how OEP can be used to help students develop research skills in teacher education programs (Trust et al., 2022). This study contributes to this emerging body of research by demonstrating how OEP in online graduate education courses assisted students in developing their capacity as researchers and scholars of their profession.

Methodology

Design-based research is a methodological approach that incorporates characteristics of design-thinking as researchers and practitioners conceptualize and analyze complex problems of

practice, design and implement solutions, and evaluate local impact through iterative cycles of analysis and design, with the goal of generating design principles and theoretical insights (McKenny & Reeves, 2019) that advance knowledge and practice. Design-based research supported our ongoing efforts to continually evaluate and strengthen the program design for authentic research-based learning experiences. The following research question guided our design-based research study: How do open educational practices support the conditions for learning research-based skills?

In the first year of the study, 12 students were in the cohort, of which eight ($n = 8$) completed a survey. In the second year of the study, 12 students were in the cohort and five ($n = 5$) completed the survey. The survey data from participants in both years were combined for reporting on the development of research skills. In both years, data were collected from participants after they completed the four courses in the program. Participants were asked questions specifically about the development of the OER manuscript during the third course of the program. Participants were invited to reflect on their experiences in the four courses and their learning tasks, and to what extent these activities supported their learning and provided engaging learning experiences (e.g., receiving feedback from peers and outside experts, authenticity of the assignments, participatory activities leading up to the development of the resource, reflection activities, course resources). Open-ended survey questions asked participants to describe their experience and to provide details about aspects of the program that supported their learning and research skill development experiences. Some participants did not respond to all survey questions. A subset of participants who completed the survey also agreed to participate in individual interviews with a member of the research team. A subset of participants in year 1 ($n = 5$) and in year 2 ($n = 3$) agreed to be interviewed to provide further details and insights about their learning

experiences (see Table 2). Interview transcripts were sent to participants to review and verify the content. Pseudonyms were assigned to each transcript prior to analysis.

Analysis of year 1 and year 2 survey data involved reviewing the select-response data and calculating average responses. A review of qualitative data from interview transcripts and open-ended survey questions involved two cycles of coding (Miles et al., 2014).

Table 2

Total Number of Participants in Year 1 and Year 2

Year	Cohort Size	Survey Responses	Interviews
1	12	8	5
2	12	5	3
TOTAL		13	8

Each response to individual survey and interview questions was treated as a single unit of analysis. In the first cycle, descriptive codes were assigned to each individual response to capture the key idea(s) provided by each participant. In the second cycle, similar codes were clustered together and informed the development of themes. Four members of the research team were involved in the two cycles of coding and data analysis, followed by the convergence of the data sets from year 1 and year 2 that informed the development of themes. The extensive process of data analysis by multiple members of the team and convergence of the quantitative and qualitative data, and then synthesis of data to develop themes, provided a rigorous process for credible and trustworthy reporting on results.

Results

Data were synthesized into three themes that demonstrate how open educational practices (OEP) created and supported fertile conditions for graduate students' research skill development. Each of the three themes reflects one of the conditions that facilitate student learning of research-based skills. Interviews and surveys uncovered how the design of engaging, meaningful, and authentic learning tasks, supported by dynamic feedback and positive relationships with peers, enhanced student learning. Results demonstrate how three key conditions within this study supported students with their learning, development, and continual improvement of research-based skills: (a) design of layered assignments, (b) formative feedback, and (c) peer learning.

Condition 1: Design of Layered Assignments for Authentic Learning and Engagement

This graduate certificate was designed to offer students a series of layered assignments to support the development of graduate-level competencies as they progressed through the four courses in the program (Brown et al., 2021). The first two courses were designed to engage students in various topics related to educational technology as they completed a critical article review and literature review. In the third course students selected a topic for a chapter related to educational technology and ethics. Across both years of the study, over 90% of participants who completed the survey agreed that the authenticity of the assignments, including being able to pursue a topic of personal and professional interest and relevance, increased their learning and engagement. The following participant reflections illustrate how opportunities for authentic learning fostered greater engagement in their inquiry. One survey respondent commented that “the ability to determine the subject of the chapter created an internal motivation to complete the work. This motivation would not exist, or at least not be as strong, if the subject was assigned by the instructor.” Another survey respondent noted “the ability to select a topic of personal interest allowed for a broad range of topics and personally I benefited from being able to concentrate in

this way.” Participants indicated that having a choice for the topic of inquiry embedded in the design of the third course enabled them to deepen their learning of a topic that had intrigued them in earlier courses, or to engage in knowledge building relevant to their professional context.

Throughout the program, layered assignments guided and supported the students in reaching milestones towards the completion of their learning tasks. Participants described how layered assignments kept them engaged and helped them develop valuable communication and research skills by holding them accountable for their progression, while providing them with opportunities to give and receive formative feedback. During the interview, Jack explained, “I liked all the little built-in checks and the frequency of checks. I felt like that was beneficial in the final turnout of the product [OER Chapter].” Additionally, Ian described the variety of skills they were able to practice as they navigated through the layered assignments towards their final OER chapter: “in a chapter of this magnitude you have the opportunity to hone research skills and writing, analysis, assessment, what to include, what not to include, how to relate your particular chapter to personal experience.”

In the third course, layered assignments were scaffolded by participatory activities that provided students with opportunities to research and synthesize knowledge in open and social online communities. Activities such as curating resources, engaging in public chats on Twitter, and blogging invited students to contribute their voice and experiences to wider knowledge-building networks that were focused on their topic of inquiry. The following two participant excerpts illustrate how open educational practices enabled their development of research skills by participating in, rather than borrowing or merely observing, the knowledge-building process:

The [third] course was not conducted in isolation. The integration of Twitter and the publicly accessible blogs made the learning open to the world and therefore more authentic. The utilization of the wider #edtechethics community brought the

possibility of engaging with others around the world who have been working on the topics and provided the opportunity to expand the student's Professional Learning Network. (Survey respondent)

It was cool to connect with a bunch of people outside of the class, and I also helped build my connections, my learning network through that, so definitely a huge benefit there. What I really appreciated from the Twitter chat was the data that came after. (Interview with Robyn)

Participatory activities often involved interactions with people outside of the class, which students appreciated as an opportunity to expand their personal learning networks and to benefit from collaborative learning linked with their careers beyond graduate school. According to the survey, many of the participants (92%) agreed that connections to experts outside of the class enhanced their learning in the course. Participants reported they appreciated being able to connect directly with researchers and authors in the broader community through Twitter and blogs. Connections beyond the course made participants feel less isolated in their learning and broadened their ideas of what engagement could look like. Many participants described how the open environment of their course enabled them to engage directly with authors/outside experts in support of their inquiry.

I had my draft chapter in a Google Doc.... And I was blown away that this person [author that was quoted in the chapter] had taken the time to comment on my draft.... That was a cool experience to be able to connect that way. And it just encouraged me to finish it....Very motivating. (Interview with Devon)

Overall, all of the participants agreed that layered assignments and the associated participatory activities engaged them in the research and writing process. In response to the survey, 92% of participants agreed that the participatory activities strengthened their communication skills; and

while the same proportion felt these activities engaged them in the course, 75% asserted that the activities supported their learning. The ongoing opportunities that course activities provided to connect students with experts outside of the classroom in real ways facilitated connection-building and helped learners to realize their research would be relevant to a broader audience, when it was published within the OER. With the open access and connections came added pressure for students who knew their assignment was renewable (that is, publicly accessible and openly licensed). However, overall, their writing experience in the context of open access was viewed by participants as a positive, uniquely authentic learning opportunity within their course-based graduate program.

Condition 2: Ongoing and Constructive Formative Feedback

The layered assignments and accompanying participatory activities gave rise to the second condition which enabled students to develop research-based skills: ongoing and constructive formative feedback. During the first two courses, students engaged in providing and receiving peer feedback on their learning tasks. During the third course within the program, students sought formative feedback from multiple sources (e.g., peer groups, instructors, outside experts found by students, outside experts found by the instructor, alumni) to support their inquiry. Results from the survey found that 92% of participant respondents agreed that feedback from their peers supported their learning, and about 50% felt that feedback from outside experts similarly benefitted their learning.

The following two excerpts of participants' responses illustrate how formative feedback enabled them to develop research-based skills, including gathering and analyzing relevant resources and communicating findings to a specific audience:

The following aspects were key learning highlights for me. Key, timely, and ongoing support from my instructor who always took the time to help me link our theories

discussed in class with relevant coursework/project; working on the chapter and receiving feedback from my instructors. (Survey respondent)

It challenged me to make sure my voice was heard and understood, so I think that helped my communication skills, and being able to share my ideas and make sure they're clearly understood for the audience. (Interview with Sarah)

The use of open education practices meant students were encouraged to connect with and seek feedback from experts on their topic outside of the boundaries of their course community.

Participant responses in the interviews converged around a common appreciation for the opportunities they had to pose questions directly to academics and other professionals, and whose work they were engaging with as they worked on their inquiry:

It kind of forced me to seek feedback from people that I wouldn't normally have done so and that feedback really helped. I was able to connect with some people that I know who share some of my research and educational interests and who have sort of related perspectives.... That helped guide where I went. The external feedback was what helped shape my chapter ultimately. (Interview with Maria)

Right from the get-go of the beginning of my writing to the end, [I] kept her in the loop and would bounce ideas off of her. The engagement was right there.... It felt like it wasn't just me writing this chapter. It was definitely the community approach, and it was the same with another colleague who was part of my feedback loop. (Interview with Robyn)

For the [OER] pressbook, I had reached out to a former faculty member that I know who still researches everything under the sun, and he's always engaged. And I asked his advice where to start.... Then he got me in touch with a gentleman in the States, and I had this 45-minute conversation with somebody from [location redacted].... I think it opened

my eyes too, there's a community of people out there that will help other people learn.

(Interview with Devon)

Balancing the amount of feedback given and received can be challenging for each individual student. While the responses highlighted in this section demonstrate how most participants found value in the multiple sources of formative feedback, some participants indicated they felt overwhelmed by trying to interpret and implement a wide range of feedback. While Robyn noted how their chapter benefitted from extensive formative feedback, they also acknowledged that this review and revision process was overwhelming at times:

My document was littered with all these comments and things to consider. I didn't even know where to start with it, and so my colleague, my outside person, she sat down with me, helped me organize my thoughts, helped organize their comments.

Additionally, Devon indicated that peer feedback was not always useful and focused more on minor grammatical fixes instead of concrete feedback on the content, which would have been more valuable: "I think maybe in the beginning we would have benefited more from [learning] how to do feedback appropriately." Relatedly, a participant in year 2 commented in the survey that "much of the feedback I received attempted to expand my topic as opposed to focus on it. I would have liked to have had feedback like 'you should focus on this' as opposed to 'you should add this.'" Overall, participants found the ongoing and constructive feedback supported them with developing research skills for their inquiry, though their responses are a reminder that not *all* feedback is considered *useful* feedback. Participants reported they tend to prefer content-focused feedback that is narrow enough to not prompt a drastic shift in their inquiry (e.g., recommendations for significant additions once the research has already begun).

Formative feedback on students' inquiry did not end when the course or program did. The OER chapter remained in draft form as it underwent additional rounds of editing from the internal

research team and an external copyeditor. Participants continued to respond to and edit the chapter based on feedback received from these sources, including from a copyeditor before the final publication. Participants' engagement in formative feedback loops beyond the duration of the course reflected how they had a heightened commitment to ensuring that their original inquiry into a topic of interest was synthesized to the highest quality of writing for publication.

Condition 3: Peer Learning

This third condition of OEP that supported students with learning research-based skills was the experience of peer learning. The interview and survey data illuminated how participants reported that working on individual inquiries alongside peers with a shared and collective goal to contribute to an OER fostered a positive learning community. In the survey, 92% of respondents agreed that working with their peers supported their learning and engagement in the course. Given that students were co-producing an open educational resource, with each writer contributing a chapter towards a wider, collective product, this learning process challenged hierarchies and environments of competition that can often arise in graduate school classrooms. Instead of seeing others as competitors, participants reported feeling a sense of solidarity with one another. Sarah explained that “there’s a bit of a teamwork thing. We’re all going to either fail or pass this together.” This sense of solidarity could explain why peer feedback was rated positively by 92% of participants who completed the survey after the program was completed. The following excerpts from participant responses demonstrate how peer learning served as a strong safety net and support system amidst what some felt was a high-stake learning experience. “I really benefited from my in-class feedback group. Not only did they help provide specific feedback, but they were also great motivators” (survey respondent); “two girls who just would randomly message me something that they had found that worked within my chapter, and vice versa. Even though my chapter was my

own, it felt like a community project” (interview with Robyn). Another survey respondent mentioned:

Cohorting and peer feedback strongly supported my learning. I felt being in the same class with the same students developed a positive environment (even in an online class). Peer feedback was very helpful in our studio groups as it helped refine ideas and develop our inquiries better. (Survey respondent)

An element of peer learning that the participants consistently reported they appreciated was the exposure to diverse perspectives, which opened new ideas that informed their research. In addition to sharing resources and ideas, participants appreciated having a peer support system to problem-solve collectively as they worked through challenging assignments and their inquiry. While perspectives were sometimes mixed on whether specific peer feedback was useful, most participants expressed an appreciation for having a smaller cohort that they could connect with during and outside of the course to share challenges, offer advice, and motivate one another to complete their inquiry. As this final condition illustrates, OEP can nurture the links between individual accountability and community responsibility, and create a shared participatory culture that engages peer groups in research-skill development.

Discussion

In the present study, data were gathered about students’ experiences engaging in open educational practices (OEP) as they conducted an inquiry using research-based skills that led to the development of an OER. Participants identified three conditions that supported their learning and development of research skills: layered assignments, formative feedback, and peer learning. Study results provide new insights and understanding that can inform future program design and conditions in which OEP can be used to support graduate students’ development of research-based skills in authentic, meaningful, and engaging ways.

Havemann (2020) discussed opening moves in education and how terms associated with “open” in education are used and interpreted in a range of different ways. Openness in education can be framed as an ecology or repertoire of practices: “Through this frame, a university is an ecology in which digital and analogue, and ‘open’ and ‘closed’ educational practices may well co-exist in interdependent, complementary ways rather than being positioned as opposite to each other” (Havemann, 2020, p. 6). The following discussion illustrates how openness and open educational practice was embedded in the educational approaches identified by students as supportive conditions for conducting an inquiry and developing research skills within a graduate certificate. The three conditions (layered assignments, formative feedback, and peer learning) were part of a broader ecological frame that included other open educational practices within the graduate program.

We draw on attributes of open pedagogy in our discussion of these educational practices, such as using participatory technologies, developing an openness for working with others, encouraging innovation and creativity, openly sharing ideas and resources, participating in a connected community, facilitating learner’s contributions to open resources, engaging in reflective practice, and contributing to peer review and open critique (Hegarty, 2015). We also draw on the six dimensions of the Connected Curriculum Framework (Fung, 2017) for developing facets of research-based skills (Willison & O’Regan, 2007; 2006/2019) in our description of openness in layered assignments, formative feedback, and peer learning (see Table 1): students connect with researchers and with the institution’s research; a through line of research activity is built into each programme; students make connections across subjects and out to the world; students connect academic learning with workplace learning; students learn to produce outputs directed at an audience; and students connect with each other, across phases and with alumni (Fung, 2017).

Layered Assignments

A through line of research activity was built into the learning tasks and course work in this graduate certificate, and for some students (e.g., those who published an OER manuscript) it even extended beyond the duration of the program (Fung, 2017). “The layering conception suggests that research is about uncovering or unearthing that which is hidden” (Fung, 2017, p. 21). The program offered layered assignments that were renewable so students could continue developing ideas as they progressed through each of the courses. Participants in our study discussed how layered assignments provided authentic learning experiences and engagement in embarking on an inquiry (facet 1) and developing research skills. Learner-generated topics of inquiry that connected to their workplace, including K-12 classrooms and schools, supported the authenticity of the assignments (Fung, 2017; Hegarty, 2015). The layered assignments also provided graduate students with accountability as they progressed through the program and continued to find needed information (facet 2), while critically evaluating information (facet 3), organizing information (facet 4), and synthesizing the new knowledge (facet 5). The layered assignments were strengthened through the participatory technologies used during the program (Hegarty, 2015). For example, in the third course, the participants discussed how OEP in digital spaces, such as Twitter and blogging sites, contributed to their inquiry and supported opportunities to communicate knowledge (facet 6) and engage with authors and outside experts. Participants acknowledged their growth in research skill development across all six facets described by Willison and O’Regan (2007; 2006/2019), when discussing layered and renewable assignments in the four graduate courses.

Formative Feedback

Participants valued the ongoing and constructive feedback received from peer groups, instructors, outside experts found by the students, outside expert connections through their instructor and alumni of the program. However, it was the formative feedback provided by their

peers that the majority of participants agreed (92%) best supported their learning. Peer feedback played a significant role which will be elaborated on and discussed in the next section. Formative feedback from many sources can benefit students when engaging in an inquiry and developing research skills. This finding is consistent with the literature that suggests a connected community can be involved in feedback and help with sharing ideas and resources (Hegarty, 2015) and that students can be supported through connections with each other and with alumni (Fung, 2017).

Participants discussed how formative feedback helped with finding needed information (facet 2) as well as analyzing and synthesizing it (facet 5). Participants also discussed how formative feedback did not end at the conclusion of the program and continued as they revised and refined their chapters for inclusion in the OER (Jacobsen et al., 2021). All participants agreed that receiving feedback from others strengthened their communication skills, which aligned with the sixth facet for research skill development to communicate knowledge and understanding, and the processes used to generate them (Willison & O'Regan 2006/2019).

While most participants reported they appreciated having multiple channels through which to receive feedback, some discussed the challenges related to the quantity and quality of formative feedback. Some participants indicated that their experience with receiving and actioning feedback from different sources was overwhelming at times, while others suggested it would have been helpful to explicitly teach peers how to provide constructive, content-centred feedback. The timing and type of feedback as well as the capacity of those delivering feedback, and expectations for using feedback, should be considered in OEP.

Peer Learning

Students worked alongside peers in a cohort through the four courses and the same group of students were enrolled in the four sequential courses. Embarking on inquiries (facet 1) in the company of peers offered students an opportunity to share diverse perspectives, ideas, and

resources (Hegarty, 2015). Participants explained how they received valuable support from their peers, who would often help them with locating relevant research related to their inquiries (facet 2). Through peer feedback — which most participants agreed supported their learning — learners were supported with critically evaluating their research (facet 3) as well as organizing and synthesizing their findings (facets 4 and 5) for dissemination in their final chapter. Overall, the interview and survey data reveal that participants perceived that the opportunities to work alongside peers and receive peer feedback, as they developed their inquiries, supported their learning and enabled them to develop research-based skills.

The emphasis on peer learning reflects attributes of OEP, which include developing an openness for collaborating with others, openly sharing and critiquing ideas, resources, and other scholarship, and participating in connected learning communities (Cronin, 2017; DeRosa & Robinson, 2017; Paskevicius & Irvine, 2019). Graduate students felt motivated to continue developing their research skills knowing that they were in a connected community of peers working towards producing a collective output as an open pressbook (Jacobsen et al., 2021). The emphasis on collaboration with peers meant that graduate students had a strong support network that became particularly valuable as they progressed with their inquiry, which many felt was a challenging experience that pushed them out of their comfort zone. Establishing a positive learning community with their peers helped graduate students develop the confidence to engage in knowledge-building as active participants and “protagonists” of their own learning.

Conclusion

This chapter provides evidence and examples from design-based research and practice on how Open Educational Practice (OEP) can be used to teach research-based skills to graduate students in authentic and engaging ways. The research question guiding this study was: how do open educational practices support the conditions for learning research-based skills? This question was examined using design-based research, a methodology that enables researchers and practitioners to collaborate on iterative design, implementation, and evaluation of solutions to complex problems of practice as a means of uncovering new theoretical insights and design principles for practice. Data from surveys and interviews with graduate students revealed how OEP activated three conditions through which students developed research skills — the design of authentic layered assignments; frequent opportunities for formative feedback; and ongoing, supportive peer learning.

These three conditions for learning were explicitly embedded in the design of the four-course graduate certificate program — Leading and Learning in a Digital Age — to reflect the principles of OEP, which were understood as “collaborative and pedagogical practices that involve the creation, use, and reuse of OER as well as participatory technologies and social networks to interact, learn, create knowledge, and empower learners” (Cronin, 2017, p. 18). Each condition encouraged graduate students to become co-designers of their learning as they developed research skills; this meant having the agency to pursue a topic of personal and professional interest, seek feedback and insights from within and outside the boundaries of their course, and develop an appreciation for the social process of knowledge-building alongside their peers. Graduate students appreciated how the layered and renewable assignments enabled them to develop research-based skills and expertise that were transferable across courses to their culminating inquiry project. The ongoing opportunities to seek formative feedback from a wide community of sources — including

outside experts, academics, instructors, and peers — were seen as valuable to students, and in some cases led students to connect directly with the authors of research they were engaging with for their inquiry project. Finally, graduate students reflected how peers supported their learning and engagement through sharing ideas and resources and supporting one another with challenges that arose as they completed their inquiry project.

Overall, OEP emphasizes authentic learning tasks which highlight disciplinary expertise where learners, seeing themselves in the discipline or the professional community of practice, can make personally relevant connections to their learning. Students are encouraged to transition from an observer of learning to an active participant in the learning process as a “protagonist,” and this transition helps foster confidence and lifelong learning. This study is particularly significant to scholarship in teacher education given the current educational landscape in which there is a growing demand for innovative approaches to open and online learning. The results can inform faculties of education and instructors in pre-service, in-service, and graduate education on open education practices and principles. They can also demonstrate how to design and enable high-quality, open and online learning experiences and create the conditions for student teachers, practicing teachers, and school leaders, who are graduate students, to develop research-based skills in ways that are personally and professionally authentic and meaningful. Additionally, this study contributes to the growing field of OEP and research-based skill development in online professional graduate programs.

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Section 4:

Conceptualizing Learner Centered Models in Higher Education

Chapter 19

Preamble - Conceptualizing a Learner-Centred Model for Designing Digital Instruction

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Abstract

The six of us contributed to a new dynamic, learner-centred model for designing digital instruction (see Figure 1). This proposed model is based on a fusion of Design Thinking (Hennessey & Mueller, 2020) and Technological Pedagogical Content Knowledge (Koehler & Mishra, 2005) frameworks and is centred on *the learner* as the key focus of Digital fluency, Pedagogical considerations, and Interdisciplinary content hence the acronym (DPI). These aspects of teaching and instructional design are within a dynamic context of design thinking with outcomes in constant flux. The model was first conceived in a collaborative meeting of researchers at the Canadian Association for Teacher Education (CATE) Working Conference, which was held virtually on 14–16 October 2021 and hosted by the CATE executive team, with support from the University of Calgary and Mount Royal University.

Résumé

Les auteurs ci-dessus contribuent à un nouveau modèle dynamique centré sur l'apprenant pour la conception de l'enseignement numérique (voir la figure 1). Reposant sur une fusion des cadres théoriques *Design Thinking* (Hennessey & Mueller, 2020) et *Technological Pedagogical Content Knowledge* (Koehler & Mishra, 2005), le modèle qu'ils proposent est centré sur l'apprenant comme point central de la fluidité numérique, des considérations pédagogiques et de l'interdisciplinarité (ou *Digital fluency, Pedagogical considerations, and Interdisciplinary*, d'où l'acronyme DPI). Ces aspects de l'enseignement et de la conception pédagogique s'inscrivent dans un contexte dynamique de pensée conceptuelle dont les résultats sont en constante évolution. Le modèle a été initialement conçu lors d'une réunion collaborative de chercheurs au cours de la réunion de travail de l'Association canadienne pour la formation des enseignants (CATE) tenue virtuellement du 14 au 16 octobre 2021 et organisée par l'équipe de direction de la CATE, grâce au soutien de la University of Calgary et Mount Royal University.

