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Transforming Pedagogies: Learn – Design – Innovate

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UNIVERSITY OF CALGARY
WERKLUND SCHOOL OF EDUCATION

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Transforming Pedagogies

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Innovators, Designers, Educators, Academics and Students (IDEAS) 2019, Transforming Pedagogies is the sixth conference hosted by the Werklund School of Education at the University of Calgary. The mandate of the conference is to improve education through research, evidence-informed decisions across teaching, learning, and leadership. The conference brings together innovators, designers, K-12 practitioners, school leaders, post-secondary educators, consultants, undergraduate and graduate students, ministry personnel, academics, and researchers.

All proposals to the conference go through a blind review process. Those proposals that potential presenters indicate will be submitted to the proceedings undergo a second double-blind review.

The accepted proposals for the proceedings are invited to submit papers for the Proceedings of the IDEAS Conference, following the conference. These papers undergo a double-blind peer-review process that involves a minimum of two people reviewing each proposal. The reviewers' feedback provides recommendations to the authors for improving and revising their manuscripts. Authors are required to address reviewers' comments for the final version of the paper. The Selected Proceedings of the IDEAS 2019 Conference includes 10 papers.

Transforming Pedagogies

Transforming Pedagogies: Learn – Design – Innovate, reflects the ways in which participatory inquiry articulates knowing in experiential, presentational, propositional, and practical forms. Participatory inquiry draws on an extended epistemology to inform the ways that researchers and participants engage with each other in collaborative democratic dialogue and action. Researchers and participants collaborate to define the problems and questions they wish to explore (propositional knowing), they decide on the methods most appropriate to the exploration (practical knowing), which leads to new ways of encounter with their environments (experiential knowing), and they find ways to represent this new experience (presentational knowing) (Heron & Reson, 1997; Lincoln, Lynham, & Guba, 2018). The four forms of knowing then feedback into a revised propositional understanding of the originating problem and questions. The primary purpose of participatory inquiry is practical—in service of human thriving and flourishing.

As those engaged in participatory inquiry turn their attention to transforming pedagogy, the thinking and practice of educators are explored, examined, and reworked. Transforming—trans, from Latin, meaning across or beyond, and form, meaning shape, appearance, way, manner the work of transforming calls for an orientation and commitment to questioning and reworking the familiar and taken-for-granted boundaries and ways of thinking and working that have shaped and constrained pedagogy within formal education institutions. Transforming pedagogies provide insight into the ways in which educators are designing, creating, adapting, understanding, and researching pedagogies appropriate for a contemporary world opening different ways of knowing, doing, being, and being together. Participatory inquiry creates the opportunity for new alliances to study and understand pedagogy. These new alliances transcend the conventional boundaries between practitioners and researchers, and between the disciplines. Research from the fields of neurology, psychology, sociology, anthropology, and ecology inform the ways of knowing. Collaboratively, practitioners and researchers undertake to create and understand transforming and transformed pedagogies.

The articles presented in these proceedings focus on transforming pedagogies and three imperatives serving as the foundation for educational research in the Werklund School of Education: Learn, Design, and Innovate.

1. *Learn*. Learning is understood to be a ubiquitous, co-adaptive process. Individuals learn, but so do schools, districts, societies, ecosystems, and other coherent forms.
2. *Design*. A design attitude is associated with a more responsive sensibility, acknowledging that efforts to study phenomena that learn require strategies: i) that are aware that events of transformation and adaption can never be fully isolated, ii) that can be adapted as agents and context shift, iii) that can attend to and incorporate the situations in which learning happens, and iv) that maintain a critical mindset for evaluating the impacts of interventions and solutions.
3. *Innovate*. Associated toward meaningful and productive improvement.

The first two papers highlight the strength of design-based approaches to educational research. Beck, Roberts, and Brown examine the strengths of design-based research demonstrating the versatility of design-based approaches. They highlight the ways in which design permitted the researchers to be responsive to an emerging theme in the data. Preciado Babb, Francis, Mosher, and Friesen describe a design-based research study that examined teacher and student learning as they worked with various number representations and the ways in which the various representations support or limit mathematics learning.

The four papers that follow draw upon the aspects of design to investigate new approaches to professional learning, group assignments, tabletop games, and board games. First, Pascoe provides a literature review investigating the use of design thinking approaches to support teachers in designing their own professional learning for mathematics teaching. Second, Thomas, Brown, and Hill present findings from a two-year study exploring how instructional design can improve student learning in group assignments. In articles three and four aspects of game design are explored. Rahimi, Dadkhahfard, and Kim provide insight into the ways individuals develop skills and ideas while engaged in design practices through the design of games; and Gatti Junior, Kim, Liu, and Lai discuss how a board game design has the potential to support systems thinking.

The last four papers, in the Proceedings, provide an examination of transforming practices within the fields of leadership development, supervision, and second language acquisition of gifted learners. Thomas, Jorgenson-Adam, Brandon, Marler, Turner, and Friesen report on a two year action-research study conducted with a school jurisdiction through a research-practice partnership to design and explore a collaborative professional learning design. Brandon, Friesen, and Saar present a professional learning approach to advancing leadership development. Ogilvie and Burleigh provide the findings from a case study investigating the efficacy of supervision of student teachers in their practicum placements. Kilani reports on an exploratory case study involving students', parents', and teachers' views on gifted English-as-a-Second-Language linguistic strategies.

We are pleased to present this edition of IDEAS Proceedings from the 2019 IDEAS Conference at the Werklund School of Education, University of Calgary. The conference and the proceedings represent the innovative contributions of K-12 practitioners, school leaders, post-secondary educators, consultants, undergraduate and graduate students, ministry personnel, academics, and researchers.

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Connecting Design-Based Research: A Responsive Methodology for Connecting Research and Practice

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Abstract

In this paper, the authors reflect on the strengths of design-based research, using a recently completed research project as a case study. In this case, design-based research allowed the research team to be responsive to an emerging theme in the data, to the point of creating a tool for analysis for data collected in subsequent research cycles. The created framework also became, in and of itself, a valuable contribution to the research literature. This highlights the ability of design-based research to meaningfully connect theory and practice.