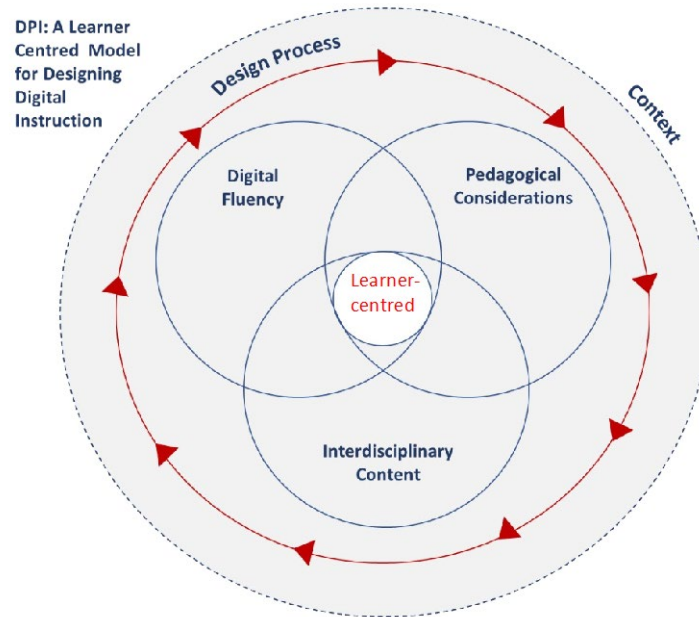
Preamble - Conceptualizing a Learner-Centred Model for Designing Digital Instruction

The final section of this book is a collection of four chapters (Khirwadkar et al.; Macleod, et al.; Manners; Mueller and Yennemadi) that address the development, design, and re-design of courses, learning modules, or resources in learner-centred contexts that spanned both online and blended models of delivery. The authors in this group conducted much of this research and development during the sudden emergency move of K-12 and postsecondary education systems, in the context of the COVID-19 pandemic, to predominantly remote, online learning. Remote learning was translated as online learning in most jurisdictions, while other delivery methods of remote learning included telephone calls or radio programs. Still, other provinces and institutions continued with face-to-face class instruction with additional or optional online delivery portions. Online learning was realized as synchronous, asynchronous, or a blended approach. The principles of course and resource development that were utilized may, in some cases, have been initially intended for face-to-face instruction and re-designed for online, while other development strategies were consistently applied to online resources and/or course design.

The model presented in Figure 1 emerged during the conference's working sessions, when the contributing authors of this section met to discuss their respective chapters. As a result of these discussions, common themes were identified as fundamental to each of the working chapters. A deeper analysis of the research in each chapter resulted in the blending of two established models, Technological Pedagogical Content Knowledge (TPACK) (Herring, Mishra & Koehler, 2016) and Design Thinking (DT) (Hennessey & Mueller, 2020). This integrated union recognizes that the TPACK model and DT together serve to address the complexity of course or program redesign and resource redevelopment in the constantly changing context of the pandemic and designing online instruction.

Figure 1

Digital Fluency, Pedagogical Considerations, and Interdisciplinary Content (DPI): A Dynamic Learner-Centred Model for Designing Digital Instruction



The model in Figure 1: Digital Fluency, Pedagogical Considerations, and Interdisciplinary Content (DPI): A Dynamic Learner Centred Model for Designing Digital Instruction infuses DT and TPACK, capturing the dynamic nature of teaching and learning in a changing *learner context* across all venues. However, in response to the pandemic, this model was envisioned and conceived through our collaborations as it connects to both enhancing online teaching and learning pedagogy and our quest to pivot the literature placing our students, the learners, at the centre. Moving from the centre of the Venn diagram to the outer perimeter are three areas of consideration: Digital fluency, Pedagogical considerations, and Interdisciplinary content. These are three areas which an instructor must consider as they plan with the learner in mind. The learner

will experience each of these areas of design and development as the lesson or course unfolds. All contained within the context of the teaching and learning situation, these aspects adhere to the design process as it is described below.

The content of courses or programs has not necessarily changed in response to the pandemic and remote learning; however, the pedagogy may have adjusted to meet fully online delivery or partially online delivery with an increasing menu of digital technology options. Koehler and Mishra's (2005) Technological Pedagogical Content Knowledge (TPACK) model suggests that all three of these domains of knowledge are essential to the successful development and implementation of teaching and learning. Nevertheless, remote learning and flexibility required of the past two years in a global pandemic have continued to integrate domains of knowledge as they were in the past — the content, pedagogy, and technology — but the reality of teaching and learning across a pandemic has created an acute awareness that the learner is at the heart of all course designs.

Therefore, it is only reasonable to consider that the design-thinking process takes a learner-centred view to the development of courses and learning activities, focusing on the learner's needs and the changing impacts of the learning context. A design-thinking approach to instructional design is responsive to changes in context and empathizes with the needs of the learner; these two considerations have been crucial in the ever-changing learning landscapes of the pandemic. Moreover, a design-thinking approach demands dialogue and reflection between instructors and learners to create dynamic learning environments that embrace flexibility and ambiguity (Paniagua & Istance, 2018). Over the past two years, we as educators and course designers have found that the design or re-design of courses and learning materials needs to include choice and flexibility for learners in the constantly — and rapidly — changing learning contexts. Beyond the knowledge required to implement course content and appropriate pedagogy using relevant technology, we as

educators and teachers in the field were forced to amplify the innovative, creative aspects of instructional design, putting the learner at the centre. Rather than a static focus on the outcome in a backward planning approach (Bowen, 2017), implementing a cyclical system of Design Thinking (DT) ensured that there was empathy with the learner, a clear identification of the “problem” or learning outcome, ideation, or innovation of possible solutions, prototyping or creating the syllabus or resource, and testing of the result or implementation of the course or resource (Hennessey & Mueller, 2020). The decisions related to learning and the learner, as we discussed, are constantly “in flux” and the design must be responsive to both the learner’s needs and the course outcomes, thereby yielding a new learner-centred model for designing digital instruction (Figure 1).

The following four chapters allude to and discuss the integrated model, and how the specific research connects to aspects of the knowledge foundation and design process in our own unique situations, as we, as researchers and educators, navigated the implementation and the follow-through of digital instruction via a learner-centred approach during the beginning of the COVID-19 pandemic.

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Chapter 20

Virtual Makerspaces: Effective Learning Environments for Developing Preservice Teachers' TPACK for Teaching Elementary Mathematics

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Abstract

Designing learning environments for students immersed in a digital society is becoming increasingly important where the preservice teachers need to be prepared to create meaningful digital learning experiences. Mathematics teacher educators are successfully using makerspaces as learning environments to provide avenues of play, experimentation, and interdisciplinary connections while expanding preservice teachers' understandings about the omnipresence of mathematics in daily living. However, the COVID-19 pandemic brought with it the need for all teachers to adjust instructional delivery. This chapter describes findings of a study of 182 preservice teachers (PSTs) participating in a virtual makerspace included in the fall of 2020 mathematics methods course. Using a qualitative approach, our study rests on data sources which included video recordings, pictures of artifacts, written reflections considering the guiding questions, and exit questionnaires collected during virtual makerspace activities. Follow-up interviews with consenting PSTs were completed after their first practice teaching block. Four themes emerged from the data analysis: (a) There was considerable growth in PSTs' understanding of Technological Pedagogical Content Knowledge (TPACK) via makerspace experiences; (b) PSTs were able to make a variety of mathematics curriculum connections across grades/strands with the making activities; (c) PSTs showed significant awareness about computational thinking skills while coding and working at other stations such as origami and beading; and (d) Mathematics learning could be tied to the virtual makerspace activities in both synchronous or asynchronous environments. Virtual makerspaces were perceived as positive learning experiences by participants in preparing them to promote computational thinking and mathematical curriculum connections within technologically-rich learning environments.

Résumé

La conception d'environnements d'apprentissage pour les étudiants immergés dans une société numérique prend de plus en plus d'importance, dans la mesure où les futurs enseignants doivent se préparer à concevoir des expériences d'apprentissage numérique enrichissantes. Les formateurs d'enseignants en mathématiques utilisent avec succès les makerspaces comme environnements d'apprentissage pour offrir des possibilités de jeu, d'expérimentation et de connexions interdisciplinaires tout en incitant les enseignants en formation à s'ouvrir davantage à l'omniprésence des mathématiques dans la vie quotidienne. Or, la pandémie de la COVID-19 a contraint l'ensemble des enseignants à ajuster leur prestation pédagogique. Ce chapitre révèle les résultats d'une étude menée auprès de 182 enseignants en formation initiale (PST) qui ont participé à un espace de création virtuel contenu dans un cours de méthodes mathématiques à l'automne 2020. Adoptant une approche qualitative, notre étude repose sur des données tirées des enregistrements vidéo, des images d'artéfacts, des réflexions écrites en réponse aux questions directrices et des questionnaires de sortie recueillis au cour des activités d'espace de création virtuel. Des entretiens de suivi avec des PST consentants ont été réalisés au terme de leur premier bloc d'enseignement pratique. Quatre observations convergentes se dégagent de l'analyse des données : (a) on note une croissance considérable dans la compréhension des PST pour le

Technological Pedagogical Content Knowledge (TPACK) grâce aux expériences de l'espace de création; (b) les PST ont pu établir une série de liens existants à travers les années et les niveaux scolaires entre le programme de mathématiques et les activités de création; (c) les PST se sont sensiblement ouverts aux compétences de la pensée informatique relative au codage et au travail effectué dans d'autres stations, telles que l'origami et le perlage; et (d) l'apprentissage des mathématiques pourrait bien être lié aux activités de l'espace de création virtuel dans des environnements synchrones ou asynchrones. Les participants évaluent favorablement les espaces de création virtuels comme modes d'apprentissage susceptibles de promouvoir la pensée computationnelle et les connexions entre les programmes d'études mathématiques et les environnements d'apprentissage technologique de pointe.

Virtual Makerspaces: Effective Learning Environments for Developing Preservice Teachers' TPACK for Teaching Elementary Mathematics

The greatest challenge for mathematics teacher educators has traditionally been making mathematics relevant to elementary preservice teachers (PSTs), so that they could recognize the omnipresence of mathematics in daily living. Currently, mathematics teacher educators often foster relevance through assignments and learning activities that help PSTs envision their own role as mathematics educators. For example, at our university, mathematics teacher educators engage novice teachers in designing meaningful mathematics-based learning experiences for their own students. Other activities that create relevance introduce PSTs to new, technologically enhanced learning environments, collaborative learning activities, and practice-based assessments in order to make mathematical connections to daily life. The act of modelling/demonstrating of promising practices/pedagogies for teaching mathematics in the K-12 environment is often a large part of these methods courses. One such promising practice — makerspaces — has been included in our elementary math methods course since 2018 for the purpose of supporting the development of future-ready skills and knowledge about teaching mathematics with technology (Blackley et. al., 2017; Figg et al., 2018). Figg and Khirwadkar (2019) explained how makerspaces supported the development of Technological Pedagogical Content Knowledge, or TPACK (Mishra & Koehler, 2006), by providing PSTs with opportunities to:

- explore multiple digital technologies,
- observe how this technologically enhanced learning environment could be structured to promote informal learning,
- participate in discussions about how makerspace activities map to the curriculum, and
- engage in the process of critical thinking and problem solving (Friederichs, 2016; Komanski & Black, 2016; Shively, 2017).

Specifically, Figg and Khirwadkar (2019) found that mathematics-based makerspaces effectively promoted holistic mindsets about teaching mathematics in three areas: (a) PSTs demonstrated computational thinking throughout participation in the makerspace activities and described their thinking in computational terms; (b) PSTs developed confidence with, and knowledge about, how to teach effectively with technology tools to promote mathematics understandings; and (c) PSTs connected curriculum learning goals with makerspace activities, thereby identifying the value of makerspaces as alternative learning environments for mathematics teaching.

However, a new challenge arose when all instruction moved online due to the pandemic. How could the promising practice of making and makerspaces be re-envisioned for meaningful learning in virtual spaces? The purpose of this chapter is to describe the re-envisioning of physical makerspaces and the act of making within virtual learning environments, as well as the effectiveness of such virtual learning for developing TPACK.

Makerspaces and PSTs

A makerspace is “a creative and uniquely adaptable learning environment with tools and materials, which can be physical and/or virtual, where students have an opportunity to explore, design, play, tinker, collaborate, inquire, experiment, solve problems and invent” (Meyer et al., 2018, para. 15). With the potential to expose PSTs to the creative side of mathematics for play, experimentation, and interdisciplinary connections, makerspaces encourage student acts of knowledge generation rather than mere consumption (Iwata et al., 2020). Developing the making mindset through participating in makerspaces fosters creativity and innovation, risk-taking, and problem-solving by providing a safe environment to explore ideas and inviting the learner to think in different ways with a “can-do attitude” (Dougherty, 2013, p. 9). With increased interest in makerspaces as unique environments that promote critical and creative thinking skills in K-12

students (Halverson & Sheridan, 2014), these environments also provide students in higher education with opportunities to engage in risk-taking, encouraging a *try it* mindset (Komanski & Black, 2016). According to Hughes et al. (2022), makerspaces and the act of making is an effective way to explore how both digital and non-digital resources and tools can be utilized to prompt critical thinking and problem solving, thus stimulating a maker identity in participants. Maker identities emerge from experiences with makerspaces and acts of making, especially understandings that support mathematical knowledge such as inquiry-based learning, problem solving, perseverance through failure, and sharing the process and product of making — all of which enable educators to integrate maker values and practices into their teaching. Therefore, the learning environment of a makerspace encapsulates not just a learning “space,” but bolsters both technological and pedagogical knowledge about the tools that can be utilized within that learning space. PSTs build knowledge about structuring learning environments for integrating effective pedagogies within the space and making activities that enhance the development of mathematical knowledge (Figg & Khirwadkar, 2019).

However there remains a dearth of research about how makerspaces and making are related to the development of knowledge about teaching with technology (TPACK), self-efficacy for teaching with technology, and developing teacher beliefs about how to teach with technology in a variety of content areas, including mathematics (Cohen, 2017). The pandemic brought additional challenges in understanding how makerspaces could support PSTs knowledge development about teaching with learning environments such as makerspaces, mostly because makerspaces were conducted through face-to-face, physical learning environments that included a variety of material and digital tools. How would working in virtual makerspaces build TPACK, especially pedagogical content knowledge within virtual and fully digital makerspaces?

Makerspaces and TPACK

According to Mishra and Kohler (2006), TPACK is developed through a series of learning opportunities that provide teachers with experience in building three types of knowledge and skills, specifically associated with the knowledge intersections as shown in Figure 1, where technological knowledge (TK) overlaps with pedagogical content knowledge (PCK), content knowledge (CK), and pedagogical knowledge (PK) — namely TPCK, TCK, and TPK (Harris, Mishra, & Koehler, 2009; Neiss, 2005). In teaching practice, these knowledge intersections are observed as:

- TCK (Technological Content Knowledge), or knowledge about content-appropriate technologies, which includes teachers' personal attitudes, skills, and comfort level with these technologies;
- TPCK (Technological Pedagogical Content Knowledge), or knowledge about how teachers think about representing content using technology in instructional practice; and
- TPK (Technological Pedagogical Knowledge), or knowledge of practical teaching competencies (i.e., classroom management, differentiated support, and assessment) (Figg & Jaipal, 2009; Figg & Jaipal, 2012; Jaipal & Figg, 2010).

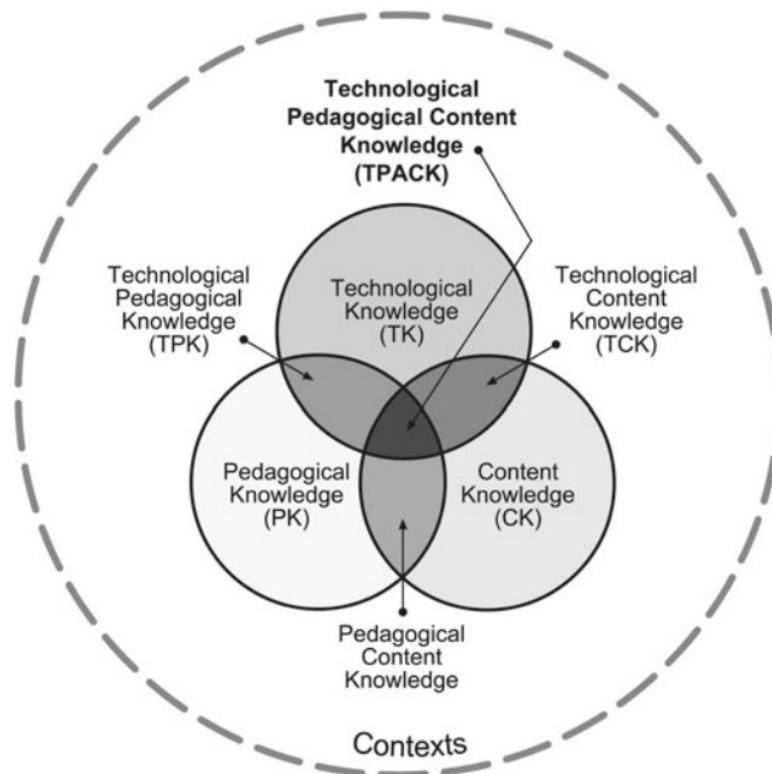
The instructional design of experiences for PSTs that provides these types of knowledge building opportunities enhances the TPACK of PSTs and contributes to their ability to incorporate tech-enabled teaching within their own instructional practices.

Makerspaces, in general, can support the development of TPACK by providing teachers with opportunities to become familiar with technologies and develop essential technical skills essential for integration into instructional environments (which builds Technological Pedagogical Content Knowledge, or TPCK); they also promote pedagogical understandings through engagement in learning environments that demonstrate how to structure informal learning

environments (which enhances Technological Pedagogical Knowledge, or TPK). Finally, makerspace explorations provide participants with opportunities to discuss and make connections to the curriculum through different types of makerspace activities (enhancing Technological Content Knowledge, or TCK).

Figure 1

The Technological Pedagogical and Content Knowledge TPACK Framework



Note. The image is from <http://tpack.org>.

Specifically engaging PSTs in *math* makerspaces can provide opportunities for PSTs to develop computational literacies. These include problem-solving, critical thinking, using tools for critical action, and recognizing different cultural value and diversity of practices while making connections to the elementary mathematics curriculum — thus promoting real-world and daily life applications of the abstract conceptual understandings of mathematics (Friederichs, 2016; Komanski & Black, 2016; Shively, 2017; Kafai & Proctor, 2022). Math makerspaces naturally

provide a space in which participants can engage in a process that requires them to apply their thinking to modeling in real life contexts, through the exploration of a variety of activities available within the makerspace, including 3D construction, origami, beading, and coding (such as *Code Your Family*, *Unplugged Coding*, and *Scratch Coding* activities). All of these activities promote learning and understanding of mathematical concepts (Figg & Khirwadkar, 2019). Burke et al. (2016) suggest that the intersection of making, coding, and math applied to real world projects results in the emergence of computational participation, which “extends this thinking beyond the individual to integrate social networks and digital tools in a networked society” (Burke et al., 2016, p. 371).

Virtual Makerspaces in Elementary Mathematics Methods Courses

In the fall of 2020, due to COVID-19, all course instruction was shifted online, and therefore the math makerspace design team had to re-envision the makerspace experience to ensure that it remained a valuable and meaningful learning experience of the elementary mathematics methods course. The literature on makerspaces and online learning revealed important considerations for the redesign. First, virtual makerspaces could include synchronous and/or asynchronous making activities (Lock et al., 2020). As well, the making in an online environment could involve virtual tools (i.e., internet-driven or virtual-reality) to create, build, and invent (Loertscher, 2015). As well, virtual making — the act of making simultaneously in the virtual environment — was shown to support makers as they work collaboratively at a distance by giving and receiving feedback (e.g., feedback related to the direction of the project, asking questions, or simply sharing work) (Oliver et al., 2017).

Once the design phase of the proposed research had determined the structure of the virtual makerspace and prepared the virtual makerspace learning environments for instruction, questions arose about how this type of virtual learning environment could effectively promote TPK, TK, and

TPCK within the mathematics teaching context. The guiding research questions to be explored during the project implementation became:

1. What did preservice teachers learn about teaching with technology (TPACK) from exploring in a *virtual* math makerspace?
2. How did *virtual* makerspace exploration contribute to the development of computational mathematical thinking skills in preservice teachers?
3. What curricular connections did preservice teachers make for learning mathematics through *virtual* makerspace activities?

Purpose of Study

The purpose of this chapter is to describe how exposure to a structured use of virtual makerspaces builds teacher knowledge leading to the use of makerspaces within the mathematical teaching practices of these PSTs, as well as enhances their knowledge about teaching with technologies (or TPACK) and computational thinking. It is important for PSTs to know not only the different tools for computing and programming, but also how to communicate and interact with others in ways that build relationships (Kafai, 2016).

This chapter further explores what PSTs learned from experiences in *virtual math-making* makerspaces, specifically as to: (a) gain pedagogical knowledge about how to teach with makerspaces as a way to enhance PSTs' knowledge about teaching with technology; (b) make mathematical connections which can be shaped through experiential learning; and (c) acquire insights about how working in *virtual* makerspaces contributes to the development of computational thinking and informs PSTs' thinking about the making experience.

Methods

The virtual mathematics makerspaces explored in this study were organized due to COVID-19 restrictions and were possibly, for most of the PST participants, the first experiences

with makerspaces and online making. These ideas are rooted in social constructivism of experiential learning, such as described by Dewey (1938), Piaget (1963), and Vygotsky (1981) while drawing from the TPACK framework for enhancing PSTs' teaching beliefs about how to teach with technology (Donnelly et al., 2011; Ertmer et al., 2014). To honour this theoretical underpinning, we designed a qualitative study that collected participants' perceptions through a variety of sources, including videotaped conversations, digital images, journal reflection statements, questionnaire statements, and interviews, as these ensured that participants' voices were considered central components of the study findings (Lincoln & Guba, 1985). Themes emerged from a constant comparative textual analysis (Creswell & Creswell, 2018).

Participants

Participants were selected using a purposive sampling technique, where the recruitment criteria would be to draw study participants from students enrolled in the fall of 2020 elementary mathematics methods courses, both Primary/Junior and Junior/Intermediate divisions. From the 350 PSTs meeting this criteria, 182 PSTs agreed to participate in the study. Participants were also asked to share their work from participation in the virtual makerspaces, including artifacts, images, videos, and any comments or reflection journals. Of the 105 PSTs who consented to share their work, 68 PSTs were primary junior division and 37 were junior intermediate division.

Data Collection and Analysis

Using a mixed-method approach, we collected qualitative data from a variety of sources while the PSTs were working on their maker activities. Data sources included a final "exit ticket" questionnaire consisting of 10 questions, video recordings of synchronous making activities, individual notes and pictures of participants' asynchronous making, individual participant interviews, and the researchers' reflective journals. After data collection, the process of transcribing and coding of data was conducted to look for emerging patterns and themes related to

the research questions, as well as any common patterns that surfaced from the analysis (Creswell & Creswell, 2018). Within this study, three types of data were considered: multiple-choice frequency data, textual, and artifact/image/visual data.

Thus, data analysis began with the exit questionnaire, which had a mix of open-ended and multiple-choice types. The data obtained from the two multiple choice questions on the exit questionnaire were analysed for frequencies. Textual data, such as the responses from the open-ended questions on the exit questionnaire, were coded along with other textual data (i.e., interview transcriptions, transcriptions of the videos of making sessions, and the researchers' reflection journals). All were analysed using an emergent coding process for constant comparative analysis of content (Glaser & Strauss, 1967). The emergent coding process began with unitizing the data, or segmenting the text into codable units, which Reed et al. (2018) explain "represen[t] the smallest data component that is analyzed within interactions" (p. 208). Erlandson et al. (1994) further explain that this process is "defined as disaggregating data into the smallest pieces of information that may stand alone as independent thoughts" (p. 117). These unitized data were then categorized into common patterns, or similar ideas, from which common themes were then identified (Erlandson et al., 1994). The artifacts, images, and other items shared by the participants were analysed using a visual analysis process that Saldana and Omasta (2021) describe as the act in which researchers make "special note of items that seem to suggest particular meaning to either the researchers or the participants" (p. 74). These meanings were also categorized using emergent coding.

Erlandson et al. (1994) and Creswell and Creswell (2018) describe specific techniques employed in research to ensure trustworthiness of the data collection and analysis processes, and we used the following: (a) triangulation, or the collection of data from multiple and diverse data sources; (b) purposive sampling of participants ensuring diversity and richness of the perspectives

collected; and (c) the use of emergent coding of data to identify common themes from the multiple PST voices participating in the study.

Procedure

The procedure used in the virtual makerspaces experience mirrored the original, physical mathematics makerspace stations studied previously (Khirwadkar & Figg, 2019). The virtual makerspaces took place in the final two weeks of the elementary mathematics course.

Week 11 Procedure

In Week 11, participants worked asynchronously (see activities at <https://docs.google.com/presentation/d/1X-joj8nNKX39IRuWSNBWPjKH3VPp3pywbp57-TOhZeg/present> or see Figure 2 for the slide presented to the participants containing the checklist steps required for completing the makerspace activities for Week 11).

Figure 2

Week 11 Makerspace Activities Checklist

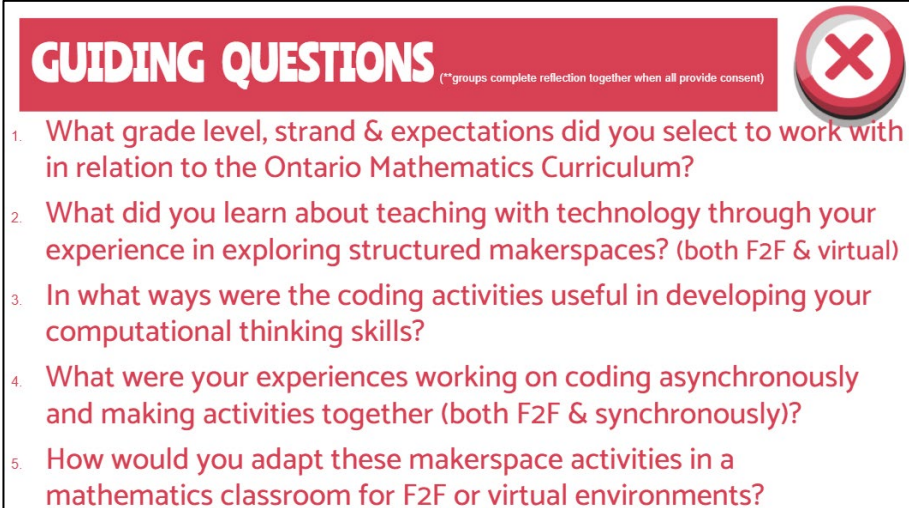
ASYNCHRONOUS - WEEK 11		
	WEEK 11 - ASYNCHRONOUS (INDIVIDUAL)	
CHOOSE 1	CODE YOUR FAMILY	SCRATCH CODING
ACTIVITY	COMPLETED INDIVIDUALLY DURING WEEK 11	
LIVE MEETING	N/A COMPLETE ACTIVITY INDIVIDUALLY	
PRE-ACTIVITY PLANNING	COLLECT MATERIALS REQUIRED TO COMPLETE ACTIVITY INDIVIDUALLY DURING THIS WEEK	
DURING ACTIVITY	SPEND 20-30 MINUTES EXPLORING THE ACTIVITY TAKE NOTES, PICTURES AND VIDEOS - <i>Use Guiding Questions to structure your notes and reflections</i>	
POST ACTIVITY	POST REFLECTION, RELATED PICTURES AND VIDEOS FROM YOUR ACTIVITY EXPERIENCE IN TEAMS UNDER THE APPROPRIATE FILES (EITHER CODE YOUR FAMILY or SCRATCH CODING)	

In Week 11 students worked on their own asynchronously for a coding activity. They had an option to choose from: (a) *Code Your Family*, or (b) *Scratch Coding*. For the *Code Your Family* coding activity, PSTs engaged in unplugged coding where they selected topics such as moving

their family members from one place to another place, going for a walk around the block, or going to the shopping mall while considering sequencing, selection, and loop. They tried out the code and debugged their program where necessary. They took pictures, made curriculum connections, and wrote reflective notes to share with their makerspace group about the process and any curriculum connections they made through their making. PSTs were asked to keep journal entries about their experiences and answer guided reflection questions during their explorations with virtual makerspaces (see Figure 3).

Figure 3

The Guiding Questions from the Mathematics Virtual Makerspace



GUIDING QUESTIONS (**groups complete reflection together when all provide consent)

1. What grade level, strand & expectations did you select to work with in relation to the Ontario Mathematics Curriculum?
2. What did you learn about teaching with technology through your experience in exploring structured makerspaces? (both F2F & virtual)
3. In what ways were the coding activities useful in developing your computational thinking skills?
4. What were your experiences working on coding asynchronously and making activities together (both F2F & synchronously)?
5. How would you adapt these makerspace activities in a mathematics classroom for F2F or virtual environments?

These questions helped PSTs explaining what they had experienced in the asynchronous learning environment, as well as what they had learned about teaching with technology, thereby connecting their learning activities to computational thinking, curriculum, and their possible use of a coding makerspace in their own teaching practices.

Week 12 Procedure

In Week 12, PSTs worked in a group of three and met synchronously using a videoconferencing tool (using the MS Teams platform). PSTs selected one of the station activities

(Beading, Origami, and 3D Construction) to explore with their group synchronously. For this workshop, PSTs collected their own materials to complete the making activity. They video-recorded their making session and discussed curriculum connections and any pedagogical connections about how they would use makerspaces in their own teaching practice. The PSTs were once again asked to use the guided reflection questions to focus their thinking about their experiences in these synchronous learning stations. See Figure 4 for the list of makerspace activities completed in Week 12.

Figure 4

Week 12 Makerspace Activities Checklist

SYNCHRONOUS - WEEK 12	
	WEEK 12 - SYNCHRONOUS (GROUP OF 3)
CHOOSE 1	BEADING ORIGAMI 3D CONSTRUCTION
ACTIVITY	COMPLETED COLLABORATIVELY WITH GROUP OF 3 DURING SESSION 12
LIVE MEETING	YES - COMPLETE LIVE ACTIVITY COLLABORATIVELY WITH YOUR GROUP ON TEAMS AND RECORD YOUR SESSION
PRE-ACTIVITY PLANNING	SELECT ACTIVITY CHOICE WITH GROUP DURING WEEK 11, COLLECT MATERIALS REQUIRED FOR WEEK 12
DURING ACTIVITY	FIND YOUR GROUP'S CHANNEL THEN RECORD WHILE WORKING COLLABORATIVELY FOR 20-30 MINUTES WITH YOUR GROUP OF 3 IN YOUR ASSIGNED MS TEAMS ROOM. DISTRIBUTE WORK AMONG 3 MEMBERS: RECORD ACTIVITY AND TAKE PICTURES, MAKE MATH CURRICULUM CONNECTIONS, DISCUSS AND REFLECT ON GUIDING QUESTIONS PROVIDED - <i>Use Guiding Questions to structure your notes and reflections</i>
POST ACTIVITY	POST REFLECTION, RELATED PICTURES AND VIDEOS FROM YOUR COLLABORATIVE GROUP ACTIVITY EXPERIENCE IN TEAMS UNDER THE APPROPRIATE GROUP FOLDER IN THE SYNCHRONOUS ACTIVITY
QUESTIONNAIRE	

After Week 12 Procedure

At the end of the Week 12 exploration, individual participants completed a final “exit ticket” questionnaire which asked for specific examples related to the research questions. The exit questionnaire also recruited participants for follow-up interviews. Those who consented were interviewed, once they completed their teaching block, to discuss their experiences in the virtual

makerspaces, to relate to their own practice teaching experiences, and to further elaborate on the “exit ticket” questions.

Findings

This study focused on the perceptions of PSTs in an elementary mathematics methods course as to what they learned about teaching with technology and mathematics within a virtual makerspace learning environment. Three types of data were collected and analysed: (a) two informational multiple-choice questions on the “exit ticket” questionnaire; (b) textual data from the short answer questions on the “exit ticket” questionnaire (i.e., transcriptions of in-depth, individual interviews, transcriptions of making conversations videotaped during making experiences, and reflective journal entries from researchers’ notes); and (c) visual analysis of artifacts, documents, images, and other materials shared by participants.

The overall analysis provided rich descriptions of what was learned through participants’ experiences in the virtual makerspaces with math-making activities. Further analysis across participants’ experiences found four common experiences described in the themes below.

Theme #1: There Was Considerable Growth in PSTs’ Understanding of TPACK via Makerspace Learning Experiences

By experiencing the virtual math making in both synchronous and asynchronous makerspace environments, the PSTs were able to develop stronger technological and pedagogical content knowledge, especially growth in TPK and TK knowledges, while applying it across the mathematics curriculum. Comments from participants show PSTs’ thoughtful deliberation and judicious selection of technological tools for teaching specific mathematics content, thus illustrating enhanced TPCK knowledge. For example, one participant explained, “we learned that you can make any activity virtual with the proper tools and strategies put in place.” Another explained, “I learned about extended opportunities for students to learn through the virtual

makerspace experience. It is possible to integrate entertaining and creative activities as resources in a virtual environment, with proper direction and structure.” Connections between content, pedagogy, and technology were also evident. One participant stated “teaching with technology is very useful. This allows all different types of learners to have the opportunity to engage. There are so many different resources available online that can help educators in the classroom.”

One of the PSTs shared that technology offers a lot of options and can be more engaging; however, it is more frustrating when things do not go as planned. This finding resonates with Lukas et al. (2019) who share the importance of technical media competence and subject-specific media competence for prospective teachers. Lock et al. (2020) explain that developing this knowledge can be complex and requires confidence in selecting tools that support meaningful and purposeful learning from math making.

Other participants explained that matching the content with technology was not the only design consideration when selecting the technology: it was also necessary to consider the pedagogical aspects of the technology, including feasibility and how to run the activity in the classroom. Their comments are examples of application of their TPK in action. For example, one participant explained, “you need to be very organized with your supplies ready before starting the activity. [It is important] to be prepared and have backup ideas.” Another stated:

I learned that when using virtual teaching, it is super important to provide lots of resources for students. With the resource we had (the step-by-step visual instruction), we couldn’t figure out how to make the fish. If students are provided ways to find other information, such as links or ideas, it would help, as we found a video with words so we could see it, watch it and hear it!

An added benefit that we observed and saw reflected in the “exit ticket” questionnaire responses was an inclination for PSTs to express more confidence in their ability to recreate

similar maker activities in their own mathematics classrooms, both in-person and virtually, with technology integration. One PST explained it this way:

As I am not very technologically inclined, this activity has helped me develop the way I would normally think or attempt to complete an activity. Having so many resources provided to us on the internet has forced me to think in a more 21st century way. This activity was quite easy once you got the hang of it and could be a great resource to use within the classroom to incorporate technology in a fun engaging way.

Another made this comment:

Prior to starting the activity, when I heard the word “coding” I started to get nervous because I have no idea how to code. Once we got started and I knew what I was doing [...] was straight forward. It was fun seeing how everyone in the class was having fun displaying their names in a creative way.

These examples provide specific evidence of how PSTs are gaining TPK and TK knowledge, while applying it across the mathematics curriculum.

Theme #2: PSTs Were Able to Make a Variety of Mathematics Curriculum Connections Across Grades and Strands with the Making Activities

Figg and Khirwadkar (2019) identified the value of makerspaces as alternative learning environments for the teaching of mathematics in a face-to-face environment (enhancing the TCK of TPACK). TCK is the knowledge that enables PSTs to connect appropriate technologically enhanced instruction with the curriculum content area. Therefore, the participants in the virtual makerspaces were able and eager to share the connections they made with the mathematics curriculum in their grade of choice. For example, the Origami station activity was one of the most preferred activities (probably due to the availability of the material required to complete the activity within the home environments of the participants). Different participants who engaged in

the Origami makerspace activity made different curriculum connections to mathematics strands, including Numbers, Geometry/Spatial Sense, and Measurement. PSTs also made connections to Strand A: Social-Emotional Learning and Mathematical Processes, showing their deeper understanding of mathematical processes and related skills. (More examples in which participants made specific curriculum connections with makerspace activities are included in the Appendix).

These findings are similar to the observations made by Hynes and Hynes (2018) who suggested that makerspaces can be collaborative, cross-curricular environments promoting problem-solving and design thinking skills. Taylor (2016) also explained that makerspace activities are not limited to subject studies, but could additionally provide scope for cultivating this connection of mathematics with everyday life activities and, thereby, help all students develop a positive learning experience while being supportive for those with math anxiety.

Theme #3: PSTs Showed Significant Awareness About Computational Thinking Skills While Working on Coding, and Additionally While Working at Other Stations Such as Origami and Beading

Developing computational thinking skills is important for understanding the applications of future technologies in the world of education. McNicholl (2019) describes basic computational skills as decomposition, pattern recognition, abstraction, and thinking in terms of algorithms. All of these identified skills are crucial in connecting mathematics with computational thinking. And, although makerspaces encourage playful thinking, the learning environment provides a structure in which basic computational skills used in the making activities could later be transferred to more complex coding tasks. For example, PSTs shared how completing the coding tasks of *Code Your Family* and *Scratch Coding* enabled them to develop their computational mathematical skills. One participant stated, “this activity also promotes algorithms as you are creating a set of rules that

have to be followed by the computer to complete the code. Both my experiences working in person as well as asynchronously went well.” Another suggested:

Coding is a good way to develop computational thinking skills because there is a lot of room for creation which is a good way for students to explore their thinking and understanding. Because of the different varieties of things to code and ways to code, this allows for students to explore and develop computational thinking skills. I believe that my skills have been developed because previously I was not familiar with these programs, and I think that by testing out some different combinations and exploring the website, I was able to create new codes.

Another student explained her computational thinking in this way:

The skill I feel [I] worked on the most was decomposition. When I had come up with ideas or knew what I wanted to do for a coding activity, I was forced to then break down the big activity into many little components and work on each little action until they all worked together to make the big activity.

Participant comments demonstrate evidence of connecting the making to the acquisition of computational mathematical skills. Additionally, both coding activities helped PSTs to visualize the connection between the virtual world and real-life scenarios, providing an ability to think creatively while problem solving and writing the code into manageable steps. PSTs came up with different ideas during the *Scratch Coding* activity, with one PST stating that it “allows for students to develop a greater understanding of how the virtual world they are immersed in is developed, which in turn enables them to make real-life connections.” Similarly, Bower et al. (2017) reported that, “many teachers, especially after attending the workshops, replied that they would use computer programming and coding technologies to develop computational thinking knowledge” (p. 62).

It was not only coding activities but also working in the Origami and 3D Construction stations that inspired PSTs to develop computational thinking skills. PSTs made a connection between computational thinking awareness and the “debugging” process as it appeared in alternate non-coding activities, which was both unanticipated and welcome. During the *Code My Family* activity, PSTs reflected that while testing their code they “had to debug a handful of times to account for things like stop signs and crossing streets” and had to “debug when coding or make multiple attempts to create their origami.” These excerpts indicate that the process of debugging applied to both coding and other activities, such as Origami, where PSTs learned to repeat and correct steps or follow step-by-step instructions in the actions of folding paper. PSTs realized that working on coding activities supported the development of “critical thinking and problem-solving skills, as well as the ability to communicate and collaborate effectively with others.” This aligns with Mishra and Yadav’s (2013) argument that creative and non-programming tools can enhance computational thinking.

Sengupta et al. (2013) suggest modelling, representation, and abstraction are important concepts for developing computational thinking, which are integral components of making activities in makerspaces; thus, makerspace exploration can help students with visualizing, abstracting, and representing their ideas to augment the development of computational thinking.

Theme #4: Mathematics Learning Can be Tied to the Virtual Makerspace Activities in Both Synchronous and Asynchronous Learning Environments

Engaging in mathematics learning through virtual makerspaces was found to be an enjoyable and enlightening learning experience for PSTs and was experienced in both synchronous and asynchronous making activities. One participant expressed it this way:

I learned that even activities that appear more complicated — such as Origami, which involves many instructions and steps — can be completed online. I thoroughly enjoyed this

Origami activity, and, therefore, I learned that using technology to teach and learn does not always have to be frustrating and difficult, but can actually be quite enjoyable.

These findings were similarly supported to some extent by Loertscher (2015) who suggested that virtual makerspaces, like physical makerspaces, could provide a more self-directed experience, which is a tenet of learning environments that adult learners, such as the PSTs, often find preferable (Knowles, 1975). Oliver et al. (2017) further explained that both traditional and non-traditional spaces can be beneficial to students, and therefore have implications for application to the design of multiple types of educational environments across education levels. Additionally, the very act of making in makerspace activities, whether virtual or physical face to face, supported students to create together, share work, ask questions, and provide feedback while making valuable connections to support math learning (Figg, Khirwadkar et al., 2020).

Discussion

Makerspaces in our mathematics methods courses were deemed effective learning environments in our physical, face-to-face courses in previous years as a means of promoting growth in TPACK knowledge that could be applied to mathematics curriculum (Khirwadkar & Figg, 2019). Although recent literature studies suggest that all tech-enhanced experiences grow TPACK (Willermark, 2018; Chai, Tan et al., 2017), robust designs of tech-enhanced learning promote deeper understandings (Figg & Jaipal-Jamani, 2013). However, the pandemic changed our instructional delivery methods and instructional designs, which, in turn, became a complete design-thinking exercise for our makerspace design team. In this study, we examined how we could redesign physical makerspaces so that our students, who participated virtually, would have the opportunity to engage in math making and transform what had been a strictly hands-on, face-to-face learning environment into a virtual form of distance learning. Specifically, we sought to investigate the effectiveness of virtual makerspaces as a learning environment to promote the

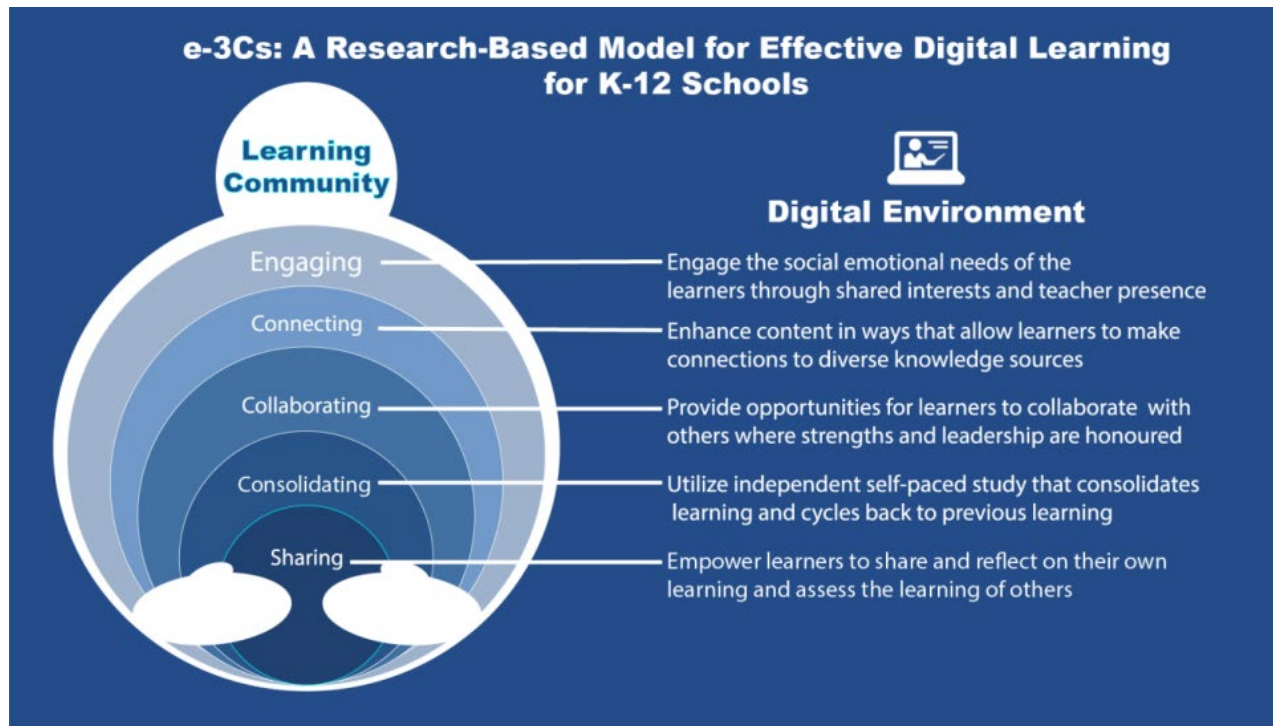
growth of three types of teacher knowledge for PSTs: TPACK, mathematical curricular knowledge, and computational thinking knowledge. Our findings suggest that virtual makerspaces have the potential to enhance TPACK knowledge by bringing real-life applications to virtual mathematics classrooms, which is similar to the study findings associated with physical makerspaces (Khirwadkar & Figg, 2019; Lock et al., 2020). By participating in the virtual making experience, participants were able to draw conclusions about how to use makerspaces to support the mathematics curriculum in their virtual teaching practices and provide for the inclusion of activities that support computational thinking, similarly to their peers who participated in the physical makerspaces. Overall, PSTs found the virtual math-making experience to be beneficial and valuable in making math fun and engaging.

However, there are elements of quality online learning that must be thoughtfully and purposefully included in the design of virtual makerspaces to ensure a robust learning experience for makerspace participants. The act of making engages participants in the act of purposeful learning through community (Lock et al., 2020), which is at the heart of all quality online learning (Figg, Crawford et al. 2020). Therefore, three aspects of virtual learning, recently highlighted in the pandemic literature as important ingredients of a purposeful learning community, were essential design considerations for the virtual math-making makerspace described in this chapter. They include: (a) the e-3C model (as shown in Figure 5), which highlights considerations for effective activity selection to promote learning through community (Figg, Crawford et al., 2020); (b) design thinking about robust learning environments (Hennessey & Mueller, 2020); and (c) the Dynamic Learner-Centred Model for Designing Digital Learning (DPI) (Mueller & Yennemadi, 2022). The connections to the virtual makerspaces the PSTs experienced are discussed next.

First, selecting making activities for the virtual environment should take into account research-based elements associated with quality online learning communities (as described in the e-3C Model by Figg, Crawford et al., 2020).