Keywords: design-based research; education research methodology; reflective conversations

Design-based research (DBR) is a methodology that incorporates the characteristics of design-thinking in order to conceptualize solutions to complex problems of practice (McKenny & Reeves, 2012). Understandings of the particular strengths and processes that unfold during design-based research in an education context are still emerging, though there are foundational papers (Brown, 1992; Collins, 1992), critical examinations (Anderson & Shattuck, 2012), and numerous studies using DBR available. This paper focuses on the DBR process, rather than the detailed findings of the research. Using one research project as an example, this paper contributes to the literature on DBR by exploring how the project unfolded, and includes research reflections on one strength of this methodology: the ability for the research to be responsive to and inclusive of emerging research directions.

The aim of our research project was to document the impact of the professional learning intervention designed for teachers new to a large urban school district. We employed a design-based research process. During the iterative cycles of the research process, findings emerged that expanded upon the original research questions and directions. This paper will describe how using DBR facilitated and encouraged all parties involved in the research to be responsive to emerging research findings, thereby contributing to the larger body of literature around teacher induction processes, while making meaningful contributions to the specific professional learning program.

We begin this paper with a description of design-based research. The DBR description includes the history, characteristics and rationale of DBR as a methodological approach. Then we consider our research process as a case study which examined how a professional learning intervention influenced probationary teachers' practice. In the discussion, we consider how the DBR process encouraged findings and new research possibilities in new teacher professional learning supports.

Design-Based Research

Design-based research is a participatory research methodology that focuses on advancing theory while exploring an intervention that changes teacher practice in authentic learning contexts. As such, DBR provides a methodological research framework focusing on two objectives simultaneously: balancing educational theory and practice. In order to define DBR, researchers have examined common research method characteristics. Although usually a mixed methods approach (Anderson & Shattuck, 2012), DBR can be qualitative or quantitative and cannot be solely defined on methods alone. As a result, DBR is often critiqued for the lack of specific definition (Christensen & West, 2018; McKenney & Reeves, 2012).

Early definitions of DBR stem from research that challenged the notions educational research that was not completed in authentic and responsive learning contexts with the opportunity for change and flexibility. As early leaders in defining DBR, Brown (1992) and Collins (1992) established specifications of DBR which included research which considered an authentic context, cycles of iterative design, intervention, data collection, and evaluation. Collins (1992) extended the flexible, pragmatic, and participatory research design by suggesting that there be comparisons of multiple sample groups which could include multiple participant configurations.

According to Christensen and West (2018), as DBR literature evolved, seven key characteristics of DBR emerged which expanded upon, clarified, and revised the original DBR specification from Brown (1992) and Collins (1992). The seven DBR characteristics suggest the research process is: design driven (Anderson & Shattuck, 2012; Design-Based Research Collective, 2003), situated (Anderson & Shattuck, 2012; Barab & Squire, 2004), iterative (Anderson & Shattuck, 2012; Barab & Squire, 2004; Brown, 1992; Design-Based Research Collective, 2003; McKenney & Reeves, 2012), collaborative (Anderson & Shattuck, 2012; Barab & Squire, 2004; McKenney & Reeves, 2012), involves theory building (Anderson & Shattuck, 2012; Barab & Squire, 2004; Brown, 1992; Cobb et al., 2003; Design-Based Research Collective, 2003; McKenney & Reeves, 2012), is practical (Cobb et al., 2003; Design-Based Research Collective, 2003; McKenney & Reeves, 2012), and productive (Barab & Squire, 2004; Design-Based Research Collective, 2003).

To provide the conditions for a collaborative research environment which exhibits the seven characteristics, design-based research projects tend to progress through iterative phases guided by the intention of supporting and examining a relevant and authentic intervention that impacts educational theory and practice (Kennedy-Clarke, 2013). The phases are often described in process models and there are numerous examples of DBR models in current literature. McKenney and Reeves (2019) cohesively integrated the characteristics of design-based research by creating a model that, "portrays a process that would easily lend itself to being: theoretically oriented, interventionist, collaborative, responsively grounded, and iterative" (p. 82). The three phases described by McKenney and Reeves's (2019) model for conducting DBR are: (a) analysis and exploration; (b) design and construction; and (c) evaluation and reflection. The analysis and exploration phase focuses on problem identification and diagnosis of how the problem could be solved. The design and construction phase encourages creativity by focusing on the design of a potential solution to the

problem by exploring and considering multiple options that could be introduced within the specific learning context. The evaluation and reflection phase describes the data analysis as a result of the impact of the intervention throughout the research process. Within each phase are single and multiple sub-cycles which model the same three phases. McKenney and Reeves' (2019) model for DBR provided the cohesive, iterative, and flexible research process which guided our project.

Research Design

Our design-based research (DBR) project was a collaborative project between representatives from three organizations who came together to support beginning teacher professional learning (i.e., university faculty, professional learning facilitators, and school district leaders). The professional learning supports occurred at specific points during one school year, and were provided for every teacher new to a large urban school district in Alberta. The majority of these teachers were new to the profession, but many had experience in other districts. DBR provided an iterative research process in which to promote change in practice and flexibility in the research method process (McKenney & Reeves, 2019). The focus of this study was to explore ways to design, implement, and sustain professional learning as an intervention to support teachers as they engaged in career-long learning. DBR provided the opportunity to promote a change in professional learning practice because of its participatory, collaborative, and iterative nature.

Five cycles of DBPL were scheduled between October 2018 to April 2019, and these cycles coincided with professional learning sessions new teachers attended. In between the professional learning sessions, the researchers and the professional learning facilitators were able to enact a design-thinking process to analyze collected data and to consider the implications emerging findings had for both theory and practice. As you will read in the next section, the reflective design thinking process is what allowed the researchers to incorporate emergent findings.

Participants and Data Collection

This study involved a research-practice partnership with a school district, university researchers, and a third-party professional learning organization. There were over 450 teacher participants involved in the professional learning intervention, and 366 teachers agreed to participate in our study (approximately 80% survey response rate). Data were continually gathered and analyzed over a one-year period to inform the ongoing design of the intervention. Two specific methods of data collection were used to inform the professional learning intervention: surveys administered at the end of each session; and researchers' observations and field notes gathered during the professional sessions. The original intention of the surveys was to collect feedback on the themes and content of the professional learning sessions. Table 1 describes the research cycles and the specific data gathered by the research team between cycles.