Figure 5

The e-3C Model: A Research-Based Model for Effective Digital Learning for K-12 Schools



Note. From “e-3Cs: A research-based model for effective digital learning for K-6 schools,” by C. Figg, K. Crawford, C. Lu, and O. Lu, 2020, *Brock Education*, 29(2), 26. Image used with authors’ permission.

A robust learning community was found to be fostered by the inclusion of five elements: engaging activities, connecting opportunities, collaborating work, consolidating ideas, and sharing voices. Such virtual learning activities would encourage community and “build upon the unique strengths of students, invite participation, and present content in various modalities as frequently as possible” (Figg, Crawford et al., 2020, p. 26). As in the virtual mathematics makerspace presented in the study, activities were devised so that participants worked in learning environments

by themselves, but in close connection to others through synchronous videoconferencing or sharing uploaded artifacts. Making in groups was also found to be possible as groupmates engaged in the making act at the same time, but in different locations, connected through videoconferencing tools. Therefore, the unique collaborative environments established through digital tools promoted much of the behaviour encouraged in physical makerspaces — brainstorming, sharing, providing help/support, and innovating through critical and creative thinking skills (Halverson & Sheridan, 2014) — while also promoting the five elements of learning through community, ensuring quality virtual learning experiences.

Secondly, design thinking is an integral part of virtual makerspaces. Although there are many frameworks for design thinking (Dam & Siang, 2020), it is generally agreed the process is a reiterative cycle of: (a) envisioning the human/learning need; (b) defining that need as a problem to be solved/investigated; and (c) brainstorming ideas and possible solutions, which often results in the developing and testing of prototypes (Hennessey & Mueller, 2020). Virtual makerspaces are both a product of a design thinking activity by teacher educators and a learning environment that encourages participants to engage in the process during their making activities. Leidtka (2018) explains that design thinking provides “a structure to the innovation process; design thinking helps innovators collaborate and agree on what is essential to the outcome at every phase” (p. 79).

For example, in designing the virtual makerspaces for the fall of 2020 mathematics methods course in this study, initial design considerations focused on determining resources needed by the learner in their home environment that would allow them to be able to do the making activities. Thus, addressing the learners’ needs, such as lacking access to physical robots of previous making activities, necessitated adaptation — replacing physical resources with online resources or adapted activities. Figg, Khirwadkar et al. (2020) describe how design thinking was used by the makerspace design team to re-envision the *Coding with Ozobots* activity as the *Code*

Your Family activity, where learners would move their family members around in the same way they would have programmed the *Ozobots*. Likewise, *Scratch Coding* replaced the physical makerspaces activity in which participants coded the *Dash*, *Cue*, or *Onyx* robots. Even the collaborative discussions and sharing of completed products so prominent in the physical making activities had to be adapted. Providing for virtual discussion spaces and the sharing of products created by PSTs' making experiences led to the use of videotaping of making activities within the MS TEAMS meeting rooms, and the use of online rooms for the storage of documents, images, videos, and other artifacts so that the making could be shared (Figg, Khirwadkar et al., 2020). Design thinking used to solve the transition from the physical to the virtual environment also required the makerspace design team to develop prototypes and to test the activities, generating feedback for additional supports and resources required for the successful use of the makerspace.

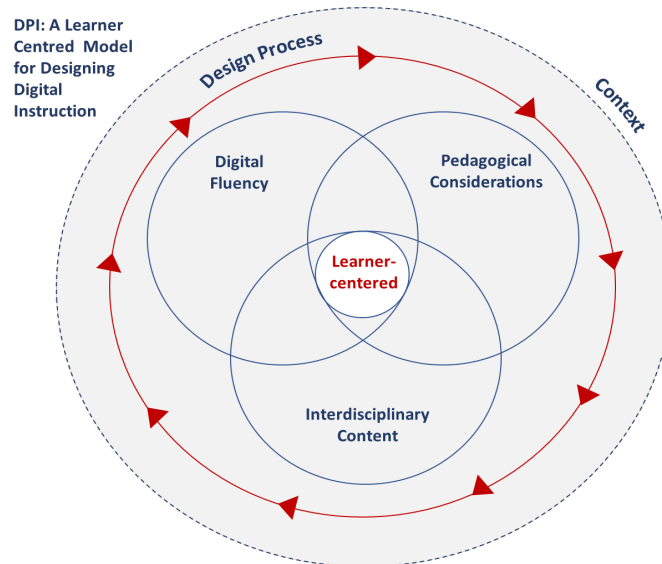
Design thinking is also an inherent part of the making experience and provides PSTs with an informal, fluid working environment that encourages design thinking. For example, providing guiding questions to PSTs as a part of their making activities (see Figure 3) required PSTs to use design thinking, as they considered the learner and formed pedagogical and curricular connections during their making activities. PSTs also created products/prototypes that presented solutions during the making activity.

And finally, in a similar fashion, Mueller and Yennemadi (2022) suggest that successful digital learning environments should leverage technology in terms of “digital fluency, interdisciplinary content, and pedagogical considerations, where it continuously adapts for virtual environments which are fluid and in constant flux in the broader context of teaching and learning” (p. 2248). They present the DPI: Dynamic Learner-Centred Model for Designing Digital Learning (see Figure 6) in which the knowledge teachers use when effectively designing digital learning environments, whether virtual or face-to-face, is depicted. The DPI Model focuses on the learner's

needs first and applies teacher knowledge of digital fluency, interdisciplinary content, and pedagogical considerations to address those learning needs.

Figure 6

DPI: A Dynamic Learner-Centred Model for Designing Digital Instruction (Chapter 19)



Therefore, there may be a need to highlight those types of teacher knowledge about teaching in the digital age (digital fluency, interdisciplinary content, and pedagogical considerations) as primary considerations when preparing PSTs to teach in digital learning environments. For example, technical skills necessary for digital environments can be learned through participation in making while in the virtual mathematics makerspace. In our study, PSTs were asked to use a variety of technical knowledge about digital skills (i.e., videotaping, downloading and uploading of files, taking digital images, constructing summary statements in forum discussion tools, completing online questionnaire forms, and accessing and following online module resources to complete learning tasks). The more digitally fluent the student, the easier for them to complete the task; and yet, participating in such environments also increased digital fluency and confidence. Therefore, it was necessary for this virtual environment to also include supports, such as short how-to videos, virtual access to instructors, activity-making resources, and

detailed guides for those with a lesser-developed degree of fluency. The activities were further designed so that, through the guiding questions, PSTs were always engaged in the curricular and pedagogical considerations. With the activities being interdisciplinary, a learning environment such as a makerspace proved a natural match for developing three types of teaching knowledge, specifically, TPACK, mathematical curricular knowledge, and computational thinking knowledge, that PSTs need to be successful in teaching in the digital classroom.

Conclusion

Extending the learning community of PSTs through virtual makerspace activities and digital tools is one example of how teaching during COVID-19 supported the growth of tech-savvy PSTs, and also promoted development of a *can-do* mindset willing to try new approaches and adjust to meet the needs of their students in different teaching situations (Dougherty, 2013). Providing PSTs with opportunities to learn about teaching mathematics in these unique virtual makerspaces was received positively by PSTs and promoted much more than the learning of mathematics pedagogy. Overall, three takeaways would be significant to others hoping to design and develop virtual makerspace learning environments for their own instructional purposes:

1. Virtual makerspaces encouraged growth in TPACK knowledge, while also promoting the knowledge highlighted by the DPI Model. PSTs were able to articulate pedagogical strategies for designing making experiences that integrated technological tools and understanding of mathematical concepts. Additionally, participating in virtual learning environments promoted confidence in using virtual learning environments for teaching, as PSTs began to recognize the pedagogical requirements for such a technology rich learning environment, including the ease of teaching with virtual resources. Likewise, they began to identify the challenges of such environments, including accommodating students without needed resources or poor internet connectivity.

2. Virtual makerspaces encouraged the use of mathematical computational thinking. During making experiences, PSTs demonstrated the four strategies of mathematical computational thinking (McNicholl, 2019), with different making experiences stimulating articulation of pedagogical reasoning (such as the use of small steps, logical procedures, and debugging errors). Makerspaces that are content focused should provide activities that promote experiences with content-based conceptual learning (McNicholl, 2019).
3. Virtual makerspaces were perceived by PSTs as viable hands-on learning environments for exploring mathematical concepts and curriculum standards. Having students articulate what they were learning and share examples from their own making to explain curriculum standards and mathematical concepts connected with the making was a key component that promoted and reinforced PSTs pedagogical learning. Several of our PSTs prepared virtual makerspaces for their own students in their teaching placements that followed the course.

To inspire a love of mathematics, teachers of mathematics often remind students that math is present in their everyday lives (cooking, dancing, music) and that finding the hidden math all around them — even in the form of nature (e.g., spider webs, snowflakes, the way dolphins communicate) — inspires math appreciation (Boaler & Dweck, 2016). Makerspaces are learning environments that encourage those connections; the making mindset developed through experiential learning also enables PSTs to identify the value of makerspaces as alternative learning environments for the teaching of mathematics. Our students said it best when one group noted that, “this making experience opened up the creative and artistic side for learning and connecting mathematics, which otherwise seemed to be a very dry and abstract subject.”

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Appendix
Data Showing Connections Shared by PSTs Between the Makerspace Activities and the Related Ontario Mathematics Curriculum K-8

Maker Activity	Ontario Mathematics Curriculum K-8: Strand Connections	PST Comments Used as Evidence of Connections between Curriculum and Making
Origami	Strand E. Spatial Sense E1. Geometric Reasoning, E1.1 E2. Measurement in various contexts, E2.4 Grade 4 Strand A. Socio Emotional Learning and Process Expectations: 3. Maintain positive motivation and perseverance 6. Think critically and creatively	PST #1 commented: This activity can be connected to E. Spatial Sense and the overall learning expectation E1. Geometric reasoning, specifically E1.1., identify geometric properties of rectangles, including the number of right angles, parallel and perpendicular sides, and lines of symmetry. It can also be connected to overall learning expectation E2. Measurement, specifically E2.4. identify angles and classify them as right, straight, acute, and obtuse. PST #2 commented: For Social-Emotional Learning (SEL) Skills, this activity can be connected to 3. Maintain positive motivation and perseverance; and 6. Think critically and creatively, as students apply the mathematical processes, representing and selecting tools and strategies.
Origami	Strand E. Spatial Sense E1. 3 Grade 1	PST #3 commented: Origami and curriculum strands related to geometry and spatial sense can be connected including Grade 1. E1. 3 construct and describe 2-D shapes and 3-D objects that have matching halves.
Origami	Strand B. Number B1.3 & B1.7 Grade 5	PST #4 commented: We visited the origami station and we thought it fits well with fractions. The curriculum strands we chose were: B1.3 represents equivalent fractions from halves to twelfths, including improper fractions and mixed numbers, using appropriate tools in various contexts. PST #5 commented: B1.7 describes relationships and shows equivalences among fractions, decimal numbers up to hundredths, and whole number in percentage, using appropriate tools and drawings, in various contexts.
Beading	Strand C. Algebra Grade 4	PST #6 commented: Beading: we used an online bead maker tool. We said it would be good for Grade 4 patterning. C1.2 create and translate repeating and growing patterns using various representations, including tables of values and graphs. and C1.3 determine pattern rules and use them to extend patterns, make and justify predictions, and identify missing elements in repeating beading and growing patterns.

Beading	Strand C. Algebra Grade 3	PST #7 commented: For the beading synchronous session in Week 12, we connected overall expectation from patterning that states: identify, describe, extend, create, and make predictions about a variety of patterns, including those found in real-life contexts. We also connected the Grade 3 specific expectation. E2.3 that states: use non-standard units appropriately to estimate, measure, and compare capacity, and explain the effect that overfilling or underfilling and gaps between units have on accuracy, which is connected to the length, capacity, and measurement unit in the measurement strand. We talked about how the beading activity is related to patterns, addition and subtraction, and measurement. PST #8 commented: We discussed using the beads for patterning and also using them as a nonstandard unit of measurement.
3D Construction	Strand E. Spatial Sense Grades 4 and 5	PST #9 commented: In a spatial sense, students can describe and represent shape, location, and movement by applying geometric properties and spatial relationships in order to navigate the world around them. In terms of specific expectations, it can be connected to E1.2, compose and decompose various structures and identify the two-dimensional shapes and three-dimensional objects that these structures contain. However, the activity can be used for a variety of specific expectations depending on how the 3D construction is used. For 3D Construction we discussed patterns as a Grade 3 concept, after completing our egg carton design. PST #10 commented: 3D Construction and we connected to spatial sense and focused on area, perimeter, volume, and surface area.
Scratch Coding	Strand C. Algebra C2 Variables C2.1 Grade 4	PST #11 commented: Scratch can help students identify and use symbols as variables in expressions and equations (C2.1). Scratch can help students to find meaning in learning things like variables, but also do so in a way that actually matters. Variables, in coding, serve a more discrete function than some students might understand working with general algebra problems.

Code your Family	Strand C. Algebra C3 Coding Skills C3.1 Grade 2	PST #12 commented: In the Grade 2 Coding Skills overall expectation C3. Solve problems and create computational representations of mathematical situations using coding and the specific expectation of C3. 1: solve problems and create computational representations of mathematical situations by writing and executing code, including code that involves sequential and current events. Based off of the fact that this activity ties in the sequential and concurrent events I thought this was a great grade to use this activity in.
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Chapter 21

The Efficacy of Online Games for Teaching Ocean Literacy in Nova Scotia: Results from a Pilot Study

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Abstract

In Nova Scotia, all citizens live within approximately 70 kilometers of the Atlantic Ocean with opportunities of both traditional and “newer,” non-traditional ocean-based careers. Yet there is an apparent lack of interest in ocean-based careers, perhaps due to formal education not emphasizing ocean literacy in engaging ways. Ocean literacy (OL) is not formally integrated into the provincial curriculum before Grade 11, at which time it is an elective course. This chapter describes qualitative research on how three specific serious online games were introduced to teach ocean literacy to pre-service teachers enrolled within a Nova Scotia-based B.Ed. program. More particularly, the focus here is on how one specific game, *Salmon Cycle*, was incorporated in classroom learning, and how pre-service teachers perceived the pedagogical value of the game for their students’ learning during practicum. Data collection via interviews of pre-service teachers focused on discussions of available classroom technology, the technological pedagogical content knowledge (TPACK) needed during their practicum placement, and their opinions on the effectiveness of *Salmon Cycle* as a catalyst to integrate ocean literacy learning with their science curriculum outcomes. The results from this study indicate that activities to increase ocean literacy can be infused into pedagogical practice by connecting cross-curricular — and culturally-relevant — interactive serious game content with science, technology, society, and environmental (STSE) outcomes, in so far as the pedagogy is the focus and the technology is not seen as the “add-on.”

Résumé

Les habitants de la Nouvelle-Écosse habitent dans un rayon d’environ 70 km de l’océan Atlantique, un environnement qui offre des possibilités de carrières tant traditionnelles que de nouvelles carrières non axées sur l’océan. Or, un manque d’intérêt manifeste pour les carrières associées à l’océan s’explique sans doute en raison du fait que les programmes d’études conventionnels négligent de mettre l’accent sur la littératie océanique susceptible de capter l’intérêt des élèves. La littératie océanique (LO) ne fait partie intégrante du programme d’études scolaire de la province qu’en onzième année, et encore il ne s’agit que d’un cours facultatif. Le présent chapitre discute des recherches qualitatives sur trois jeux en ligne sélectionnés pour enseigner la littératie océanique à des étudiants en enseignement inscrits à un programme de baccalauréat en éducation en Nouvelle-Écosse. L’attention porte ici sur la manière dont l’un de ces jeux, *Salmon Cycle*, a été intégré à l’enseignement en classe, et comment les étudiants en enseignement ont perçu, pendant leur stage en milieu scolaire, l’importance pédagogique du jeu dans l’apprentissage des élèves. La collecte de données a été effectuée par l’intermédiaire

d'entretiens avec les étudiants en enseignement et porte principalement sur des discussions entourant les technologies disponibles en classe, les connaissances du contenu technopédagogique (TPACK) requises pendant leur stage et leurs opinions sur l'efficacité du jeu *Salmon Cycle* comme catalyseur favorisant l'intégration de la littératie océanique eu égard aux résultats des programmes d'études en sciences. Les résultats de l'étude révèlent que des activités visant à rehausser la littératie océanique peuvent être intégrées à la pratique pédagogique d'ensemble, en établissant un rapport entre un contenu interactif transculturel et les données concrètes en matière scientifique, technologique, sociétale et environnementale (STSE), et dans la mesure où la pédagogie demeure à l'avant-scène et que la technologie ne soit pas simplement accessoire.

The Efficacy of Online Games for Teaching Ocean Literacy in Nova Scotia: Results from a Pilot Study

Canada is bounded on three sides by oceans: the Pacific, the Arctic, and the Atlantic, yet the impact of oceans on our daily lives may not be well known and some individuals may not have an appreciation of the global impact oceanic change can have on us as a people, a society, and as a global community. The Canadian Ocean Literacy Coalition (COLC, 2021) stated that, “the Earth has one interconnected ocean with many features. It regulates weather and climate. It is home to countless species. It provides clean air, food, and medicines to those living on land” (para. 1). In Nova Scotia, the geographic context of this study, all citizens live within 67 kilometers of the Atlantic Ocean (Chesworth, 2016). Yet our picturesque shoreline is marred with land and marine litter, and the plants and creatures dwelling in the blue depths are experiencing damage from environmental accidents, over-fishing, and rising water temperatures.

Slowing or halting further damage to this increasingly fragile biodiverse environment requires “a shift in our lifestyles and a transformation of the way we think and act” (Santoro et al., 2017, p. 16). It requires an understanding of the ocean, that is, *ocean literacy*. Ocean literacy (OL) is defined as “the extent to which a person understands our influence on the ocean, and the ocean’s influence on us” (Glithero & Stalker, 2018, p. 7). With OL comes the opportunity to make informed and responsible decisions regarding the ocean and its resources (Glithero & Stalker, 2018; Ocean Literacy Network, 2015; Santoro et al., 2017).

A variety of organizations throughout Canada have adopted ocean literacy as a primary goal, partnering with agencies from the US to move this forward (see, for example, the COLC, CaNOE, Ocean Literacy Network, Ocean Learning Partnership). Government bodies, such as the Province of Nova Scotia, and non-government organizations (NGOs), such as “the Ocean Supercluster,” are attempting to build a stable economic future around the ocean (Scully, 2019).

One key barrier for these initiatives is the apparent lack of a future projected workforce as few youth show an interest in ocean careers. Given the availability of these careers in Nova Scotia, questions have arisen whether the lack of interest in ocean-based careers is the result of the public-school education system not highlighting ocean literacy in ways that encourage students to see the multiple possibilities and opportunities for employment while staying close to home (Heymann et al. 2021; Kelly et al., 2021; Stiles-Clarke & MacLeod, 2018).

In the United States, seven ocean literacy principles are mapped into K–12 curricular topics in the national curriculum (Ocean Literacy Network, 2015). The opportunities to integrate OL into the Nova Scotia curriculum are numerous (Guest et al., 2015; Heymann et al., 2021; Kelly et al., 2021; Scully, 2019; Stiles-Clarke & MacLeod, 2018), yet OL is not formally discussed within the curriculum outcomes at all grade levels (McPherson et al., 2020; Nova Scotia Government, 2020a, 2020b). OL is indirectly related to a few Grade 7 and 8 outcomes (Nova Scotia Government, 2020a, 2020b) as well as a Grade 11 optional course; otherwise, the inclusion of OL and all of its tenets are left to the teacher's discretion. At present, teachers who teach OL typically do so with limited access to resources (McPherson et al., 2020). Given the limited resources promoting OL and the reality of potential careers available to future students (Heymann et al., 2021; Kelly et al., 2021; Stiles-Clarke & MacLeod, 2018), a logical conclusion is the integration of greater OL in Nova Scotia schools.

In addition to an awareness of the ocean and what it has to offer to Nova Scotian students within the current science curriculum, science teachers are required to embed science, technology, society, and environmental (STSE) outcomes into their pedagogy for certain grades and science competencies for other grade levels. For example, science competencies appear in curriculum connected with Grades 7 and 8 Citizenship, Personal-Career Development, Communication, Creativity and Innovation, Critical Thinking, and Technological Fluency (Nova Scotia

Government, 2020a, p. 7). For others, science curriculum is under revision and uses the science, technology, society, and environment (STSE) framework.

STSE has been researched for well over 40 years (Aikenhead, 1994, 2005; Pedretti, 1996; Pedetti & Little 2008; MacLeod, 2014; Ziman, 1980) and has been a key element of the Nova Scotia science curriculum since the early 1990s. Given the nature of OL, certain aspects of STSE education would be both an appropriate and logical pedagogical merger, specifically in the areas of OL and science as well as OL and the environment. When examining the competencies, connections between OL and citizenship, OL and personal-career development, and OL and critical thinking are tangible. In either case, STSE or competencies, teachers are called to focus on the connection between the learning objective and technology (T) in STSE or the learning objective and the technology fluency competency. The question arises of how to connect OL and technology or technology fluency?

One way is through the use of serious games via game-based learning in science education (Li & Tsai, 2013). The education field is flooded with examples of curricular-based student activities that effectively incorporate technology to inspire engagement and to connect to the world beyond the physical classroom walls. Moreover, many teachers are continuously seeking activities and options for students to connect their learnings in new ways that are efficient, engaging, and meaningful. One option that is gaining prevalence is the recourse to *serious games*, defined as an entertaining tool for the purpose of education (Zhonggen, 2019). We know that “learning occurs naturally while playing games” (Li & Tsai, 2013, p. 877). It has also been noted by Gee (2007) that “you cannot play a game if you cannot learn it” (p. 3). Studies have shown that digital game-based activities are advantageous in assisting students to learn a range of both cognitive as well as fine motor skills while contextualizing content and changing behaviour (Mayer, 2019; Pantò, 2019). The main subject application for serious games have been the natural sciences as well as

additional language acquisition and reading reinforcement (Mayer, 2019). Addressing OL via a serious gaming science education model could be an effective and efficient way to integrate ocean literacy into the classroom without requiring added time or outside classroom resources. Students can increase OL along with their required science content and gain technology skills and fluency within their learning milieu.

The Research Context

The research captured within this chapter is timely as the world continues to navigate the COVID-19 pandemic. Educators at all levels have had to re-imagine many of their pedagogical practices of pre-pandemic times, adapting to the institutional context and setting that remain in flux as COVID variants peak and wane. Additionally, significant global environmental events that have been escalating in intensity and frequency have created renewed attention on the important connections between the oceans and their role in mitigating the effects of global warming, as well as drawing attention to the fragility of the life cycle of plants and animals in changing climates (Gattuso et al., 2015; IUCN, 2017).

Since OL is vital to our existence and the ocean industry is a growing source of sustainable careers for Nova Scotians, it is important to educate students on the ocean and specifically the ocean environment so that, as members of an informed citizenry, they can make informed decisions and possibly choose a career path that will support them later in life. Developing and field-testing tools for teachers to assist with the integration of ocean education into their subject areas offers a rich societal connection and helps students see the interconnection between study and their surrounding environment.