One of the three phases in the flexible and iterative DBR Process is the Evaluation and Reflection phase (McKenney & Reeves, 2019). In this research project, the Evaluation and Reflection phase was demonstrated through the analysis of preliminary data and research team meetings that occurred between each cycle. The research team completed their Evaluation and Reflection phase after each cycle by analyzing the preliminary survey data and their field notes using InVivo and descriptive coding (Miles, Huberman, & Saldana, 2014). Initial rounds of coding were completed using the original research

as a frame to evaluate how the data connected to the initial research questions. These research questions inquired into the ways in which the program supported high quality teaching in the district using Alberta’s Teaching Quality Standards and the district’s four year plan as a guiding framework. Although the participants did respond to the surveys in a way that allowed us to address our initial research questions, we also received “additional comments” that were outside the scope of our initial research intentions. These additional comments were reflected upon by the research team (as described in the Evaluation and Reflection DBR phase) and shaped the ways in which we moved forward in the research (McKenney & Reeves, 2019). Rather than bracket out this information as irrelevant to our current study, the DBR process allowed us to be responsive to these emerging topics, especially because we were continuously reflecting on emerging themes in reflective conversations (which are described in detail below). These emergent themes connected with the data collected from three classroom observations completed at the end of cycle 5.

The Evaluation and Reflection phase of DBR encourages the researchers to be aware of the role of the intervention. In this case, the intervention was contributing to how a phenomena (teacher induction needs) could be studied (McKenney & Reeves, 2019). The preliminary survey synthesis summaries completed after each cycle were used by the research team to communicate and collaborate with the partners to learn more about the comments that were grounded in teacher induction literature. The research team started to develop stronger relationships with the other partners as they discussed and clarified possible design strategies that considered the emergent themes and participant feedback. The cyclical preliminary data synthesis became an essential means to consider how the data connected to the research questions and provided a means for the researchers to consider developing an alternative tool to consider the emergent themes also presented in the data collection.

Table 1

Research Cycle Information

Cycle Number	Cycle Activity Months	Data Collection
1	October 2018	<ul style="list-style-type: none"> • Survey • Session observation & field notes
2	December 2018	<ul style="list-style-type: none"> • Survey • Session observation & field notes
3	January/February 2019	<ul style="list-style-type: none"> • Survey • Session observation & field notes
4	March 2019	<ul style="list-style-type: none"> • Survey • Session observation & field notes
5	April/May 2019	Classroom Observations
6	May 2019	End of Series

From Reflective Conversations to Emerging Themes

We began our study with research questions around how the specific supports that contributed to the professional growth of teachers new to one school district, yet, by the end of our study, we were also able to contribute to the literature on teacher induction in a broader way. This is one of the identified strengths of DBR, that it meaningfully connects theory and practice.

As the research cycles unfolded, the research team engaged in reflective conversations. In this study, “reflective conversations” were intentional communications in order to clarify and focus on emerging themes in the data collection and synthesis, and were instrumental in directing our research. These conversations occurred, in various configurations, between everyone participating in both the professional learning program and the research that followed it including: the researchers, the professional learning facilitators, the district leaders helping to design the professional learning, and the new teachers (in the form of surveys at the end of the sessions and conversations during the sessions). Through these conversations, meaningful links were continuously made between the program goals, the data being collected, and the literature being reviewed throughout the project. In our case, this reflective and collaborative aspect of DBR allowed us to first notice and then fully explore a theme that began to emerge in the data. McKenney and Reeves (2019) refer to this type of reflection as organic and structured reflection. The researchers began to reflect organically through intended contemplation connecting with each other, reviewing field notes and the literature. The reflection then became more structured as the researchers shared the preliminary data synthesis from each cycle, clarifying data with the partners and started to clearly see new themes emerge. Similarly, as McKenney and Reeves (2019) suggested, as a result of the reflection phases after each cycle, new theoretical insights and frameworks emerged.

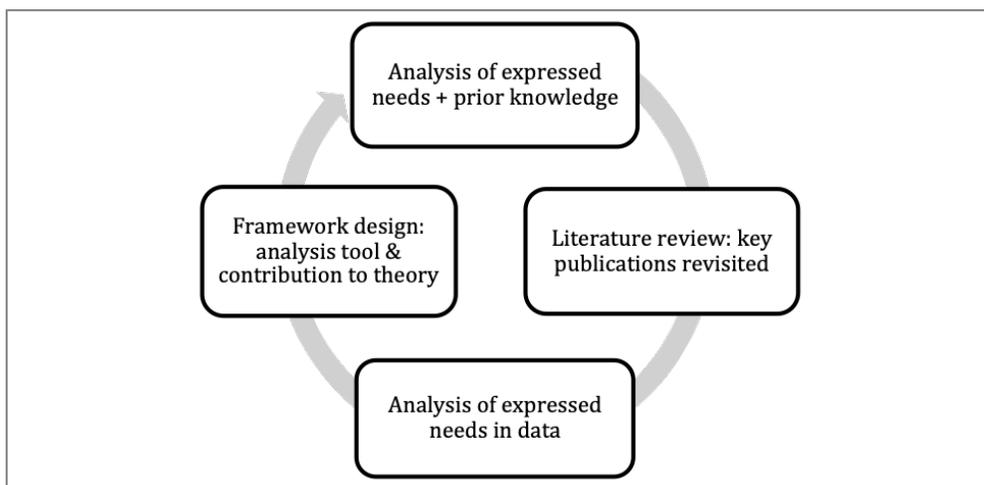
The data revealed that new teachers new in this school district had learning needs not being fully met by this professional learning program. While at first this seemed a critique of the program, we soon realized the generative possibilities in this data. Survey responses indicated that the teachers in the study had learning needs beyond the instructional design support they were getting from the induction program. Instead of simply indicating, in a final report for example, that the program was not addressing certain learning needs, we began to formally explore what other learning needs these teachers had through a combination of further literature review and data analysis. This line of inquiry was generative in the sense that it allowed us to gain new insights in the larger phenomenon of teacher induction, insights that went well beyond our initial intent of examining the effectiveness of one particular program. Literature we then pursued supported our sense that instructional design support is but one of many learning needs that new teachers have (see for example Alberta Teachers’ Association, 2013; Baker-Doyle, 2012; Fantilli & McDougall, 2009; Feiman-Nemser, 2001; Kutsyuruba, Walker, Bosica Jr., & Matheson, 2017). As is outlined in Figure 1, the research team returned to the literature with new research questions about how to better define and frame the multiple needs of beginning teachers, and with questions around what pedagogies best support these various needs. We revisited key publications from our existing literature review and sought others to support our understanding. We went back to the data analysis and looked closely at the needs the teachers in our study expressed in order to put forth a new framework for beginning teacher learning needs (Figure 1).

In subsequent cycles of data analysis, this framework became our data analysis lens. Therefore, the framework we created became both a tool for generating a new understanding of our data, and also a valuable contribution to a current gap in the literature related to the kind of learning that unfolds as

teachers begin their careers. Other than the emphasis on reflection as described by McKenney and Reeves (2019), the reflection phase is not a part of the DBR process well-addressed by existing literature and has potential for further discussion. This study was an effective hub between theory and practice as a result of the emphasis on reflection as an essential phase of the DBR process.

Figure 1

From Emerging Research Theme to Framework for Beginning Teacher Learning Needs



Conclusion

In reflecting on this DBR, the research team realized the strength of DBR as a responsive methodology. Where the emphasis in other kinds of research is on designing a study, and then enacting it, the focus in design-based research allows for a constant revision of research goals, questions, and data collection. This is significant as the question of how to best support beginning teachers is a complex problem of practice that has more than one solution. DBR allowed the researchers to explore this particular problem of practice in a number of ways, and to engage in the creation of innovative solutions. Existing research points to this being a strength of DBR (Anderson & Shattuck, 2012; Barab & Squire, 2004; Brown, 1992; Christensen & West, 2018), and this case study confirms that strength. In addition, now that the research cycles for this particular project are complete, the research team has discussed just how valuable reflective, collaborative conversations were to the research process. In future DBR projects, it is recommended that this part of the iterative cycles be even more formalized. Because of the willingness of everyone in the partnership to engage reflectively, we were able to make a valuable contribution to existing teacher induction literature. This was not an anticipated outcome of a study that originally sought to explore the ways to design, implement and sustain a professional learning program for new teachers. This reflects another strength of DBR – that of effectively connecting theory and practice.

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Transforming Conceptions of Number for the Learning of Students, Teachers, and an Education System

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Abstract

This paper describes the project Examining Student Learning in Mathematics Through Design-Based Research. It was sponsored by Alberta Education as part of its focus on improving mathematics instruction. Fifty teachers from a large school district in Calgary participated in a professional learning series focused on number representations and their implications in supporting or limiting mathematics learning. Despite this deliberate focus, there was a lack of attention to these representations in the tasks that teachers implemented in their classrooms. We elaborate in this paper on examples of such representations and provide suggestions for further work on supporting students, teachers and school systems regarding key representations of number.

Keywords: mathematics; elementary; teacher knowledge; design-based research

Amidst the public concern that surrounds mathematics education is a call for teachers to have greater skills and confidence in their specialized knowledge for teaching mathematics (Shulman, 1986). In its first recommendation, the Alberta Mathematics Curriculum Review Working Group's report to the premier and minister argues for "increased availability and access to high-quality professional development and training opportunities specific to the teaching of Mathematics" (O'Connor et al., 2016, p. 8). We decided to address this need through a partnership project between the Calgary Board of Education (CBE), the University of Calgary, and the Galileo Educational Network Association. The project, Examining Student Learning in Mathematics Through Design-Based Research, was conducted during the 2017–2018 academic year and was sponsored by an Alberta Education Research Partnership Program grant.

The project placed particular attention on the meanings of number. Recent insights from neuroscience,

Author Note

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developmental psychology, and education regarding the development of the concept of number suggest not only that young children are capable of developing the concepts of magnitude and proportion, but also that these concepts are fundamental for understanding the concept of number (Norton & Alibali, 2019). The number line has been identified as the most complete representation of number in this sense since it can be used to represent different meanings of number (e.g., order, cardinality, magnitude, and position). However, we have noticed that curricular resources, including programs of studies, do not make explicit the need to address these critical representations. It is up to the teacher to identify and deliberately include these representations and meanings of the concept of number into their classroom. This issue extends at a system level for boards of education interested in teacher professional learning with respect to mathematics instruction.

The purpose of the project was to enrich student learning opportunities and stimulate systemic growth in mathematics teaching and learning through a professional learning series for teachers at the CBE. More specifically, the project was intended to help participating teachers increase their pedagogical and disciplinary knowledge in mathematics; support participating teachers to expand the principled practical knowledge required to teach mathematics effectively; use the process as a means to more deeply understand the elements of teachers' knowledge and practice; and identify and support potential mathematics education influence on educational leaders.

The research component of the initiative focused on studying teachers' potential learning in the series, including the way they select, design, and implement tasks in their classroom. We were particularly interested in the way teachers integrated the content covered in the series into their classrooms. The project also included a perspective on learning as a system: we were interested in the potential learning of CBE as an organization.

Theoretical Framework

Following Shulman's (1986) realization that teachers require specialized knowledge for teaching a particular subject, Ball et al. (2008) suggested knowledge for teaching mathematics is specialized and requires understanding mathematics in ways that can support learning. This knowledge includes the development of mathematical concepts across the curriculum, students' common misconceptions, and key representations or models for relevant concepts such as number line and bar models with respect to the concept of number (Norton & Alibali, 2019).

More recently, knowledge has been characterized not only as individual but also as collective and distributed within a professional community (Davis, & Renert, 2014). One way of sharing knowledge is through documents. Ball et al. (2014) identified records of practice as collections of materials, that is, documentations of experience that can be retrieved and reconsidered by diverse audiences and contexts. These include textbooks and online resources for teaching. However, knowledge and expertise can also be distributed among people in a community. For instance, Askew et al. (1997) identified one elementary school among 90 schools with consistently higher numeracy levels. While the teachers at that school did not demonstrate any particularly stronger disciplinary knowledge, there were two teachers who shared responsibility for mathematics across the school: one had a strong mathematical background and the other had a background in psychology and pedagogy of primary mathematics.