Youth, when evaluating their educational experiences and learning outcomes, may be disheartened once they graduate, not “find[ing] what they learn at school to be important and relevant ... without a transformation of the education practices and adoption of contemporary tools

and information practices” (Churchill, 2018, p. 67). With this in mind, we questioned how to better meet the needs of students in Nova Scotia classrooms while navigating the COVID-19 pandemic. Specifically, as Churchill (2018) pointed out, we explored “the fundamental question of what is learning and what to learn in the contemporary times” (p. 67). We were driven by the need to understand how to meet the learning needs of students and to better prepare them for a world in which the speed and volume of information require critical thinking and reflection-in-action (Schön, 1983). This required designing digital instruction in which the learner is centred within pedagogical considerations that connect to OL, interdisciplinary science content, and digital fluency — all within shifting pandemic parameters.

The Research Team

The research team was comprised of two faculty researchers, one student intern, and an industry partner. Katarin, a PhD coordinator and faculty member within the Faculty of Education at St. Francis Xavier University (StFX), has over 20 years as a Science/ Physics/ STEM/ STSE educator in the Canadian secondary school system, and 21 years as a professor for undergraduate physics and teacher education with a focus on science and scientific literacy and assessment. She has taught in all possible modes of delivery. Wendy, Associate Dean (Research) and faculty with Yorkville University’s Faculty of Education, has over 20 years of experience as a post-secondary educator in both face-to-face and online environments and 15 years as an instructional designer and researcher of accessible online teaching and learning. Gwen, the student research intern, was a second-year pre-service science teacher at StFX, who, as a marine biologist, also has knowledge of the ocean industry. Finally, the industry partner was First Mobile that shared three serious games focusing on ocean literacy concepts within the science education realm, as this is part of their commitment to making education accessible and engaging to students in the Maritimes. The goal of the research was to determine if students found the games both accessible and engaging.

The University Context (the Course)

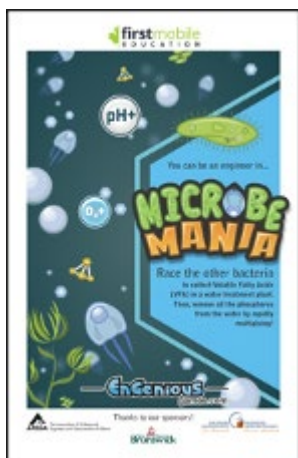
This research took place during the winter semester of 2021. At that time, Nova Scotia and the host university were in a unique situation compared to other jurisdictions in Canada, as our education systems were open, but with restrictions. Explicitly, all regularly scheduled face-to-face university courses were to be delivered face-to-face, including the science methods course that housed this research project. B.Ed. candidates came to class every day masked and adhering to the required protocols, while MacLeod taught in-person. Part of the in-person teaching was modeling ways pre-service teachers could change their pedagogy to adapt to the pandemic requirements, which often included limited face-to-face group work and physical laboratory experiences, and limited or no submissions of hard copy student work. To the province's credit, nearly every student in the public education system was provided access to a device while in school, and for at home learning while under teacher supervision. This access to technology allowed us, within the pre-service program, to push boundaries because of the opportunities technology offered in each subject area, specifically science and OL.

To explore connections to digital fluency, serious games were introduced to pre-service teachers during their science course, and again during a targeted professional development session specifically for this research project. Pre-service teachers had the opportunity to weave these OL-based games into their final practicum experience. Since pre-service science teachers had just completed their Curriculum and Instruction course in Secondary Science and were entering their last practicum where they could implement the serious games, they also had an understanding of inquiry-based STSE as well as science, technology, engineering, and mathematics (STEM) education within the public school education system in Canada and abroad (Aikenhead, 2006; Bennett et al., 2007; Bloom, 2006; Bybee, 2006; MacLeod, 2013; Pedretti & Little, 2008; Seatler, 2003). The games connected children's digital fluency to the interdisciplinary content, which the

pre-service teacher chose in relation to the themes of the games, or that the students asked to discuss post-game play, depending on the structure of the lesson.

Three specific online games to teach OL were chosen to share with the pre-service teachers: *Microbe Mania*, *MiniSub*, and *Salmon Cycle*. The games were provided by Stellar Learning Strategies and were designed for secondary (Grades 7–12) students. The selected games incorporated several learning outcomes from the provincial science curriculums as well as for Oceans 11, Social Studies, Technology Education, Careers, French, and Mi'kmaw Studies. The pre-service science teachers could pick from and use any, or all of these games within their practicum classes, depending upon age and grade level, content, interests of students, and fit with the planned learning outcomes of their field placements. A short description of each game is provided to assist with the understanding of the interdisciplinary nature of the games.

Microbe Mania



Microbe Mania was originally developed by the Association of Professional Engineers of Alberta (APEA) to encourage participation of female and First Nations students in engineering-related careers. Avatars can be changed to reflect the player's preferred identity. The game centres on the process of bioremediation and the use of microbes to remove phosphorus and other chemicals from wastewater before it is returned to the environment. Students play the Principal Coordinate

Analysis (PCOA) microbe that eats the available phosphorus and converts it to biomass that can eventually be removed from the system. Students must control the pH to keep their microbes alive and complete the two levels, in which the systems increase in complexity as they build knowledge

and understanding. At the end of the game, the water students have treated is released to the environment and, based on the success of the player, a certain percentage of fish live or die.

Minisub



Minisub was also developed by APEA. This game features use of underwater remotely-operated vehicles (ROVs) in ocean exploration.

Students design an appropriate ROV and must make decisions and trade-offs in the design process for light, power, and buoyancy. Using their sub, students search for damages in piping, using the light and radar functions on the ROV. Students must manage their vertical position in the water as well as their horizontal position along the sea floor. The end game goal is

for students to fix all the broken piping before the time runs out.

Salmon Cycle



Salmon Cycle was provided by Stellar Learning Strategies following the approval of the game's creators: the Gespe'gewaq Mi'kmaq Resource Council (GMRC) and First Mobile Education. The game is available in English, French, and Mi'kmaq (the language of the First Nations Peoples of the local area). The game follows the life cycle of salmon and the various stressors faced as they move through their life cycle.

Students are told the story of salmon and their place in Mi'kmaq culture.

Students learn about the ecological role of salmon at each life stage while they try to maximize the number of salmon that survive to adulthood.

The Nova Scotia School Context

After the provincial government closed all schools in mid-March 2020 due to the discovery of COVID-19 in the province, most Nova Scotian school-aged students returned to face-to-face

learning in September 2020. For most of the 2020–2021 school year, schools remained open with in-class learning, with the exception of isolated closures based on community outbreaks. Strict health protocols and sudden closures and absences due to exposures required teachers and pre-service teachers to reconsider their practice and develop new or alternative ways for students to engage in learning, since many pre-pandemic activities were no longer permitted or advised by the provincial Public Health authority.

The pandemic affected the classroom in many ways — it forced a change of pedagogy while teacher and students were still predominantly interacting in a face-to-face environment. Further, it altered what and how research could be carried out within Nova Scotia’s educational contexts. Due to pandemic restrictions, the collection of primary data from Regional Centres of Education (School Board) employees and students was halted as the researchers and RCE administrations felt that individuals were coping with enough stress and increased workload. The following section is a description of how instruction was designed within this evolving context.

A Learner-Centred Model for Designing Instruction

It is incumbent on the educator to think critically about the process of learning and the type and quality of assessment when making decisions about what tools and resources to use in a face-to-face learning environment that can also be applied to learning in the online context. Thus, a design thinking lens was overlayed upon these inter-connected frameworks based on the acknowledgment that the learners — the students in school and pre-service teachers delivering these lessons — would need choice, flexibility, school-based support to navigate connection issues and access to devices, and possibly external assistance from practicum supervisors to navigate pedagogical queries as they arose from the lesson(s).

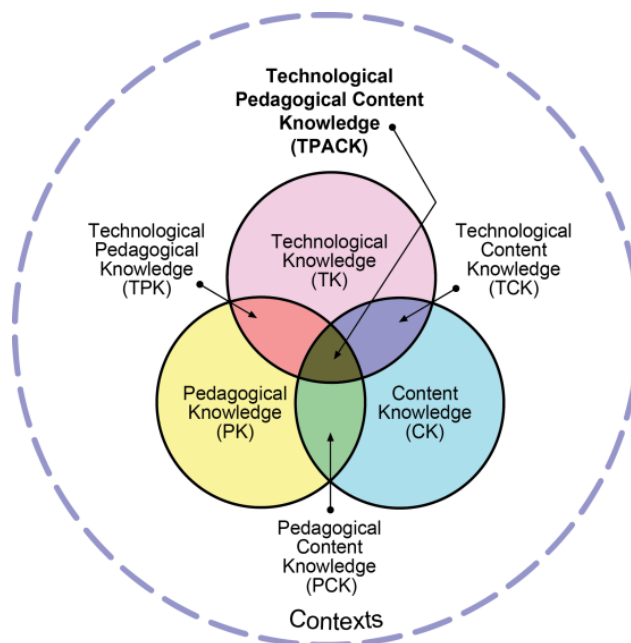
The STSE and STEM frameworks, as discussed earlier, were placed alongside the technological, pedagogical, and content knowledge (TPACK) model (Koehler & Mishra, 2009), an

extension of Shulman's (1986) work describing a teacher's evolution from content knowledge (CK) and pedagogical knowledge (PK) to pedagogical content knowledge (PCK). Shulman's (1986) argument that subject matter knowledge and pedagogy should be combined to form pedagogical content knowledge (PCK) is especially relevant to teacher education, in so far as it accounts for not just understanding *how* to teach, but also developing an awareness of what topics are difficult to learn.

Koehler and Mishra (2009) identified three intersecting elements impacting instructional practice: technological knowledge, pedagogical knowledge, and content knowledge (see Figure 1).

Figure 1

The TPACK Framework and its Knowledge Components



Note. From “What is technological pedagogical content knowledge?” by M. J. Koehler and P. Mishra, 2009, *Contemporary Issues in Technology and Teacher Education*, p. 63. (<http://www.citejournal.org/vol9/iss1/general/article1.cfm>). Rights free.

Taken as a whole, this model of technological, pedagogical, and content knowledge (TPACK) serves to underscore the challenges of teaching with technology and reveals “the types of flexible knowledge needed to successfully integrate technology use into teaching” (Koehler & Mishra, 2009, p. 60). Each of the TPACK elements outlined can be considered separately, yet effective integration of technology in learning design involves the purposeful weaving of all three elements together, while taking the needs of the student into consideration. This brings us to a learner-centred model for designing digital instruction.

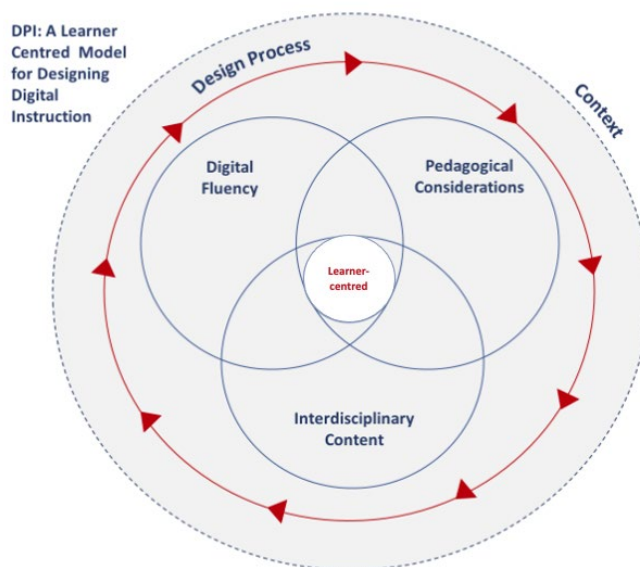
As detailed in chapter 19, a learner-centred model for digital learning emerged from the working sessions of the Canadian Association for Teacher Education (CATE) October 2021 Conference, and the subsequent meetings of our author subgroups. This model provides a cohesive conceptual representation of the framework used for the design of the course, which was the subject of this research. As captured in our research and depicted in Figure 2, we used a learner-centred approach encompassing three critical spheres for the learner (student) to experience and the teacher (pre-service teacher) to have considered and woven into their classroom routine: digital fluency (D), pedagogical (P) considerations encompassing learning preferences with a nod to universal design for learning (UDL), and interdisciplinary (I) content (STSE, STEM, OL, career education, and culturally relevant, place-specific pedagogy).

Research Methodology and Methods

As part of our commitment to advance the scholarship of teaching and learning, and adding to the dearth of research on how ocean literacy is taught in Canadian schools, we gained research ethics approval in February 2021 to formally explore pre-service teacher perceptions, attitudes, and practical outcomes in using serious games as a pedagogical tool within their practicum. With our constructivist paradigm, relativistic ontology is acknowledged whereby “multiple realities exist and the knower and respondent co-create understandings” (Denzin & Lincoln, 2005, p. 22).

Figure 2

Digital fluency, Pedagogical Considerations, Interdisciplinary Content (DPI): A Learner Centred Model for Designing Digital Instruction



This research, rooted in a qualitative case study methodology, rests on Glaser's (1956) methodology of constant comparative analysis, later revised by Charmaz (2006). The case is focused “on discovery, insight and understanding from the perspectives of those being studied and offers the greatest promise of making significant contributions to the knowledge base and practice of education” (Merriam, 1998, p. 1). Here, those being studied are the pre-service teachers. As discussed earlier, due to pandemic restrictions, data collection was not possible with any other stakeholder groups within the allotted research time.

Once ethics approval was granted, an invitation email was distributed to the host university's pre-service teachers who were enrolled in the B.Ed. program. These pre-service teachers were invited to participate in a 1-hour professional development session and then to participate in the subsequent research. Nine of the possible 120 pre-service teachers expressed an interest and were sent the link to the professional development session; six participated in the

professional development session, with five continuing on to the interview phase of the research. All six participants were either teaching science or STSE courses in their practicum.

The professional development session was approximately 1 hour and held over a private Zoom session where the three online games were demonstrated to participants and examples of lesson plans were provided in both English and French. In the session, participants were shown how the resources were connected to the provincial curriculum, while their application to the teaching and learning of STSE and STEM was illustrated via sample lesson plans and activities.

Pre-service teacher participants who completed the professional development session were contacted during their practicum to ensure their questions or concerns were addressed prior to teaching with the serious games. Following the completion of their teaching practicum, all pre-service teachers who participated in the professional development session were contacted for an interview. From the initial six participants, five agreed to an online interview held after their practicum term was over.

Participants were called using Rev, a call recorder app, and asked a series of pre-approved questions concerning the study and the game(s) that were used/implemented into their teaching during their practicum. These individual interviews were opportunities for participants to share their perceptions, observations, and ideas on the online game(s) they chose to use as a “tool” to teach with, and how useful they were in reaching the goal of increasing student’s understanding of ocean literacy within the teaching and learning cycle. Once the data were collected, the interviews were transcribed and coded, and the themes emerged from the line-by-line analysis (Leavy, 2017, p. 143). Seven common themes were noted among the different interviews, then the transcripts were read and re-read for evidence that addressed these themes. A theory explaining the effectiveness of online games to teach OL, as viewed by the pre-service teachers, was hypothesized.

Discussion of Findings

This research brought to light seven key findings that are described thematically below: games as a learning preference, games as culturally relevant, game choice by pre-service teachers, differentiation with digital fluency, ocean literacy, overall evidence of learning, and perceived game response. Overall, as reported by the pre-service teachers, a student-centred approach led to an apparent increase in the digital fluency of their students, along with greater engagement by most students.

Games as a Learning Preference

All pre-service teachers in the study indicated that they perceived that the games that were shared with them were of great value. Further, they stated their belief of the importance of games in education and indicated that such serious games, like those that were shared, and technology integration within the classroom environment were important to their students' learning. Participants commented that by using games in an effective manner through scaffolding, students were engaged and able to connect their learning beyond the textbook materials. The pre-service teachers found this to be extremely important given the augmented use of laptops and mobile devices within the classroom as tools to replace paper-based assignments.

Moreover, serious games with embedded curricular outcomes moved students away from considering gaming as only tools for play and socialization. Serious games tapped into students' preferences for technology use in daily interactions and learning. Pre-service teachers reported their students were more engaged with the content and were able to maintain their focus longer than they could when reading or completing a worksheet. More importantly, students were able to ask and answer more sophisticated questions following game play.

Games and Cultural Relevance

All pre-service teachers indicated that teaching ocean science in Nova Scotia is an important part of being a culturally-relevant teacher. Pre-service teachers differed in their beliefs about how much ocean content should be taught, though all agreed on the importance of students having some exposure to ocean literacy. Nova Scotians live and work close to the ocean and many families have ties to some aspect of the supply chain of ocean resources. As well, the bodies of water surrounding most of the province have impacts on weather, travel, and tourism. All participants were impressed and encouraged that the *Salmon Cycle* could be played in Mi'kmaw, and they were eager to see what possibilities this might hold in their future teaching careers beyond the practicum.

Game Choice by Pre-service Teacher

Interestingly, all pre-service teachers who participated in the study chose to use *Salmon Cycle* in their classroom. Pre-service teachers indicated that this game, more than the others, incorporated the Nova Scotian curriculum outcomes and incorporated Mi'kmaq culture into the game, making it easy to connect to a variety of different science lessons and topics at different grade levels. Pre-service teachers were interested in the other two games, but felt that they were very specific and due to the grades/topics/subjects being taught, they did not fit as well as the selected game.

Differentiation With Digital Fluency

All pre-service teachers delivered the *Salmon Cycle* game with varying levels of differentiation. Three of the pre-service teachers used the game extensively; one used it with a student on an alternative learning pathway in a learning centre (special education) context; and one pre-service teacher used the game for all students in a high school Oceans class. One pre-service teacher used the game as an enrichment activity for students. Essentially, pre-service teachers were

able to adapt the game to the needs of their students within the context of their own classrooms, thus demonstrating the power and flexibility of games as a pedagogical tool. They found that the game worked well for students who had an interest in video games since they tended to have foundational skills with game logic. Other students new to gaming were on a learning curve, but they proved able to catch on quickly and soon became proficient with the game. One pre-service teacher commented, “because it was a video game [and the student was a gamer], they actually skipped their required work so they could play the game.” This is interesting because the student was obviously interested in getting to the game; deducing what the student learned from their experiences with the game was the challenge, and so was embedding the game as required work. Here the game gave this student a portal into the content, using a platform which they were familiar with — one that was potentially a new avenue to learn content in a more engaging way.

Ocean Literacy

All pre-service teachers indicated that the games brought an aspect of ocean literacy to the classroom. In particular, the *Salmon Cycle* game with its connection to Atlantic Salmon and Mi'kmaq culture was seen as an effective way of connecting students' lives to the water systems and ocean. Furthermore, *Microbe Mania* and its connections to bioremediation was seen as a strong link to water conservation and the link between fresh and saltwater. One pre-service teacher indicated that they could “use it across any year to demonstrate symbiotic relationships or ... to demonstrate titration on a very game level.”

Overall Evidence of Learning

All teachers used *Salmon Cycle* and indicated that it was clear students had learned from the game; however, this learning would not have taken place with just the game as a stand-alone offering. Instead, their student learning was a result of careful scaffolding done by the pre-service teachers at three stages: pre-game, within the game lesson, and post-game. Because of this

scaffolding, students were able to answer follow-up questions and complete assessments based on *Salmon Cycle*'s educational content. Students were able to learn about the salmon life cycle and Mi'kmaq culture. One pre-service teacher indicated that the cultural aspect was the main takeaway from the game, explaining that salmon fishing "has been part of my [Mi'kmaq] culture for a long, long time."

Perceived Game Response

Two participants who used the game in a classroom setting indicated that the games elicited a strong response from students who enjoyed video games. In addition, a participant who was doing their practicum in a high school indicated that all their students appeared to be pleased to be playing a game and "mixing it up." The participant, who used the game in the learning centre (special education), said the game elicited the most engagement from their student that they had had all term. They reported "the student was interested to do it, it was definitely out of my practicum the most engagement I had."

It is important to note that not every student in every class enjoyed the game as presented by the pre-service teachers. The most significant complaint concerning any of the games was the loading time of the games and the speed. Players found them to be slow and this slowness frustrated the expert gamers. For those who were less-experienced gamers, this was still a frustration as they could not discern whether it was a user problem or a network problem.

Discussion of Findings

This was a pilot study into the effectiveness of online serious games with our primary focus being to engage students in ocean literacy and ocean-related content. However, given the pandemic restrictions, data collection was limited to those pre-service teachers who participated in the study, were able to enter the schools during their practicums, and taught content that aligned with the learning objectives of the *Salmon Cycle*, and whose practicum experiences and

interactions were not diminished by COVID-19 shutdowns or transitions to at-home learning. It is through their eyes that we were able to see what the learning and classroom experiences of online gaming and OL have to offer, and where challenges still need to be addressed within classrooms and contexts. OL is of special interest in Nova Scotia because of the province's proximity to the ocean and the importance of the ocean to our history, economy, and culture.

Cultural Relevancy

Incorporating ocean content into the Nova Scotian classroom is an important component of culturally-relevant pedagogy. One participant said, "[the ocean is] something that students really can connect to." This idea was reflected in the game choice by pre-service teachers: all participants were drawn to *Salmon Cycle* because it was made specifically for the Maritimes and offered Mi'kmaw (the spoken language of the Mi'kmaq people who are indigenous to the area) and French language options.

Mi'kma'ki is the area that is now known as Nova Scotia, Prince Edward Island, large areas of New Brunswick, the Gaspé Peninsula, and Newfoundland since time immemorial (Wi'kipatmu'k Mi'kmawey, 2021). As part of the ongoing commitment to truth and reconciliation of Indigenous presence in Nova Scotia, science curriculum continues to be modified to include content from the traditional teachings of the Mi'kmaq people, and about the biosphere and ecosystems, language, and ceremony connections. The *Salmon Cycle* is interactive and educational, with direct connection to Nova Scotia and the lives of students and teachers. One pre-service teacher explained that they chose it, because "being culturally relevant was one thing that [the students] really liked about it."

As teachers strive to connect students to their local geographic landscapes, communities, and cultures, other researchers have noted that culturally-relevant education is an effective way to keep students engaged (Brown, 2021). Given that games and technology are also engaging to

students (Mayer, 2019), culturally-relevant online games could offer much in terms of student engagement (Engermann & Otto, 2021). As one participant shared:

Using the *Salmon Cycle* game, the Indigenous cultural aspect was already woven into the game. That was one thing that I really liked about it and obviously one could even say that was one thing students noticed. Their “ah-ha” moment was when they began answering questions and realized it has been part of their culture for a long, long time. ... They are proud of their culture even the ones that don’t know as much but are wanting to learn more. This helps.

Pedagogical Possibilities: Differentiation

The results of this study indicate that the *Salmon Cycle* game was an effective learning tool. It was easily differentiated for students, it helped engage students who had different learning preferences, and students seemed to learn from the game. The conscious effort of the pre-service teachers involved in this research to scaffold their students’ learning through online gaming reflects the importance of TPACK and learner-centred pedagogy. A teacher at any stage of their career could scaffold the game into their teaching, assign the online game to their students, and then discuss the various themes from the game, namely the cultural, economic, and ecological role of salmon in Nova Scotia within the greater context of ocean literacy. As one participant aptly noted:

It’s a game that the students can be interactive and less of a teacher oriented [lesson], or student-to-teacher interaction. It was more like student-to-student interactions — kind of talking back and forth a little bit. Or like students-to-technology interactions because students were talking to their Chromebooks. I had Grades 10–12 in the class and I could see younger grades using this.

In terms of student responses to the online game after having used a guided discovery lesson format for delivery, “students were like ‘yeh, something different’ and they were excited for that, I had to talk for the first period to set up the game, but then for that second period they were more excited because of the game.” All participants noted that the students engaged with the online game in the way that they had planned, citing that at times, students who were shy or usually engaged in other online activities were now participating in content-related activities, and this created a very positive classroom dynamic. “Students learned for sure,” one pre-service teacher noted; “overall it was the most engagement I had during my practicum, especially for one student who usually turns off.”

A downside aspect of the online games, however, was the stability of the hosting site and connectivity. These two factors did create frustration and slow download times affected the level of game engagement. Pre-service teachers noticed this problem and navigated it with supplementary activities, depending on their lesson structure. “Some students got lost while waiting, others who were gamers were able to stick it out.”

Ocean Literacy via Online Serious Games in Science Education

Many Nova Scotians have played in the ocean at one time or another and see it as a place for recreation, or they may have a family member associated with the fishing industry and therefore view the ocean as a form of livelihood. What is missing in terms of ocean education is a clear understanding of how the economic, societal, and ecological systems are connected to the ocean, and how these systems affect each individual Nova Scotian and the global community. These are difficult concepts to convey and they might not necessarily be communicated on a beach or in a boat. This is where quality educational content is crucial to develop OL.

Often when groups advocate for OL, they envision students exploring tidepools and conducting intertidal surveys. The reality is, however, that those kinds of experiences are

expensive and difficult for public schools to organize. Further, given weather conditions, liability, safety, and accessibility concerns, these visits may not be possible. Online ocean games could offer a way for Nova Scotian students to learn about oceans and their communities in a low cost, interactive way. As discussed above, it appears that *Salmon Cycle* was an effective online game that allowed the pre-service teacher to not only scaffold a lesson to meet the curriculum requirements of outcomes and student learning needs, but also to connect elements of digital fluency and OL together. As pre-service teachers commented: “The game put OL in student-friendly terms and that was really important to me as a teacher, it made it accessible”; “I used this game as part of a culminating activity. The students were able to bring so many ideas together”; “We live next to the ocean, and I think it needs to be a stronger component of our science curriculum. It’s like it gets lost...”. Each of these comments point towards the importance of and the need to promote the use of online games to promote OL and digital fluency within the science classroom.

Next Steps

Moving forward, as science educators, we need to examine ocean literacy from a broader perspective so that new games can be designed with similar elements displayed in the *Salmon Cycle* game as well as the other games included in this research. These elements include the use of student-friendly language, interactivity, cultural relevance, and storytelling, all which should be supplemented with free ocean education resources for teachers. When designing educational content, ocean literacy organizations could take greater consideration of the time constraints teachers face and focus their efforts on designing games that can help meet the conceptual framework goals of digital fluency, pedagogical considerations, and interdisciplinary content (DPI, see Figure 2 above).

Specifically, game designers need to ensure that the level of digital fluency is reasonable given the grade level of the game; pedagogical considerations have been well scaffolded and explicitly detailed; and the interdisciplinary content of OL is paired with science education and viewed through either a STSE lens or via documented science competencies. An added commitment to truth and reconciliation with Indigenous Peoples would incorporate the Two-Eyed Seeing approach — *Etuaptmumk* — to include Mi'kmaw Ways of Knowing in order “to motivate people, Aboriginal and non-Aboriginal alike, to use all our understandings so we can leave the world a better place and not comprise the opportunities for our youth (in the sense of Seven Generations) through our own inactions” (Institute for Integrative Science and Health, n.d., para. 7)

Given the importance of online education and technology-driven learning in the past year, this study indicates that even technological resources need to be culturally relevant. It is not enough for a game to be interactive and connect to the daily content of the class, it needs to connect to prior knowledge of the students and relate to their surroundings. Connecting to students’ prior knowledge and context is a key component in STSE; moreover, the science competency of citizenship in a game like *Salmon Cycle* includes each component of STSE competencies as well as DPI. Pedagogically, serious games can be effective ways to educate students on scientific concepts as well as societal and environmental ones while addressing technological literacy and digital fluency.

Summary and Final Thoughts

This study was an exploration of the relationship between technology and learning. Results demonstrate that technology has differing levels of quality in terms of student engagement. To achieve the greatest benefits of its use, the chosen technology should be of high quality. Technologies used in educational contexts must be held to the same standard as other resources;

moreover, online games, like other classroom resources, should be culturally relevant and, if possible, place-based to prior knowledge of the student.

With the global shift to digital elements of education, whether the learning space is constructed as online or a face-to-face environment (or hybrid) as in this case where teachers were required to embed technology into the classroom in a way that had never been done before, there needs to be greater options for place-based and culturally relevant online games. Ocean literacy in Nova Scotia is one such example of place-specific pedagogical content. The same principles for online resources could be applied to a variety of places and cultures to deliver truly enriching online education. Online games may be an avenue through which students can simultaneously identify and foster career preferences in an engaging and educative way. Therefore, our premise is that to effectively integrate ocean education into the classroom, advocates and designers need to work with education specialists to develop online games and supplementary resources that they and practicing teachers will use while addressing the calls for place-based, culturally relevant, and economically available resources for use within the public education system.

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Chapter 22

Using Design Thinking as a Framework for Evidence-Based and Contextually Informed Online Professional Development

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Abstract

With the global shift to online education during the COVID-19 pandemic, possibilities have opened in re-thinking the design of online learning and teaching spaces; these myriad possibilities also come with a consideration for the design of ongoing and sustainable professional development for educators who continue to navigate changes in virtual learning and teaching spaces. In this case study I share how, in my role as an academic developer in a higher education institution in Toronto, I used a design thinking approach to inform the development of three distinct, though related, learning and teaching projects.

Five phases of a design thinking approach (empathise, define, ideate, prototype, and test) informed the three projects outlined in this case study: the first project involved empathising with students' needs during emergency remote learning; the second project used this learning to develop a "Model for Online Learning and Teaching" (MOLT); and the third project involved designing professional learning experiences for teaching faculty so that they may become familiar with MOLT in structured and supportive ways. I describe each of the three distinct projects separately and offer conclusions and implications about the use of design thinking in higher education as a framework to manage changing contexts and informing professional learning activities.

Résumé

Avec le passage global à l'éducation en ligne pendant la pandémie COVID-19, de nouvelles possibilités se sont offertes pour repenser la conception des espaces d'apprentissage et d'enseignement en ligne; celles-ci permettent également d'imaginer le développement professionnel durable pour les éducateurs qui continuent à naviguer à travers les changements des espaces virtuels d'apprentissage et d'enseignement. Dans cette étude de cas, je dévoile comment, dans mon rôle de développeur académique dans un établissement d'enseignement supérieur de Toronto, j'ai recouru à l'approche de la pensée conceptuelle pour développer trois projets d'apprentissage et d'enseignement distincts, bien que reliés. Cinq phases de l'approche de la pensée conceptuelle (empathie, définition, idéation, prototypage et test) ont inspiré les trois projets décrits dans cette étude de cas : le premier a consisté à empathiser avec les besoins des étudiants lors d'un apprentissage à distance en situation d'urgence; le deuxième a utilisé cet apprentissage pour développer un « modèle d'apprentissage et d'enseignement en ligne » (MOLT); enfin, le troisième a consisté à concevoir des expériences d'apprentissage professionnel pour le corps enseignant afin qu'il puisse se familiariser avec le MOLT de manière structurée et soutenue. Je décris séparément chacun des trois projets distincts et, en conclusion, je propose des suggestions sur l'utilisation, dans l'enseignement supérieur, de la pensée conceptuelle adaptée aux contextes évolutifs et en soutien aux activités d'apprentissage professionnel.

Using Design Thinking as a Framework for Evidence-Based and Contextually Informed Online Professional Development

Design thinking is used in education as a human-centred approach to learning, collaboration, and problem solving (Foster, 2021). At the onset of the first COVID-19 lockdown in March 2020, many higher educational institutions adopted “emergency remote teaching” models (Ferri et al., 2020) to maintain learning continuity, which revealed many problems in practice. For faculty, many traditional ways of learning, teaching, and assessing did not translate to an online learning context. For students, learning with community and the direct feedback of their instructors and peers was missed. These challenges gave rise to questions such as: How can we design virtual learning spaces that respond to students’ virtual learning needs? And how can we design professional learning that allows faculty to feel confident in their pedagogical decisions for teaching in virtual environments?

The prolonged pandemic has provided institutions with opportunities to rethink future formats of learning, and many institutions have adopted hybrid and flexible modes of learning with the intention to offer these ways of learning beyond the pandemic. Design thinking, an approach rooted in empathy, can help build sustainable learning solutions to the problems that have arisen during pandemic learning, and for problems that will continue to surface in post-pandemic virtual learning landscapes. The Model for Online Learning and Teaching (MOLT), developed initially as a pandemic response, is an example of such a solution aiming to provide instructors with an evidence-based and contextually informed approach to improve pedagogical practice and course design for teaching and learning in virtual environments. In this chapter, I outline how design thinking provided a roadmap for achieving this aim.

Design thinking offers a flexible methodology to embrace complex problems. Although variations of the model exist, the approach typically includes five phases: empathise, define,

ideate, prototype, and test (Kelly & Kelly, 2016). The phases mark the journey from understanding a problem to conceptualising possible solutions by generating ideas and then testing them.

Feedback elicited from each phase can then lead to revisiting other phases in a nonlinear approach to problem solving.

Much of the research on design thinking as a methodology in education demonstrates its use in enhancing skills such as empathy or critical thinking (Koh et al., 2015), its application in solving problems in STEM courses (Li et al., 2019), or its role in facilitating the teaching of certain skills in teacher education programs (Henriksen et al., 2020). However, there is not much research on design thinking as an approach to constructing policies, pedagogical practices, and professional learning experiences for institutional quality enhancement. When used to inform teaching, learning policy, and professional learning, design thinking can challenge top-down hierarchical organisational structures. For example, in this case study, students' experiences of learning in a pandemic informed the online learning and teaching model from which professional learning and development activities were generated. Ideally, students will be seen as partners at every stage in the pedagogical design, implementation, and evaluation process; providing students with opportunities to exercise their agency and develop affinity towards learning and teaching improvement processes (Cates et al., 2018)

Research Context

This case study research follows a design thinking methodology across three distinct and related projects conducted at a Teaching and Learning Centre at a large college based in Toronto. The college is a multiple-campus public college which offers full-time and part-time programs at the baccalaureate, diploma, certificate, and graduate levels. Over 25% of enrolled students are first generation students and over 40% have a first language other than English. During my time

leading this project, I was on a temporary full-time contract as an academic developer and in my third and final year of work with the institution.

Figure 1

Design Thinking Phases Across Three Projects

Empathise	Define	Ideate	Prototype	Test
Emergency remote learning	Design and development of the Model for Online Learning and Teaching (MOLT)			Professors' collaborative inquiry

In Figure 1, I summarise how the three projects described in this chapter span the five phases of a design thinking methodology. In the first project, I used second-hand data from one question in a larger institutional survey to make sense of students' experiences of emergency remote teaching during the first lockdown in 2020. In the second project, I developed the first iteration of MOLT (see "Phases 2-4: Define, Ideate, & Prototype – Developing a responsive framework for teaching and learning online" for a description of the first iteration and how it evolved into the current model presented in this chapter) and managed the development of instructional resources to support implementation of the model. Informed by findings from the first project, the second project started with defining a need (to improve students' experiences of remote learning) and moved into ideation and prototyping of the model. The prototype was the focus of the professional learning which I designed in project three, and this was the "test" phase in the larger design thinking process. Teaching faculty in the third project participated in a collaborative inquiry model to implement MOLT with their students and provide feedback with a view to revisiting multiple stages of iteration.

Phase 1: Empathise – Using a Community of Inquiry Lens to Analyse Qualitative Student Experience Data

Starting with empathy can provide a way into the problem and reveal key information about context and individual struggles. Empathy means acknowledging multiple perspectives in institutional decision-making and, where appropriate, representing these perspectives in future planning. Learning-and teaching-related struggles during the pandemic were exacerbated around the “pivots” or points of transition; for example, since March 2020, K-12 and higher educational institutions have navigated multiple transitions into remote learning, learning in physical classrooms, and learning in hybrid and hybrid-flexible (hyflex) environments. Students and educators have been impacted by each transition in different ways. The first lockdown brought with it a steep learning curve and educators were expected to learn about new technology and virtual pedagogy in a short time. Another important focus was also on the health and well-being of learners and teachers in online communities, with each subsequent lockdown revealing the need for more learning around community building and presence in virtual spaces (Dozois, 2021).

To make sense of the affective responses and learning needs of students at the onset of the first lockdown, Manners and Tremblay (2020) analysed 677 open-answer student responses received from an institutional survey about online learning experiences during lockdown. A modified Community of Inquiry (COI) framework (Darby, 2020) was used to code students’ responses. At the time of coding survey data, Tremblay was on secondment as an academic developer at the Teaching and Learning centre in the same institution. In approaching the data, we agreed upon a combined deductive and inductive coding approach. Our first cycle of coding involved organising students’ responses thematically into the four elements of the COI model: we looked for mentions thematically relating to teaching presence, cognitive presence, social presence, and emotional presence. Our second cycle of inductive coding involved developing

subcodes by identifying a few prominent themes within each deductive code, such as: “Teaching Presence – Issues with Lecture Format.” We approached both cycles of coding independently using a Multiple Coding strategy (formerly referred to as “Blind Coding”) to promote thoroughness and reliability in our qualitative coding (Barbour, 2001). We met mid-way and at the conclusion of coding the full data set independently. We used one data set for the final analysis. Table 1 includes definitions of the four presences that informed our coding and gives examples of the subcodes we used in the second round.

Table 1

Definitions of Social, Cognitive, Teaching, and Emotional Presence

Presence	Definition	Examples of Subcodes in Qualitative Data
Social	The ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities (Garrison, 2009)	Sense of community, interaction with peers and instructor, students as partners
Cognitive	The extent to which learners can construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2001)	Supporting study skills, self-regulation of learning, planning and monitoring learning
Teaching	The design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (Anderson et al., 2001)	Curriculum, learning activities, design and delivery of lessons, lecture format
Emotional	Identified as important to student adjustment to the role of online learner (Cleveland-Innes et al., 2007), the choice of instructional format (Artino, 2010), and perception, expression, and self-management (Kang et al., 2008)	Supporting mental health and well-being, stress and overwhelm

Our analysis revealed that the central themes discussed around developing “social presence” were students’ desires to have more open and inviting communication with instructors,

more responsive program and counselling support, and more awareness of the challenges for students working across time-zones. With regards to developing a meaningful “cognitive presence,” students wished for more opportunities for engagement and active learning, help with developing effective study skills, and be seen as partners in the course by providing feedback on materials and approaches. Of the responses related to a course’s “teaching presence,” students’ central concerns included the formats of lectures in their courses, instructors’ inflexibility with deadlines, and the pacing of course materials and assessments. Finally, students’ “emotional presence” was discussed in relation to their enduring stress about, and struggles with, COVID-19, social isolation, the lack of work-life balance and insufficient support, their need for more empathy from instructors, and a general feeling of being overwhelmed by online learning.

These coded results informed the first two iterations of MOLT. In this chapter, while I focus on the second iteration, I describe how the first iteration of the model evolved into its current form. Table 2 gives an example of how Manners and Tremblay (2020) broke the larger presence codes down into subcodes, and how the subcodes informed the three themes in MOLT (see phases 2-4 for details on the development of MOLT). Finally, examples of students’ responses are included in Table 2.

The initial coding exercise arose from a need to empathise with students’ experiences and to plan teaching and learning models and/or policies around these experiences. A design thinking approach gave us an intuitive path forward from understanding students’ collective needs to informing the development of MOLT and related professional learning activities.

Phases 2-4: Define, Ideate, and Prototype – Developing a Responsive Framework for Teaching and Learning Online

The central three stages of design thinking informed the second project: developing MOLT.

Defining Needs

Defining needs based on empathy and an appreciation for context made it easy to align values with actions. Students identified their learning needs through their participation in the initial student surveys, which also informed faculty professional learning needs.

Table 2

Coding and Subcoding Students' Responses

Code (Presence)	Subcode	Theme in framework	Student quote
Social	Students as Partners	Building Responsive Digital Pedagogy	"Allow students to give feedback on course structure to advise whether changes should be made to how the material is being taught"
Cognitive	Design for Active Learning	Building Engaged Learning Communities	"Make instructors prioritise engagement when it comes to interacting with students. As a new student, I feel sort of disengaged and disconnected in the virtual environment"
Teaching	Orientation and Structuring	Building an Online Foundation for Success	"More consistency with the use of [LMS]. Each professor seems to have their own style of accepting assignments and posting information. It would be better if there was more consistency"
Emotional	Timing and compassionate communication	Building Engaged Learning Communities	"Being lenient with deadlines because connectivity, along with varying time zones, really hinders the ability to learn and affects our well-being"

These needs were identified as follows: to produce a guiding model which is reflective of students' experiences of online learning during a pandemic, to inform and to support instructors' online teaching and learning approaches, and to form the foundation of institutional professional development offerings related to learning and teaching.

Ideating

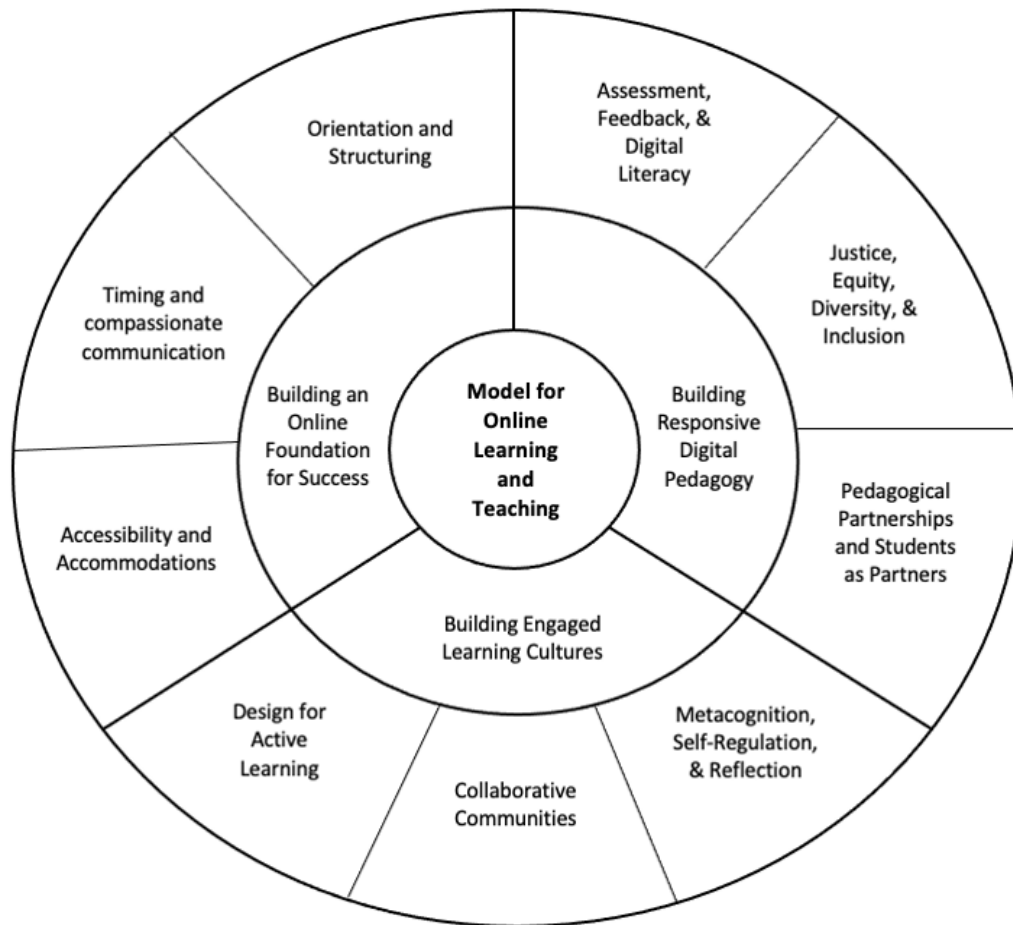
The ideation phase involved developing a model by triangulating data from student voices, academic developers' feedback, and discussions with colleagues. Existing frameworks which identified elements of quality in online learning and teaching were also consulted in the ideation phase. In a design thinking approach, "ideating" may involve multiple iterations, refined each time through dialogue and consultation. For example, one of the first drafts of the model I developed mirrored aspects of the empirically grounded Dynamic Model of Educational Effectiveness (Creemers et al., 2013). The Dynamic model, at first, offered a structure within which I could align the needs and aims that were established from the previous "empathy" phase of the design process. There are eight elements of quality in The Dynamic Model, and these are not particular to learning and teaching online: Orientation, Structuring, Modelling, Application, Questioning, Assessment, Management of Time, and Classroom as a Learning Environment. I adapted these eight elements for learning and teaching in virtual environments and identified sub-components under each of the eight categories which responded to students' learning needs and reflected the current context. After a first round of developmental feedback from our teaching and learning team, a ninth element was added to the initial model, which is now called Accessibility and Accommodations (see Figure 2 for updated names of the nine elements).

Prototyping

The prototyping stage of design thinking can look different based on the project. Usually, a "minimum viable prototype," or something that is just good enough, is encouraged. This prototype can be tested, and feedback can be collected. Based on feedback, the prototype is refined and tested again. It is the non-linearity in process and feedback generation in community that make design thinking an appropriate approach to educational improvement.

Figure 2

Model for Online Learning and Teaching (MOLT)



The prototype of MOLT in Figure 2 is a second full iteration and is presented in a circular shape rather than a table format (see Appendix A for the table format). Some sub-components from the first iteration have either been removed or condensed and moved around, to be less “prescriptive” (see Appendix B, which shows the current version of MOLT in a table format, to highlight the differences between the two iterations). The language has been broadened to increase the use, longevity, and relevance of the model across modes of learning (online, blended, hybrid, or hyflex) and beyond the pandemic. MOLT also organises the nine components within three key themes: Building an Online Foundation for Success; Building Responsive Digital Pedagogy;

Building Engaged Learning Cultures. The themes help create a clarity of purpose and allow for connections to be made between elements. In its current iteration, the MOLT model allows for flexibility and invites instructors and students' insights to continue to inform and shape the learning environment rather than constrict it. I envision that MOLT will now be a conversation starter when considering course design and redesign, or when planning and implementing professional learning, rather than a checklist of items and expectations to meet.

In the next phase, I describe how we (Tremblay & Manners, 2021) tested the initial prototype, the outcome of which also informed the second iteration presented in this chapter. This back-and-forth between ideation, prototyping, and testing emphasises the non-linearity of design thinking as an approach towards continuous refinement and improvement in education towards more grassroots teaching and learning development.