This perspective on knowledge also shaped both the design of the professional learning series and the

design of the research in this project. On the one hand, the learning series focused on the specialized knowledge for teaching mathematics. On the other, by involving a group of teachers from the school district, we expect that knowledge would be distributed as a network through CBE. As posited by Alonso-Yáñez and colleagues (2018), this approach to social networks allows for the study of shared knowledge and expertise in communities of teachers and educational leaders.

Methodology

This project focused on student mathematical learning as an intentional outcome of effective teaching practices through a design-based research approach (Friesen & Jacobsen, 2015) that examined group processes and dialogue, artifacts of teachers' work with each other and students, and teachers' evidence of student learning. Data was collected, analyzed and shared among researchers and participants in regular cycles over a year. Multiple perspectives on data and emerging insights were generated and used to inform an intentional, documented, and iterative research process involving design, enactment, evaluation, and redesign of the professional learning series.

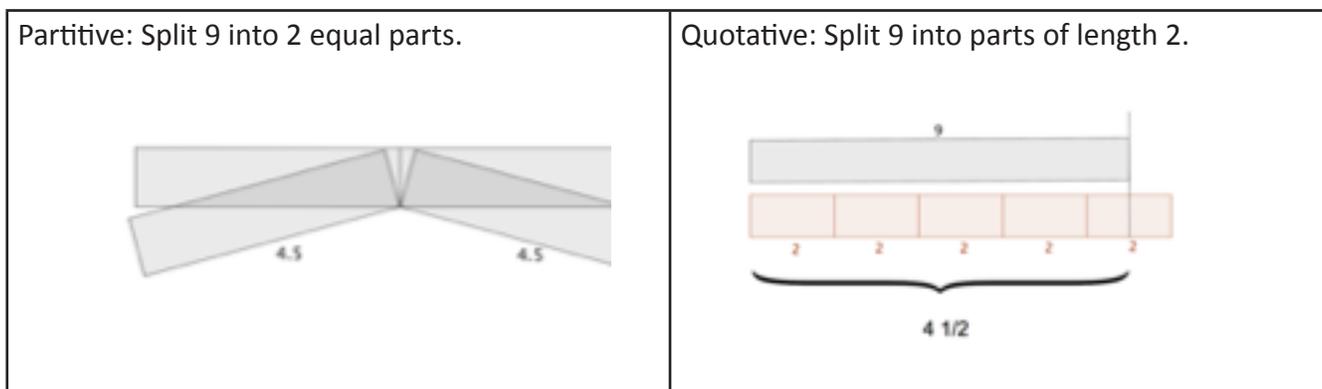
Each session of the series had a particular mathematical content, which was revisited based on the ongoing collection and analysis of data. The content of the sessions included: number line and types of numbers; magnitude and multiplication; division; fractions and decimals; coding; and computational thinking. There was a deliberate focus on number representations that allowed extending the meanings of number and operations. We elaborate on this in the following subsection.

Example of a Task for the Professional Learning Series

We include an example of a task used in the professional learning series with teachers that highlights both the use of the bar model for number and the meanings of division. Although there are multiple meanings for division as an operation, they can be classified mostly into partitive or quotative, as shown in Figure 1. Figure 1 utilizes the bar model, which allows us to make sense of the operation "nine divided by two." The model contrasts to other representations of number, such as quantities related to object collections, that only operate with whole numbers. This figure was discussed with teachers in the learning series.

Figure 1

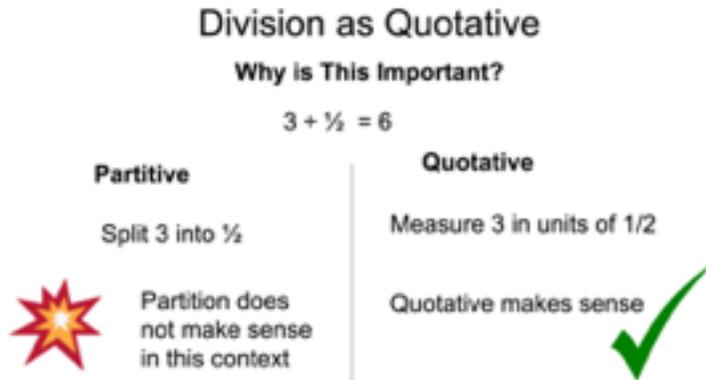
Partitive and Quotative Meaning of Division for $9 \div 2$ Using the Bar Model



The meanings of division are particularly important to make sense of division by a fraction. When considering division as a partition, it may be difficult to make sense of division by a fraction. In the learning series, the meaning of $3 \div \frac{1}{2}$ was discussed with teachers. It does not make sense to “divide three in one half parts;” however, it makes sense to divide “three into parts of length equal to one half,” as shown in Figure 2.

Figure 2

Dividing by a Fraction Makes Sense as a Quotative (Measurement), but Not as a Partition



After discussing the quotative meaning of “division by one half” with teachers, they were asked to make a story problem that could be solved with the operation $1 \frac{3}{4} \div \frac{1}{2}$ and to construct a representation showing their thinking. As we expected, the task turned out to be difficult for teachers; we offered the following question as an example: How many $\frac{1}{2}$ litre bottles can be filled with $1 \frac{3}{4}$ litres of wine? This is demonstrated in Figure 3, which represents the problem using the bar model.

Figure 3

Representation of $1 \frac{3}{4} \div \frac{1}{2} = 3 \frac{1}{2}$ Using the Bar Model



The bar model was constantly mentioned in the series, along with prompts to consider the number line as a representation that can be used for any (real) number — as opposed to other representations limited to whole numbers, such as cardinality.