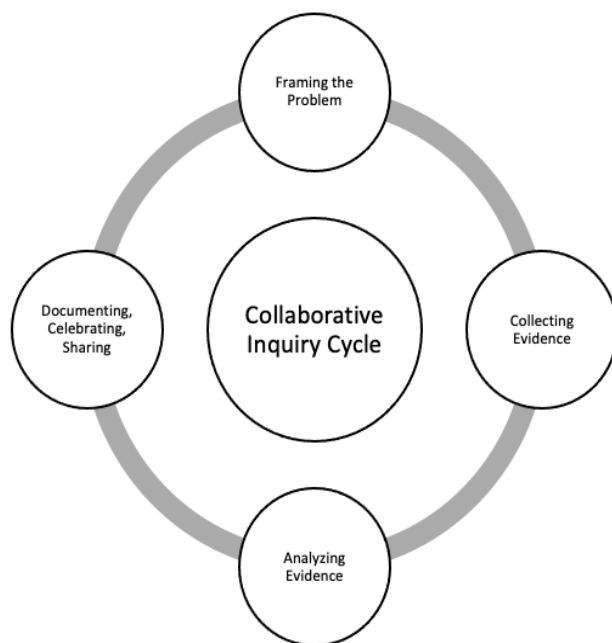
Phase 5: Test – Facilitating Collaborative Inquiry Cycles to Pilot the Prototype

The final stage of a design thinking framework involves “testing” the prototype. In this case study, this stage is mobilised through a collaborative inquiry (Donohoo, 2013) model of professional learning and development. Through cycles of systematic implementation and gathering feedback, the prototype can be continually refined. For this testing phase, I worked with the same colleague, Tremblay, because of their familiarity with the project and ability to speak to students' experiences that informed the prototype. Together, we invited instructors to select and implement one element of the MOLT. Collaborative inquiry was selected as the professional learning model because it is a group-based approach where participants co-create knowledge for change within a context. Figure 3 shows the four stages of a collaborative inquiry.

Four stages informed the development of professional learning activities within a collaborative inquiry framework: Framing the problem, Collecting evidence, Analysing evidence, and Documenting, Celebrating, and Sharing (Donohoo, 2013).

Figure 3

Four Stages of the Collaborative Inquiry Cycle as Presented in Donohoo, 2013



Tremblay and I experimented with a nested inquiry, wherein we studied both the impact of instructors' independent inquiries as well as our facilitation of the process in an online environment. The four stages of a collaborative inquiry cycle spanned 5 weeks (see Table 3 for a breakdown for each week). Weeks 1 and 2 were guided by the two of us as facilitators. In the first week, we introduced the MOLT prototype and provided a rationale for its development, we informed instructors about the collaborative inquiry process, and we co-constructed group norms. Instructors shared areas of practice they wanted to systematically study and improve and they selected a component from MOLT to focus on. In week 2, we finalized an overarching group research question and crafted individual theories of action (if ... then ... statements). The latter 2 weeks were led by the instructors and consisted of reflecting and sharing learnings. Week 3, the midpoint of the inquiry, was an implementation week, where instructors put their conversations

and plans from the previous weeks into action, and they collected and analysed data generated from implementing their theory of action.

Table 3

Outline of Our 5-Week Collaborative Inquiry Cycle

Week	One	Two	Three	Four	Five
Facilitation	Select an element of focus Facilitators guide research question development	Develop a theory of action Discussion of research ethics, and methodologies	Implementation of theory of action and data collection	Share successes and challenges in implementation and plans for revision	Present findings and reflections Facilitators invite focus group for feedback
Mode	Synchronous	Synchronous	Asynchronous	Synchronous	Synchronous
Time	60 minutes	60 minutes	na	60 minutes	60 minutes

We invited three instructors from the same faculty to participate in four synchronous meetings in weeks 1, 2, 4, and 5, while the fifth week also included a focus group interview to gather feedback about MOLT and our facilitation. The study received clearance from the institution's ethics board, all participants granted informed consent, and all data was made confidential. We took field notes and gathered data from interactive activities on Google Jamboard (such as contributions related to problem framing and theories of action). During the focus group interview at the end of the inquiry, we collected data in the form of field notes and recorded interview transcripts, with the instructors' names removed.

For their collective and individual inquiries, instructors chose to engage with the students-as-partners element within the Building Responsive Digital Pedagogy section of MOLT. In conversation during the first synchronous meeting, instructors expressed a desire to work with

students to create inviting virtual learning spaces which reflected students' interests, whilst also building the skills that are considered important in their courses such as networking and collaboration. We discussed our shared values of what a students-as-partners philosophy meant to us as a group and agreed that learning experiences designed for students must involve students in the continuous development of how the online space will be used. From our discussion it was evident that participants shared the belief that student involvement and consultation in the areas of synchronous engagement and asynchronous learning strategies is crucial to fostering student belonging and success. Consulting the literature, we also discussed how the principles of respect, reciprocity, and shared responsibility in learning shape the relationship between faculty and students (Cook-Sather et al., 2014). Following this conversation, we developed an overarching inquiry question which all instructors agreed on: How can we invite students to improve their skills as active partner-participants? Informed by this question, each instructor then selected a theory of action statement and a data collection method for their study before heading into the implementation week. Table 4 provides details about instructors' research questions from week 1, agreed upon data collection methods from week 2, and their findings from week 5.

All three instructors who participated in our collaborative inquiry model of professional learning noticed improvement in student engagement through the systematic implementation of their research question, and the analysis and evaluation of their collected data. Instructors also reflected that their participation in a collaborative inquiry made them feel valued and supported by their institution; they had space and time to reflect on their teaching, identify and discuss areas for improvement, and share their learnings with their colleagues. All instructors were keen to continue their efforts in improving practice, mobilising their findings, and sustaining a culture of collaboration in academic development.

Table 4

Collaborative Inquiry Overarching Questions, Theories of Action and Data Collection Methods, and Results

	Overarching Question	Theory of Action Statement	Data Collection Method	Findings and Interpretations
Prof 1	How can we invite students to improve their skills as active partner-participants?	“If I create a virtual networking space that is student led, I can achieve 80% response rate of students introducing themselves”	Track the response rates (number of posts and replies) from students in online discussion forum	Not a high rate of students posting or responding “I would have loved to have the opportunity to build it into my course structure, maybe at the beginning of the term, just so I knew what the milestones I wanted to hit were, but finally it’s integrated with the lectures and assignments”
Prof 2		“If I implement peer evaluation in discussions, then the rate of students’ participation and engagement will increase in quantity and quality”	“I have added a peer evaluation task to my discussion board which was due on June 16. I am going to compare the participation to the new discussion with the results of the earlier one. I am looking for improvement in terms of participation rate (number of posts) and quality (length of posts)”	Adding peer evaluation to a discussion thread resulted in a 600% increase in the number of words students posted, and the number of replies to posts increased 188% compared with previous discussion threads. Overall marks were also higher in the discussion with peer review.

Prof 3		“If I create an open call for discussion topics in an upcoming lecture, I can achieve 50%+ active participation, either in the form of suggesting a topic, or upvoting another person’s suggestion”	“I will create an online discussion board, making an open call for discussion topics. Will observe how/to what extent the class participates, especially since this is on a voluntary basis. I’ll collect data on number of new posts, unique users, number of upvotes/comments etc.”	“I used Padlet to encourage students’ suggestions and engagement (i.e., “upvotes”) to choose discussion topics. Ten in 21 students posted questions, and nine students posted responses”
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Note. Adapted from *Investigating Online Collaborative Inquiry as a Method for Instructors’ Professional Development*, by T. Tremblay and A. Manners, 2021, International Society for The Scholarship of Teaching and Learning (ISSOTL).

The group agreed that one week for implementation felt rushed, and that in general starting an academic year in concert with a collaborative inquiry would have ensured more thoughtful implementations and prolonged reflections. As academic developers the short cycle of the inquiry and timing within the academic year were constraints we worked within, and we agree that sustainable professional development needs to be well timed and positioned among other events in the academic calendar.

We collated our “lessons learned” into three sections: resource management, facilitation strategies, and strategies for scaling-up. With regards to resource management, participants commented that they often didn’t know where to look for resources or didn’t feel the need to look outside of the structured synchronous sessions. We wondered what this meant for conducting scholarly inquiries as instructors did not cite literature outside of what we had presented and curated within the discussion, and perhaps the tight timeframe was also a contributing factor here. While the inquiry cycle focuses on heavy facilitation from us in week 1 to 2 and later becomes

more participant-led in weeks 4 and 5, we want to create more space for dialogue and problem sharing in the earlier weeks, and this might mean dedicating longer than 60 minutes per synchronous session in future facilitations.

Table 5

Instructors' Focus Group Feedback After Participation in Collaborative Inquiry

Area	Professor Comments
Encouraging reflective practice	"It really was good for me to not just think about what I'm doing in an online class, but how I'm doing it, why I'm doing it ... am I being critical of what I do and how I communicate and how I can kind of heighten education experiences in online environments? "
Collaborative professional learning	"It also dawns on me, the power of collaborative work, if there's like an ongoing peer group. Imagine that, right? That we can have a forum to talk like this because I'm learning lots, not just from the study itself, but from the others"
Scholarly teaching	"And to know that I work for an organisation that takes these kinds of inquiry seriously and would like to hear from us. I feel I'm contributing not only to my own personal teaching. So that gives me a very rich sense of contribution. That's one of my best takeaways"

As facilitators we also reflected on the "collaborative" in collaborative inquiry in an online environment and thought about how this might be drawn out in future facilitations. The tight inquiry timeline and instructor's competing schedules made it difficult for them to collaborate outside of the synchronous sessions. Leaving room for flexibility and informal check-ins would indeed strengthen the collaboration component and, in turn, the instructor's individual inquiries and provide opportunities to cite wider literature. This might mean thinking of the more practical aspects such as scheduling the inquiry at a suitable time in the academic year and pre-scheduling meetings and check-ins at agreed upon times.

Finally, we discussed strategies for scaling up the scholarly aspect of collaborative professional learning for continuous and sustainable professional development. This could mean including a "developing scholarly teaching" strand within the institution as an invitation for

instructors to share their work, and for academic developers to continue designing for pedagogical collaboration. At the time of conducting this inquiry, the college did not have a formalised approach to sustaining such scholarly inquiries or an intentional focus on Scholarship of Teaching and Learning (SoTL). Planning for more SoTL projects within and between institutions would certainly be welcomed by instructors who reported that, by participating in a guided inquiry, they felt invested in by their institution and it made them proud to contribute to wider scholarship. Overall, instructors felt engaged, and their college experience was enhanced through participation in the collaborative inquiry cycle. Inviting student engagement within the design of online learning and teaching also addressed, in some part, concerns about social, cognitive, teaching, and emotional presences that were expressed in the initial student survey (see Table 2 for more details).

Conclusions and Implications of Using Design Thinking

Design thinking can offer a responsive approach to institutional needs by leading with empathy in creating and curating virtual learning spaces and the development of experience-based policies and frameworks. The flexible, non-linear methodology of design thinking means that it can be used creatively to support professional learning in education. For example, in this chapter I explained how, through a design thinking approach, students' experiences informed a professional learning experience for instructors, and then instructors' feedback after implementation continued to inform future iterations of the model. In academic development and professional learning, each of the phases in a design-thinking approach can inform a distinct purpose, aim, or goal. In this study, for example, the purpose was to learn about students' experiences, create a model which was reflective of students' feedback, and promote professional and reflective practice which was actioned through collaborative inquiry.

While design thinking can offer a structured and systematic approach, it also leaves room for experimentation. In this case study, design thinking allowed for compassionate transitions in disruptive times, from emergency remote teaching to purposefully planned online learning.

Design Thinking in a Post-Pandemic World

As our educational priorities continue to change in a post-pandemic landscape, design thinking can offer a humanised approach to innovation and problem solving. Implementing a design thinking approach has allowed us to connect our work with a broader, student-centred purpose for improving virtual educational experiences during a time of disruption. Moving forward, as educators continue to shape a post-pandemic landscape, design thinking can offer a valuable approach in pre-service and in-service teacher education classrooms. It can inform how teacher education programmes continue to reflect, change, and grow in ethical ways, starting with a deep appreciation for the needs of a population, whether that is teachers or students.

This case study involved students and instructors at different phases of the design thinking process, and future studies could, and should, look at pedagogical partnerships from start to finish. If design thinking has a future in informing responsive pedagogical models, then it is imperative that we continue to investigate and deconstruct the Eurocentric approaches to design and contemplate the relationship between design, power, and justice to practise community-led projects. This case study does not address these issues, as it is a brief, albeit promising, exploration into design thinking that still makes assumptions that need to be dismantled to design for justice. For example, in the initial “empathy” phase we used second-hand student data from one question in a larger institutional survey, and even though we coded many responses, we do not know whose voices were excluded from that survey. Maintaining partnerships from the start with students ensures that we design *with* and not *for* (see, for example, Design Justice Issue 3, Design Justice in Action).

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Appendix A
Table of First Iteration of Model with Identified Sub-Components

Components in Framework	Sub-Components		
Orientation of the virtual space	Welcome message	Course navigation	Instructor information
Structuring the online course	Course information	Course materials	Questions and feedback
Accessibility and legal responsibilities	AODA	Copyright	Privacy
Assessment strategies for a virtual environment	Assessment design and type	Assessing with integrity	Feedback strategies
Engagement and communication in a virtual space	Netiquette	Use of online tools	Students as partners
Equity, Diversity, and Inclusion in the online course	Equitable learning environments	Inclusive course materials	Diversity in the online classroom
Universal Design for Learning in a virtual environment	Multiple means of engagement	Multiple means of representation	Multiple means of action and expression
The virtual classroom as a learning community	Teaching presence	Social presence	Cognitive presence
Management of time in an online course	Scaffolding for success	Metacognition and self-regulation	Course continuity

Note. The bolded rows show how the first iteration relied on named frameworks like UDL and COI and the three sub-components are part of those existing frameworks.

Appendix B
Table of Second Iteration of Model Named MOLT
(Linear Representation of Circular Model)

Theme	Elements			Supporting frameworks
Building an Online Foundation for Success	Orientation and Structuring	Timing and Compassionate Communication	Accessibility and Accommodations	Universal Design for Learning (Meyer et al., 2014)
Building Responsive Digital Pedagogy	Assessment, Feedback, and Digital Literacy	Justice, Equity, Diversity, and Inclusion	Pedagogical partnerships and students as partners	EAT Framework (Evans, 2016) Students as Partners (Cook-Sather et al., 2014) Trauma aware pedagogy
Building Engaged Learning Cultures	Design for Active Learning	Collaborative Communities	Metacognition, Self-regulation, and Reflection	Community of Inquiry (Garrison et al., 2000) Communities of Practice (Wenger, 1999) Frameworks for Reflection

Note. Much of this second iteration is a thoughtful re-shuffling of the first: it involved eliminating sub-components which overlapped with others and identifying broader themes. In this table references are made to external supporting frameworks which might support and enhance the use of MOLT, although it is not necessary to refer to them.

Chapter 23

Using Design Thinking as a Lens to Examine Faculty Members' Experiences Teaching During COVID-19

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Abstract

In this chapter, the authors describe their use of design thinking (DT) as a theoretical lens to frame the experiences of faculty members in redesigning and teaching remotely previous in-person courses as an emergency response during the COVID-19 pandemic. This chapter presents a descriptive case study of five faculty members across undergraduate and graduate courses in education at the postsecondary level during the COVID-19 pandemic. The results of the study indicated that while the faculty members did not intentionally apply the DT model to their course design process, they followed the stages in the DT process to design courses and address the challenges posed by the pandemic. The authors conclude that DT, characterized by empathy and iterations, was unintentionally relevant to the immediate redesign of courses for remote learning, and may be suitable as a model for a more intentional design of online courses. The chapter also shares insights from the experiences of the faculty members related to the challenges of remote, online course design. The in-depth case study approach to examining the design process also resulted in recommendations for using DT to design student-centred courses.

Résumé

Dans ce chapitre, les auteurs discutent de leur utilisation du *design thinking* (DT) comme cadre théorique de manière à exprimer les expériences vécues par certains professeurs dans le contexte du passage d'urgence des cours en présentiel aux cours à distance pendant la pandémie de COVID-19. Cette recherche repose sur l'étude de cas de cinq professeurs ayant enseigné à l'un ou tous les cycles universitaires en éducation dans une institution postsecondaire pendant la pandémie de COVID-19. Les résultats de l'étude indiquent que même si les professeurs n'ont pas délibérément appliqué le modèle DT dans le processus de conception de cours, ils ont suivi les étapes inhérentes au DT pour les concevoir sous un nouvel angle afin de relever les défis posés par la pandémie. Les auteurs concluent que le DT, caractérisé par l'empathie et les itérations, s'avère pertinent — bien qu'il ne fut pas à l'origine intentionnellement envisagé — pour la refonte immédiate des cours dans le cadre de l'apprentissage à distance, comme modèle de conception délibérée de cours en ligne. Le chapitre offre également des réflexions tirées de l'expérience vécue par ces professeurs et liées aux défis de la conception de cours à distance et en ligne. Cette étude de cas approfondie, visant à examiner le processus de conception, suggère des recommandations concrètes eu égard à l'utilisation du DT dans la conception des cours centrée sur les étudiants.

Using Design Thinking as a Lens to Examine Faculty Members' Experiences Teaching During COVID-19

Education is facing one of its greatest challenges in recorded history. In an unprecedented move, schools and universities across the globe halted their on-campus operations due to the COVID-19 outbreak and one year after the pandemic, close to half the world's student population was still affected by partial or full school closures (UNESCO, 2021). As a response to the pandemic, educational institutions began rapidly transitioning courses to online learning environments described as "emergency remote learning." This rapid transition to what became "online learning" was often compared to courses that were purposely designed to be online; however, the rapidly redesigned face-to-face and hybrid courses were not necessarily the same.

Iglesias-Pradas et al. (2021) suggest that the main difference between structured online learning and emergency remote learning is that the former is a product of careful instructional design and planning, which often requires an investment of time, effort, and finances. Emergency remote learning is merely a response to a crisis, and it assumes that teaching will return to the original format once the crisis ends (Iglesias-Pradas et al., 2021). During the initial stages of the pandemic, it seemed that educators were misidentifying the remote learning opportunities offered to students, in the emergency response context, as structured online learning. Hodges et al. (2020) noted that well-planned online courses are significantly different from remote learning offered as a crisis response. However, the quality of online instruction, rapidly designed in response to the pandemic, may have a lasting impact on the perception of students towards online learning. It is therefore important to analyze and streamline the online course development process with a focus on quality and effectiveness. Several researchers have emphasized the relationship between quality of course design and students' learning experience (Alston et al., 2017; Chao et al., 2010; Elliot 2017; Karthik et al., 2019; Lister, 2014; Stevens, 2013).

Hodges et al. (2020) examined several cases of educational planning in crises and indicated that these circumstances call for creative problem solving and suggested that the course design process can impact the quality of the instruction. Design thinking (DT), an iterative design approach popularized by Stanford University's Hasso Plattner Institute of Design (Plattner et al., 2012), can potentially support the development of a model to address issues in online education, particularly the course design process (Akram et al., 2020; Baran & AlZoubi, 2020). Conventionally, the design thinking model offers an approach to solving complex problems using an iterative process consisting of five stages: empathize, define, ideate, prototype, and test (Willard-Holt et al., 2018). Examining the approach used to design these online emergency remote courses through the lens of DT may inform future practices in teaching and learning, while supporting the development of interactive courses based on problem solving and critical thinking (Brown & Green, 2018). DT involves collaborative and human-centred activities which may assist faculty and programs in adjusting to unexpected changes (Willard-Holt et al., 2018) caused by the pandemic.

There is limited pre-pandemic research that examines the experiences of faculty members designing online courses in higher education through the lens of design thinking; however, there is evidence in literature that the choices made by the instructors related to the design components before and during the delivery of the courses can impact student engagement and achievement (Iglesias-Pradas et al., 2021). Recent studies in this field have focused on innovative, flexible, and human-centred approaches not only to analyze emergency remote learning, but also to address the longstanding problems associated with online education (Bao, 2020; Baran & AlZoubi, 2020; Sandars et al., 2020; Zhu & Liu, 2020;). Rapidly transitioning classroom courses to online learning environments while focusing on a positive learning experience for all students (Crawford et al., 2020; Hodges et al., 2020) has become a challenge for course instructors and instructional

designers. As DT focuses on understanding human need, it calls attention to inclusivity, diversity, and participant safety (Svihla, 2017). Hence, examining the lived experiences of the faculty members as they relate to redesigning, and facilitating emergency remote courses through the lens of design thinking can provide valuable insights and inform teaching and learning practices.

Context of the Study

The COVID-19 pandemic has created an opportunity to alter the design and structure of our traditional educational programs (Baran & AlZoubi, 2020). The widespread shift to online education amplified learning environments in which every learner has unique needs characterized by their financial situation, access to technological infrastructure, and caregiving responsibilities among many other factors. Universities are making efforts to support students in continuing higher education, and “flexibility” is emerging as an overarching theme in literature (Zhu & Liu, 2020; Bao, 2020; Sandars et al., 2020). Many researchers have highlighted the need to embrace innovative approaches and challenge traditional and rationalized methods to create flexible learning solutions in online education.

Designing Online Courses

The online course design process, often referred to as instructional design, is a growing and evolving discipline that focuses on systematically developing instructions based on learning theories for making learning more efficient and effective (Karthik et al., 2019). Much like online learning itself, there is ambiguity in research over the definition of instructional design and the role of instructional designers (Bond & Dirkin, 2018). Instructional designers are not always the same person as the faculty member who is designing and teaching the courses. Karthik et al. (2019) point out that instructional designers are often seen as the technological experts; however, they are also required to understand the needs and expectations of the online learners. Instructional designers now collaborate with faculty and subject matter experts to design instruction and make

recommendations related to educational technologies (Stevens, 2013; Karthik et al., 2019).

Therefore, instructional design can be viewed as the art and science of “creating detailed specifications for the development, evaluation, and maintenance of situations which facilitate learning and improve performance” (Stefaniak, 2020, p. 202).

While critiquing the existing models of instructional design, Chen (2016) indicates that popular approaches used by faculty members and instructional designers often tend to be linear and inflexible where the design process is driven predominantly by instructional objectives. This is contradictory to a student-centred approach where students participate in the design process. The DT approach encourages course designers to empathize with the students, interact with them, and allow them to become a part of the design process by becoming co-designers (Brown & Green, 2018). Hennessey and Mueller (2020) propose that “the cornerstone of the DT process is its iterative nature, such that all stages can be repeated or returned to at any time until the design is fully optimized.” The characteristic flexibility of the DT process facilitates the creation of multiple prototypes and iterations (Hennessey & Mueller, 2020).

Design Thinking

In a special issue on design thinking for innovation, Docherty (2017) suggests that “design thinking can be considered a process as well as a mindset and is widely viewed as a mechanism for addressing ‘wicked problems’ and exploring possible futures” (p. 719). The growing research interest in this area may be indicative of the increasingly pervasive presence of this approach and design-informed methods in addressing complex social challenges. When carefully deployed, DT can enable the innovation process by creating a safe space for sharing diverse perspectives and co-creating shared solutions by empowering the participants or end users. Although the elements of the DT process are often depicted as linear steps, in practice, the DT method is fluid and organic (Brown & Green, 2018). This process indicates that designers should start by *empathizing* with the

user of the final product — in the case of instructional design that “product” is the students for whom the course is being designed — to ensure that the design process is human-centred (Hennessey & Mueller, 2020). In the second stage, the instructional designers must *define* the problem that their solution will address, the individuals impacted, and the contextual factors involved (Stefaniak, 2020). In the *ideation* stage, designers must engage in brainstorming to identify possible solutions and evaluate each solution to identify the most viable alternative. The next stage involves designing a *prototyping* for the most viable solution. In the final stage, the prototyping should be *tested* for effectiveness (Stefaniak, 2020). It is important to note that since the DT process is iterative, all stages can be repeated or reversed until the design is fully optimized (Hennessey & Mueller, 2020).

Although designing courses with the learner in mind suits the design thinking process, in the empathy stage of the DT process instructional designers must carefully attend to power dynamics. While including learners in the design process, learners may be uncertain about how honest they can be, especially if they come from marginalized communities or cultures unfamiliar to the instructional designer (Svihla, 2017). The emergency remote context of the pandemic highlighted many differences and unique needs of learners. When deployed appropriately, design thinking can enable innovation by providing a “safe” space for diverse perspectives to be openly shared, for new insights to emerge, for knowledge to be created, and by empowering participants in the co-creation of shared visions (Docherty, 2017).

Challenges in Using DT for Designing Online Instruction

Willard-Holt et al. (2018) suggest that DT is a complex and multi-faceted approach to learning and problem solving. It relies on the ability of the designers to be intuitive, to recognize patterns, to construct ideas that are human-centred and functional. Using the DT process in Instructional Design can be challenging and may not be suitable for all instructional design

projects. A change in mindset is often required to position the learner at the centre of the development and requires a greater involvement of end users.

Employing the DT process in instructional design may require a change in the mindset of the designers and faculty members towards course design. Svihla (2017) cautions that inexperienced designers may jump to solutions too quickly, because of the emphasis in their professional development on finding the most efficient solution; once they identify a viable solution, they may not consider alternative approaches. Brown & Green (2020) suggest the DT process can also feel chaotic to those who are not experienced in using it. DT practitioners must be prepared for ambiguity, uncertainty, and must be willing to learn from failure and use that knowledge to iterate (Glynn & Tolsma, 2017). DT encourages designers to take a democratic approach to decision-making, and not be deterred by conflicting opinions (Docherty, 2017). This advice aligns with the observation made by Hennessey & Mueller (2020) that DT can cause ambiguity which may lead to conflicts. The pay-off to managing these conflicts and providing support through all the DT stages can be the sparking of innovation.

Inviting end users to participate in the solutions and designing through iterations can pose potential risks and challenges. Svihla (2017) cautions that too much emphasis on iterations with little end user participation may lead to the development of a solution that is innovative but does not meet the users' needs. On the other hand, an excess of end user participation with fewer or no iterations might lead to solutions that meet the needs but lack innovation. Course designers must carefully consider the extent of student involvement in the course design process, and the emphasis on iterative design considering the time and budget constraints. Kelly et al. (2020) argue that DT practices are counter-intuitive to the mainstream traditional practices in education, which tend to focus on content-transfer and corresponding assessments. Using DT effectively requires a shift in disposition from passive consumption to active creation. This change can happen through

support and education for course designers. In the absence of such a support, educators may risk defaulting to traditional practices, which dramatically diminish the effect of even the most transformative approaches.

Research Questions

While most studies related to DT and course design have focused primarily on the theoretical aspects of DT and their applicability to instructional design (Brown & Green, 2018; Svihla, 2017; Kale et al., 2020), there is limited research that examines the application of DT to the course design process that focuses on the experiences of faculty members. Such an examination is important as it may create opportunities to innovate the course design process, but also support the development of online education with a student-centric focus (Willard-Holt et al., 2018). To address this gap in research, our study attempted to answer the following questions:

1. What are the experiences of faculty members in designing and teaching courses remotely during the COVID-19 pandemic? What tensions might have existed between explicit design and naturally arising circumstances that forced change?
2. In what ways is DT a suitable model for describing the design of remote courses as an emergency response in an online context? What are the challenges in applying the DT stages to the course design process?

Methodology

To achieve our research objective, we used a multiple case study approach (Hamilton and Corbett-Whittier, 2013) to better understand faculty members' experiences in redesigning courses offered remotely as an emergency response during the COVID-19 pandemic. Applying DT as a theoretical lens, our study attempted to gain an in-depth knowledge of the process of designing online courses during a crisis, through a brief survey and semi-structured interviews.

Participants

This study was conducted in a faculty of education at a mid-sized university in Ontario. The faculty members who participated in this study had some experience in teaching courses remotely and using a learning management system. As the Faculty of Education offered some courses in a blended format with synchronous as well as asynchronous classes, faculty members had access to an existing technology infrastructure and relevant training. A total of five faculty members participated in this study and the pseudonyms Emily, Melanie, Nancy, Olivia, and Sophia were assigned to the participants. Out of the five participants, four had designed and taught courses during the pandemic at the undergraduate level and one other had taught courses at the graduate level (Table 1). All the courses were transitioned from the classroom to the remote format as a crisis response during the pandemic, with limited time and support for redesign. Some support was provided by the Teaching and Learning Centre at the university.

Table 1

Course Format and Details

Participant	Course Duration	Asynchronous classes	Synchronous classes	Program level
Emily	6 weeks	No	Yes	Undergraduate
Melanie	12 weeks	Yes	Yes	Undergraduate
Nancy	12 weeks	Yes	Yes	Undergraduate
Olivia	12 weeks	Yes	Yes	Graduate
Sophia	12 weeks	Yes	Yes	Undergraduate

Data Collection & Analysis

Four of the five participants responded to the survey and all of them were interviewed following completion of their respective course. The survey captured details about the course design. The interviews were semi-structured: they followed five questions to guide the

conversation about the instructional approach that was adopted to re-designing the courses, and to determine what challenges were met and how learners were involved. Each interview lasted approximately 30 minutes and were recorded; the resulting transcripts were shared with participants to allow them to make changes, if required. The survey and interview data were used to build the individual case studies.

Data collection and analysis were performed simultaneously and iteratively. The data from interviews and survey results were synthesized to build five individual cases. A cross-case analysis was then performed to compare the findings from each case using the design thinking model as a theoretical lens.

Results

Cross-Case Analysis

The cross-case analysis revealed commonalities and differences in the experiences of faculty members, the challenges they encountered in designing and teaching these courses, and the pedagogical strategies they used to overcome the challenges. Use of creative problem-solving to address the unexpected challenges posed by the pandemic emerged as an overarching theme. Faculty solutions were deeply influenced by empathy for the students and focused on simplifying the learning process by considering the context of a global pandemic. Additionally, the analysis indicated that the design process continued throughout the duration of the course as the faculty members used student feedback to continually design and redesign critical elements of the course to improve the learning experience. It is evident across all the cases that instructors' experience of teaching the courses in both remote and classroom formats informed the iterations of their courses, highlighting the strong link between design and facilitation of a course.

The five stages of the design thinking process (empathize, design, ideate, prototype, and test) were mapped over the data from the individual cases to identify any presence of DT elements during the cross-case analysis.

Presence of DT stages

The Hasso Plattner Institute of Design at Stanford (n.d.), in their DT process guide, recommends strategies for each stage in the DT process, which we have summarized in Table 2.

Table 2

Stages of the DT process

Empathize	Empathize with the students by observing and engaging with them to identify the problem.
Define	Define the problem by focusing on the needs of the students.
Ideate	Identify many possible solutions using creative problem solving.
Prototype	Select a few ideas and build prototypes using those ideas.
Test	Test the prototypes by sharing them with the students and iterate using their feedback.

Although the faculty member participants did not intentionally apply design thinking as a model for designing and teaching remote courses during the COVID-19 pandemic, our analysis revealed that they intuitively applied DT stages and characteristics in their course designs.

“Empathize,” the first stage in the DT process, emerged as an important theme in all the cases.

Considering the context of the COVID-19 pandemic, the faculty members used various strategies to empathize with their students and to understand the challenges they faced. This stage was followed by rigorous planning which required defining and describing their problem in detail to lead the course design into the “define” stage of the DT process. In the “ideate” stage, the faculty members created and evaluated possible alternatives and came up with creative solutions using the

remote teaching infrastructure available to them. In the prototyping stage, some faculty members created multiple prototypes of the course schedules with different combinations of asynchronous and synchronous classes, and so on, and designed various pedagogical strategies to test in the classroom. Iterations were then created using observation and student feedback.

It is important to note the DT stages often overlapped and the process of course design was cyclical. For instance, ideation and prototyping in Sophia's course was done at the same time and all the ideas were converted into actionable strategies and then tested in the classroom. Sophia suggested that the testing phase was problematic as the only way to test a prototype was to implement it, and there were limited opportunities to iterate in the same course. Nancy shared that there were limited opportunities to iterate within the same course and added that it was difficult to meaningfully use the learnings from one course to another, as the students change with each cohort and may have different learning needs.

Using the design thinking process as an interpretive framework, detailed reporting from the data is addressed below with reference to each stage from *empathy*, to *definition of the problem*, to *possible solutions*, to *prototypes*, to *test and evaluation*.

Stage 1. Empathize With the Students by Observing and Engaging with Them to Identify the Problem.

The faculty members were able to empathize with the students by not only observing them and engaging with them during class, but also by using various other strategies such as considering their own lived experiences of dealing with the unprecedented challenges created by the pandemic. Nancy shared that she understood why students chose to not have their camera on in classes facilitated via Zoom. "There's a whole lot happening in people's lives and they didn't choose to be online. They are not necessarily in a space where it is easy to work online," she added.

The faculty members also considered the context of the pandemic while designing the course. Olivia added:

Another consideration, during this pandemic, was that I knew how stressful it had been for everybody, for my students. I think I have tried to be especially conscious of making things uncomplicated, well-structured, clearly laid out, repeating information in multiple formats.

Melanie was able to empathize with her students and appreciate the problems that they were facing through the experiences shared by her daughter, who was enrolled in a remote learning course at another university. This personal experience allowed her to address student problems using suitable pedagogical strategies:

it helped me understand that even if I thought something was clear, it probably could be made even more clear. Clarity of instructions and availability of resources is important. I felt, as an instructor, an obligation to make it as easy as possible for them to get through this material.

Olivia emphasized that empathy was a very important factor in her course planning and design. Considering the chaos and uncertainty created by the pandemic, she wanted to ensure that “the expectations that I was laying out for students were reasonable and fair and considerate under the conditions in which we were operating.” She was able to empathize with her students by examining her own experiences during the pandemic and this, she stressed, informed her teaching: “The pandemic really influenced my thinking so I probably would take quite a different approach if it weren’t for the pandemic.”

All of the participants emphasized that their efforts were centred on making the learning experience easier and less stressful for their students. They had identified that getting to know the students in the online learning environment was a challenge. Not knowing the students, their backgrounds, challenges, and learning needs prevented them from empathizing with the students

and responding to their specific needs. To address this problem, Sophia and Emily designed and shared a survey with the students containing questions about their background, experience, and so on, the results of which allowed them to modify their approach. Nancy asked for mid-class feedback which allowed her to understand what was working for students and what wasn't.

Empathizing with students was foundational in the course design and teaching process across all the cases. This provided a strong basis for all other stages of the DT process.

Stage 2. Define the Problem, i.e., Designing the Course.

The problem as defined in the design process in this study was 'redesigning a course for remote delivery'. The participants were able to identify the challenges in remote education during the pandemic and describe them by using their own observations as well as their colleagues' experiences. Olivia observed, "I think what helped was that, immediately, those of us who were teaching in the spring term decided that we would start to meet, talk, share ideas." Olivia's peers, who had taught remotely in the very initial days of the pandemic, shared their experiences in terms of what worked and what didn't work with other faculty members. Strategies such as using resources shared by the university, leveraging information available on the internet, taking a course on teaching remotely, and so on helped the participants define and frame the problems faced by their students in terms of the course.

Stage 3. Identify Many Potential Solutions Using Creative Problem Solving.

All the participants highlighted that the course redesign planning process was extremely time consuming due to the constantly changing circumstances of the pandemic. Faculty participants were required to consider many potential solutions before finalizing the course design, specifically with respect to the course format and the combination of synchronous and asynchronous classes. Nancy shared her frustration with the uncertainty:

It was really different. I had the opportunity to look at it as completely online, also as remote, and in person. I was trying to pull the best of all three together. But I think that is what made it difficult. I had this whole history.

In some ways, she suggested that her experience of teaching the course many times in the past helped as she was able to draw from it. In other ways, it created hurdles as not all of it could be transferred to the remote environment. Sophia indicated that “there were a lot of different possible schedules and assignments for the course.” She then proceeded to select which sessions were going to be synchronous and which sessions were not, before building in the activities for each session. The timing of the classes, associated learning activities, and assessments were important considerations for her.

Stage 4. Select a Few Ideas and Build Prototypes Using Those Ideas.

Sophia suggested that the way the course schedule and the activities are put together could be “commensurate with the idea of a prototype.” All the participants indicated that while designing the course they considered multiple course formats and combinations of synchronous and asynchronous classes. In Melanie’s case, she treated each class as a prototype, and noted that there were 12 class sessions and therefore 12 iterations from a pedagogical standpoint. She identified what worked and what did not work in every class, and she made a change in her approach in the next class to make the learning more effective and easier for her students.

The faculty participants also indicated that there were challenges in identifying which portions of the course materials should be offered synchronously through the Zoom class, and asynchronously through the LMS. While discussing the distribution of content across the classes, Olivia shared, “I wanted to make sure that the expectations that I was laying out for students were reasonable and fair and considerate under the conditions in which we were operating.” Having a blend of synchronous and asynchronous learning was even more of a consideration during the

pandemic for Olivia, and she recognized that students may not want to be in Zoom meetings for extended periods of time.

Many factors such as duration of the synchronous classes on Zoom, complexity of the course materials, background and experience levels of the students, and so on contributed to the design of the prototypes — be that individual class sessions or the course as a whole — which were then tested during the delivery of the course.

Stage 5. Test the Prototypes by Sharing Them With the Students and Iterate Using Their Feedback.

Out of the five DT stages, test was least evident in the cases as the only opportunity to try out the design prototypes was during the course, and hence iterations from a design point of view were less apparent. Sophia shared that she was not able to test the design prototypes fully with anybody until she taught it. She was, however, able to make some changes based on the results of this phase once she understood what the challenges were with the technology. “Some things that I thought I was able to do with the technology, I could not. And so, there were changes that we made as we went along,” she added. While describing the role of iterations in her design, Olivia shared that the two major influences on her course iterations were student feedback and her observations of the class. In response to her students’ need for more professional development opportunities, she incorporated choice within the course. “They can choose if they want to research and learn about multiple kinds of challenges, or they can choose some of their practical knowledge.” Nancy pointed out that iterations take place not only at the class or course level, but also at the program level. She also shared the challenges associated with creating iterations of the course, considering the time and the resources that were required to do so. “It is about what you want to do and the reality of what you can do,” she added.

Melanie highlighted the challenges with iterations while working remotely. “When I am sitting in an office, down the hall from my colleagues, I work for a bit, I check, I talk, and then I go back. The iterations would be a lot more apparent. Whereas [while working remotely], you had to make a commitment and you didn’t really get that feedback from students or colleagues as you went along, so it worked but it wasn’t perfect.”

The design thinking process was apparent in the data at all stages, with *empathy* taking on a key role in the context of the pandemic. The following section notes both successes and challenges of the process of designing and implementing courses.

Successes

Creative Use of the Learning Management System (LMS)

Faculty participants experimented with various features of the LMS to help students asynchronously engage with the content in a meaningful manner. Emily used data generated by the LMS to understand what content the students had accessed and the extent to which they interacted with the content and used it to make instructional decisions. Melanie found that explainer videos and screen-recordings were beneficial in responding to students’ questions and she also used the newsfeed feature for providing clarifications. Recognizing that the students were spending a lot of time reading online, Olivia began adding audio files to each page in the course on the LMS, so that students could have the option to listen to the content along with reading it. Sophia leveraged H5P, the eCampus Ontario platform, to help students engage better with the online content.

Student Interaction

All the faculty participants highlighted the benefits of using breakout rooms in Zoom, the video conferencing software authorized by the university, to allow students to interact with their peers. Nancy was able to transfer activities that she used to conduct face-to-face in the classroom to the remote classroom using the breakout rooms. Olivia had learned from the early experiences

of her colleagues that students were looking for opportunities to interact with each other. She was able to address this need by using breakout rooms and hosting unstructured discussions. Sophia used breakout rooms not only to allow students to interact with each other, but also to facilitate complex group learning activities such as the Jigsaw exercise.

Training and Peer Support

The faculty participants found the support extended by their colleagues valuable. When they started teaching remotely during the spring term of 2020, during the initial stages of the pandemic the faculty participants decided that they would meet regularly to discuss their experiences and share ideas, which Olivia found very helpful. Sophia's colleagues, who had taught remotely in the winter and spring sessions of 2020, shared their experiences which allowed her to make changes to the design of her course in order to make it more student-centric, adding games and quizzes with platforms such as Quizlet and Padlet. Melanie reached out to a few senior faculty members for advice and support. While her colleagues were generous with their time, their interactions were always "timed and scheduled, and not spontaneous." In addition to seeking guidance from her colleagues, Emily was able to complete a training course offered by the university on teaching remotely, some parts of which she found very useful, specifically about the features of technology and equity considerations.

Time Saving

The faculty participants identified not having to travel to the campus as a positive outcome of the remote format for the students. Emily mentioned that in the winter, none of her classes had to be canceled due to harsh weather or poor road conditions. Nancy noted that while the remote format allowed everyone to save time, it also took away social opportunities that came with being on the campus such as the conversations in the hallways.

Challenges

Impact of the Pandemic

Every instructional decision made by the faculty participants was influenced by the pandemic. Olivia suggested that the pandemic influenced her approach to course design, and that she would have taken a different approach if it were not for the pandemic. Nancy noted, “It’s interesting, everything I am talking about as we go through this year is followed by ‘and it’s a pandemic.’ It is not just remote education; it is remote during a pandemic.” The uncertainty created by the pandemic, especially in the initial stages, prevented faculty participants from planning ahead for their courses. Sophia knew that she was going to teach in the winter term and started planning months in advance; however, at that time, there was no clarity on what the situation would look like in the winter term. Emily found that students would get tired from attending classes via Zoom. “We benefited late in the pandemic using the adaptations and learning from the previous year and yet we also inherited a more tired group of students,” she added.

Technology Barriers

The students in Emily’s class faced problems with internet speed and connectivity. Due to poor connection, students would often get dropped out of the class. Emily also found the remote learning environment very limiting, as she was not able to share concrete artifacts and other learning instruments with her students as she would in a physical classroom.

Student Response and Feedback

Nancy added that getting to know the students online was difficult. “Not knowing the screen of squares [felt] as if you talked into the abyss.” While she understood why the students would not turn their videos on during the synchronous classes, Emily acknowledged that teaching to a screen was not a rewarding experience. Sophia shared that many students were reluctant to turn their camera on. “I didn’t feel like I got to know them at all. I felt like I was teaching to no

one, and I found that difficult,” she added. Olivia indicated that teaching remotely was tiring, as she would have to put more effort in reading the room. Observing students was difficult and she compensated for that by being more explicit in her requests for feedback. According to Melanie, getting continuous feedback from the students was a challenge and it was difficult to gauge what their experience in the course was like.

Lack of Unstructured Interactions

Faculty participants emphasized the importance of unstructured conversations with students that typically took place before or after class. Olivia identified this as the biggest challenge of not having in-person learning: missed opportunities regarding pre-class and post-class discussions in remote classes. To overcome this challenge, she began scheduling unstructured synchronous discussions and found that about a third of the class participated in those discussions. Emily shared that, in the physical classroom, she would have students come early or stay after class and through those unstructured conversations they would share more about their lives. This helped her get to know them better, connect with the students, and tailor the course for them.

Fixed Syllabus

Nancy shared that ‘syllabus is a contract’ prevents faculty members from making major changes to the course. These structural limitations presented challenges while designing the course. Melanie added that writing the syllabus was challenging as you had to commit to the assessments before meeting the students and starting the course. In this unprecedented remote environment, she was unsure which types of assessments would be impactful and fair. “So that felt like a little bit of a gamble,” she shared.

Availability of Time and Resources

All the participants highlighted that the process of planning was extremely time consuming, and the uncertainty created by the pandemic made it difficult to plan. Nancy

recognized that the students may not necessarily be in a space where it is easy to work online, and she expressed her frustration regarding iterations that needed to be made in the course that attempted to address these challenges. “It is about what you want to do and the reality of what you can do. Not having enough time was also a challenge.”

Discussion

Crawford et al. (2020) examined the first responses from higher education institutions globally to the COVID-19 pandemic and remarked that while universities initially dedicated their efforts towards transitioning courses to online formats merely as an emergency response, the focus has quickly shifted to a fully online pedagogy. UNESCO Global Education Coalition (2020) suggested this shift to remote education may not only help mitigate the immediate disruption caused by the pandemic but pave the way for developing flexible education systems in the future. Using DT as a theoretical model for course design may support educators in designing flexible courses that continue to respond to the changing needs of students beyond the pandemic.

Willard-Holt et al. (2018) suggest that, when combined with technology, DT has the potential to enhance students’ and teachers’ capacity to transform learning. Results of this study indicate that while faculty participants did not intentionally apply the DT process (empathize, define, ideate, prototype, and test) as a model when they designed the remote courses, some DT elements were present in their design and implementation strategies. The initial stage in the DT process — empathy — was highlighted not just in terms of understanding the user (i.e., the learner), but also of reflecting on the designer’s experience and their context. The cases also revealed that the design process continued throughout the duration of the courses, as the faculty participants continued to respond to students’ needs and the constantly changing circumstances of the pandemic. As there is limited research that examines faculty members’ experiences of designing and teaching course through the lens of design thinking, this research is important to

address this gap. A variety of strategies have been implemented in instructional design for analyzing the learning environment and identifying the comfort level and existing knowledge of learners (Karthik et al., 2019). However, the explicit use of the design thinking process in a remote, online context may come with challenges that are identified by the participants in this study, including the rigidity of syllabi, the impact of the pandemic restrictions on student interaction, restraints on interaction online, and lack of student interaction and feedback. Further research is required to examine the effects of using DT as a model for designing and teaching remote courses, when the process is explicitly used to design the course and iterations of classes throughout a course in an online context.

Recommendations

- The use of design thinking as a model, particularly the empathize stage, for designing courses may have several benefits.
- The DT model may be used to enhance existing models of instructional design which often tend to be linear and inflexible. For example, ADDIE, “backwards design’ (McTighe & Wiggins, 2005), Universal Design for Learning (CAST, 2018).
- Design and delivery should not be viewed as two separate processes, as the redesign of course components often continues throughout the delivery of the course. The pedagogical approaches can, and were, “redesigned” in iterations of class sessions and course offering.
- Student feedback should be sought for the whole duration of the course through multiple channels. When collected at end of the course, student feedback may not be as useful for future iterations of the course since students’ needs may change from one cohort to another and may be influenced by changing circumstances of the crisis during the course.

- Iterations and participation of students as co-designers (Gordon, 2017) should be encouraged within the course. Instead of positioning it as a contract, the syllabus should be viewed as a living and working document that students and faculty members can co-design.
- Participants indicated that training and peer support were strong influences on designing and redesigning courses. Faculty members should receive training and support for leveraging the DT model in the design and delivery of their courses, along with the technology and pedagogical training that is needed.

Benefits and Limitations

Our study, while limited in scope, provides new directions for further research. From a theoretical standpoint, we examined the suitability of design thinking as a model for designing online courses, especially in times of crisis when instructors have limited resources and time to make design and instructional decisions. Further investigation is required to expand on the benefits and drawbacks of using design thinking as a model for designing online instruction that is human-centred and holistic. The COVID-19 pandemic has created an opportunity for educators and policymakers to design flexible education that works for all students. The voices of the faculty participants heard through the analysis of the individual survey responses and the collective case studies provide evidence of a natural, human-centred approach to designing courses and learning experiences that could be further informed and refined by a formal design thinking model.

Continued individual learner feedback that includes response to the learning context (such as a pandemic), along with on-going redesign of courses, suggests that course design and instructional strategies may need to be considered as separate processes in instructional design.

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