Research Data and Analysis

The study involved two phases. The first phase comprised the design and implementation of the eight-session series of professional learning for teachers. Fifty teachers from the learning series accepted our invitation to participate in this phase. As the research also intended to provide accounts of the collective knowledge within the system, the research included a social network analysis to identify the potential impact of the project at the district level. Data from this phase comprised: student samples of tasks selected and enacted in teachers' classrooms; teachers' reflections after analysing student samples; reflective journals; teachers' productions during the sessions; teachers' feedback; field notes; and a survey intended to identify teachers' social networks within the school system. A thematic analysis (Braun & Clarke, 2006) was conducted on teachers' reflections and productions to identify common themes regarding their learning experience. Student samples and classroom implementations were classified according to the involved representations and models for number. A social network analysis (Scott & Carrington, 2011) was conducted on teachers' responses to the survey.

The second phase of the project focused on how teachers implemented tasks in their classroom. The researchers observed six teachers teaching in their schools to identify the representations and models of number present in the tasks with which students were engaged.

Results

The thematic analysis resulted in four intertwined emerging themes regarding the impact of the series on teachers' mathematical knowledge for teaching, namely: development of a deeper mathematical knowledge of the targeted concepts; connecting topics related to the targeted concepts across the curriculum; attention to mathematical quality in the tasks implemented in the classroom; and consideration of common student misconceptions, as well as suggestions to support struggling students.

The network analysis revealed that the series attendees had consistent interactions with peers at their schools, suggesting that this intervention impacted the system — CBE — beyond those who participated in the project, as originally intended.

An analysis of student samples that teachers brought to the sessions showed a lack of attention to representing number using the number line, which was a main focus for the learning series. The observed lessons also showed a lack of critical representations of number. This is consistent with our review of curricular materials, including textbooks and programs of study.

Discussion

The results from this study have implications regarding teachers' knowledge for teaching. We found a need to understand critical representation of number and operations not as an additional topic, but as fundamental disciplinary basis. For example, number line is not another topic to teach but is a basis for understanding number. As many teachers in the professional learning series showed a need to deepen their mathematical knowledge for teaching, we can expect that many other teachers in the project are in the same situation.

We claim the need to support systemic learning (including teachers) through several actions. First, there is a need to reinforce the value of participatory professional learning — of creating action during the learning process and building lateral, internal group accountabilities of taking action and using those actions as a resource for continued learning and the learning of others. Second, we need to recognize more complexities and nuances within teachers' own mathematical understanding that

require support. Third, we need to help create additional coherence in terms of priorities and direction among district support and leadership systems. Finally, there is a need to assure that teachers have access to a network of mathematics teaching specialists within the district.

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Re-designing Professional Learning for Math Teachers: Empowering Teachers As Designers

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Abstract

Today's complex 21st century world requires a shift towards teaching approaches that will support students' mathematical success and development of 21st century competencies. The goal of this literature review was to investigate whether current research supports the use of design thinking to engage K-12 teachers in designing their own professional learning for mathematics teaching. Results of the literature review pointed towards the need for design thinking to support a year-long collaborative approach to mathematics teacher professional learning, driven by a design-thinking model. A framework is presented to help improve student learning in mathematics by improving teacher professional learning experiences.

Keywords: mathematics education; K-12 education; teacher professional learning; professional development; design thinking

Context

School systems in Canada continue to implement structures and practices designed for the past. A model of school that emphasizes the delivery of knowledge will not prepare students for today's 21st century world. Educational scholars such as Friesen (2009) are calling for a paradigm shift, where schools nurture students' capacity for learning and foster their ability to use and make sense of knowledge. As such, it has become increasingly important for models of teacher professional learning (PL) to be innovative and suitable for the complexities of the 21st century educational world. This paper describes a framework for mathematics teacher PL based on an investigation of current literature related to three topics of interest: design thinking, PL, and PL for mathematics teaching.

Background

A common approach to providing PL is a one-time episodic workshop which typically takes place away from teachers' school contexts with content that is often pre-determined by the facilitator offering the workshops or by school administrators (Timperley, 2011). This common one-shot workshop model is known to be ineffective in creating long lasting teacher change (Darling-Hammond & Richardson, 2009; Guskey & Yoon, 2009; Jensen, Sonnemann, Roberts-Hull, & Hunter, 2016). Furthermore, many teachers are not sufficiently engaged in these PL workshops to grow their practice enough to see positive

impacts on student learning (Friesen & Jacobsen, 2015; The Organization of Economic Cooperation and Development, 2009). In contrast, a PL environment where teachers approach learning with a disposition of design (Friesen & Jacobsen, 2015) creates the conditions for teachers to be designers of their own learning and the learning of their students (Friesen, 2009). A disposition of design requires that teachers approach learning through an iterative cycle involving reflective discourse and collaborative knowledge-building (Bannister, 2018; Bruce, Esmonde, Ross, Dookie, & Beatty, 2010; Little & Horn, 2007; Muir, Beswick, & Williamson, 2010). Design thinking is the process through which teachers will develop a disposition of design.

Teaching Mathematics for Conceptual Understanding

The topic of mathematics teacher learning is timely, as several Canadian provinces, including Alberta, are moving towards concept-based mathematics curricula. This approach to learning mathematics recognizes that the development of procedural fluency from conceptual understanding helps students to make sense of mathematical procedures and the ability to transfer understanding to new situations (National Council of Teachers of Mathematics, 2014). This way of approaching mathematics education requires a significant pedagogical shift beyond a focus on knowledge and skill-based outcomes towards a recognition that knowledge and skills are foundational to the construction of conceptual understanding (Erickson, Lanning, & French, 2017). This shift therefore presents an important need for changing the standard approach of PL for mathematics teaching.

Purpose of the research

The purpose of this research was to determine if literature supports a PL model that uses design thinking to engage teachers in designing their own professional learning for mathematics teaching. In recent years, design thinking has become a prevalent framework in classrooms for engaging students in building 21st century competencies and to inspire innovation across the disciplines (Bush et al., 2018; Kelly, 2016; Long, 2012). Design thinking is less commonly used as a model for teacher PL than in classroom applications, and moreover, literature connecting design thinking to PL is still somewhat sparse. However, there is emerging evidence providing strong support for the real and potential advantages of design thinking as the basis of teachers' PL (Friesen & Jacobsen, 2015; Kaser & Halbert, 2017).

Methodology

This research project set out to answer the following question: how can design thinking be used by mathematics teachers to create their own PL? A hermeneutic literature review (Boell & Cecez-Kecmanovic, 2010) was conducted, guided by a constructivist worldview. Boell & Cecez-Kecmanovic (2010) describe a hermeneutic approach as an open-ended process through which increased understanding of the research area and better understanding of the research problem inform each other. The literature review sought to identify important features of PL experiences for engaging mathematics teachers in meaningful PL. Literature in the areas of PL, PL for mathematics teachers, and design thinking was reviewed and analyzed using a conceptual framework (Figure 1).

Conceptual Framework

Search terms and keywords that were used to identify full text, peer reviewed documents, include 'elementary secondary education', 'professional development', 'professional learning', 'mathematics', 'design thinking', 'educator', and 'teacher'. The search was not limited to a particular date range or limited to experimental studies, and both qualitative and quantitative research were included. However, preference was given to more recent research, particularly in the area of professional learning

'design thinking', 'educator', and 'teacher'. The search was not limited to a particular date range or limited to experimental studies, and both qualitative and quantitative research were included. However, preference was given to more recent research, particularly in the area of professional learning due to the high number of search results. Suitable documents were collected and reviewed, and main ideas and major findings were organized in accordance with the conceptual framework, to illuminate common themes within and between topics of study. Following an initial review of the selected literature, a more in-depth review was conducted which focused on identifying themes in common and connections between the three topics. The connections and common themes identified serve as essential rationale and recommendations for the creation of the PL model for mathematics teaching, which is discussed in the What Works section.

Figure 1

Conceptual Framework



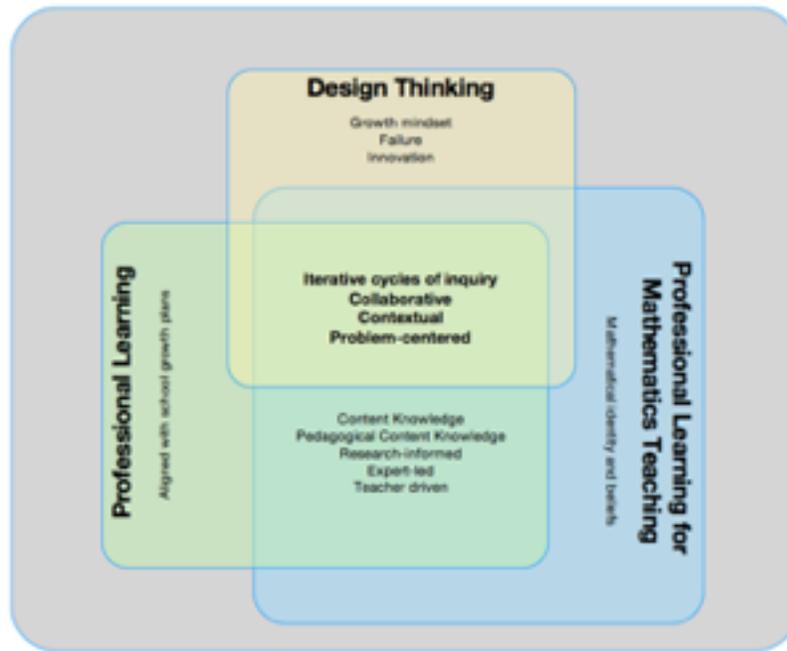
findings were organized in accordance with the conceptual framework, to illuminate common themes within and between topics of study. Following an initial review of the selected literature, a more in-depth review was conducted which focused on identifying themes in common and connections between the three topics. The connections and common themes identified serve as essential rationale and recommendations for the creation of the PL model for mathematics teaching, which is discussed in the What Works section, below.

Findings

In the review and analysis of literature on the topics of PL, PL for mathematics teaching, and design thinking, common themes were identified between and among the three topics of research, as well as themes that were unique to each topic. Figure 2 provides a representation of common themes as they relate to each of the topics of research. All of the themes identified in the research informed the recommendations which are discussed in the What Works section.

Figure 2

Themes Found in the Literature by Topic



What Works?

The findings of this research project highlight the need for mathematics teacher learning to move beyond an episodic workshop-based model, towards a design-thinking model for engaging teachers in PL that fits their needs. Themes found in this literature review suggest that a PL community (Levine, 2010) that inquires into current problems of practice will produce greater and longer lasting teacher change. The professional learning community needs to connect on a regular basis, led by a trained facilitator, to engage in reflective discourse and collaborative knowledge-building (Bannister, 2018; Bruce et al., 2010; Little & Horn, 2007; Muir et al., 2010) in order to effectively implement an iterative cycle of inquiry. Using design principles to guide the work of the PL community will create conditions supportive of teacher inquiry, sustained over time, into problems of practice. Design cycles take many forms. Figure 3 presents a framework summarizing the recommended model of PL for mathematics teachers based on the literature review and the Spiral of Inquiry (Kaser & Halbert, 2017).

Figure 3

Frameworks for Professional Learning for Mathematics Teachers



The framework outlines the stages of the design cycle, and the recommended roles of teachers and facilitators in each stage. The cycle could take place over the course of one school year, with the four stages distributed throughout (for example, October, January, March, May). The cycle is divided into four sections, each representing one stage in the PL design cycle. Each of these stages begins with a face-to-face meeting where teachers and the facilitator engage in learning focused on mathematics content and pedagogical content knowledge, driven by the direction and needs of the teachers involved. In between the face-to-face meetings, teachers and the facilitator will remain connected through an online collaborative environment. Colleagues within the same school will continue to connect more regularly. The online asynchronous environment provides a venue for teachers to engage with each other and with the facilitator in an ongoing, just-in-time manner. Table 1 provides details on each stage.

Table 1

Description of Stages in PL Design Cycle

Stage of Design Cycle	Purpose	Facilitator Role	Teacher Role
Scan	<ul style="list-style-type: none"> Identify a current problem in practice or area of growth as a focus area. Teachers may choose a learning focus as individuals or in teams. 	<ul style="list-style-type: none"> Provide inspiration, ideas and resources to support teachers in determining direction for their PL. Facilitate design thinking activities (e.g. empathy interview). 	<ul style="list-style-type: none"> Identify problem of practice, questions and student needs from current context. Consider school context and student community. Set a PL goal.
Learn	<ul style="list-style-type: none"> Inquire into a problem of practice and develop a plan. 	<ul style="list-style-type: none"> Provide resources, research-backed promising practices and coaching to support teachers in their respective areas of PL. Facilitate design thinking activities (e.g. finding themes, define insights) 	<ul style="list-style-type: none"> Study the resources provided by the facilitator that support the PL goal. Create a plan for the Act phase. Collaborate with others with similar contexts and goals and with others.
Act	<ul style="list-style-type: none"> Take the plan into school and classroom context and implement. This stage begins as a prototype and will involve many small iterative cycles in connection with the Check stage. 	<ul style="list-style-type: none"> Model classroom routines, support teachers with additional resources or strategies. Help to problem-solve. Facilitate design thinking activities (e.g. building a culture of trust). 	<ul style="list-style-type: none"> Implement new strategies and routines into classroom. Support other teachers as critical friends, providing and receiving feedback.
Check	<ul style="list-style-type: none"> Teachers reflect on the Act stage, and make changes as needed (in connection with the Act stage). 	<ul style="list-style-type: none"> Provide additional resources, strategies and meetings. Share stories of successes with other group members. Facilitate design thinking activities e.g. sharing stories. 	<ul style="list-style-type: none"> Reflect and iterate as needed based on observations of student learning and feedback from students and critical friends.

Design thinking requires a shift in mindset, from seeing a learner as a receiver of knowledge to seeing a learner as a designer (IDEO.org, 2015). In order to scaffold the development of a design oriented mindset and build creative capacity (Kelly, 2016), design activities will be integrated into the design of each of the face-to-face professional learning experiences. In between the face-to-face meetings, teachers and the facilitator will remain connected through an online collaborative environment.

Discussion and Next Steps

The themes that were identified in this literature review were used to create a framework with recommendations for the creation of a professional learning model where math teachers, supported by a leader, chart the direction of their own professional learning journey. In this model, teachers and a facilitator work together face to face and online to blend the everyday needs of teachers with math content knowledge and research-informed math pedagogies. An iterative design thinking model supports teachers in designing and experimenting with new ideas in search of solutions to their own problems of practice, and in this case, supports the common goal of teaching mathematics for conceptual understanding.

As educational systems become more invested in building 21st century competencies in students, teacher PL must immerse teachers in 21st century experiences that build conceptual understanding of the mathematics they teach. The findings of this research did not indicate an optimal time frame for the PL model described. Further research into the most impactful time frame would be a useful next step. This framework for a collaborative approach to mathematics teacher professional learning, driven by a design-thinking model, will support educational leaders in creating powerful professional learning experiences for mathematics teachers. This framework has the potential to improve student learning in mathematics by enhancing the impact of mathematics teacher PL experiences.

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Improving Student Learning in Group Assignments through Instructional Design

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Abstract

Researchers present findings from a two-year study exploring how instructional design can improve student learning in group assignments. In both years of the study, approximately 400 undergraduate students (pre-service teachers) in an interdisciplinary course worked in groups to design unit plans. The researchers were part of a team of instructors teaching these students and intentionally designing the course to support the group work that it entails. Findings from the study are shared and highlight the aspects of instructional design aimed at improving the student experience in group assignments and show how instructors are scaffolding for student success. Two of the findings were instructor feedback provided to move the learning forward and classroom to help students clarify, share and understand learning intentions and criteria for success.

Keywords: group assignments, instructional design, collaborative learning, scaffolding

Context

The researchers were part of a team of instructors that supported approximately 400 students (teacher candidates) collaboratively design interdisciplinary units of study in an eight week course in the Bachelor of Education program at a Canadian university. Undergraduate students worked in groups ranging in size from three to six members to develop an interdisciplinary unit. The learning opportunities were intentionally designed to engage students in understanding how to co-design interdisciplinary units of study with their peers. The instructors used a variety of strategies to support and scaffold (Van de Pol, Volman, & Beishuizen, 2010) the group assignments throughout the course. These strategies included providing time during class for students to collaborate with their group members. This embedded time for group work encouraged ongoing dialogue between students, their peers, and instructors. The instructors also used different forms of assessment and technology to support group assignments. The researchers were interested in finding out how instructional designs supported students' learning in group assignments.

Theoretical Framework

Instructors in the post-secondary context are interested in effective strategies to support group assignments (Clarke & Blissenden, 2013). Van de Pol, Volman, and Beishuizen (2010) offer the Conceptual Model for Scaffolding where they describe scaffolding as the instructor's adaptive support that is contingent on student's needs. While the authors note that there is a lack of consensus on the definition for scaffolding, this model helps explain aspects of instructional design. The researchers were interested in exploring how scaffolding supports group assignments. Diagnostic strategies such as formative assessment can be used as a tool by instructors to make adjustments to their instructional design based on student learning and these are referred to as contingency (Van de Pol et al., 2010). Wiliam (2011) outlines five formative strategies that inform instructors and students of their next steps in learning: (1) clarifying, understanding, and sharing learning intentions, (2) engineering effective classroom discussions, tasks and activities that elicit evidence of learning, (3) providing feedback that moves learners forward, (4), activating students as learning resources for one another, and (5) activating students as owners of their own learning. Others point out the value of making thinking visible so instructors and students can monitor progress (Bransford, Brown, & Cocking, 2000) and this includes peer assessment which can aid in identifying the extent of individual contributions in assignments (Dijkstra, Latijnhouwers, Norbart, & Tio, 2016). Formative assessment strategies can assist instructors in providing contingent support for group assignments and thereby scaffolding. Group work has been extensively researched, however there are limited studies examining how to assess group work (Clarke & Blissenden, 2013; Dijkstra, et al., 2016). In this study, we were interested in how instructional designs, such as scaffolding along with formative assessment strategies can improve student learning in group assignments.

Methodology

The research design for this study was Design Based Research (Amiel & Reeves, 2008; Dai, 2012; McKenney & Reeves, 2012) which involves three iterative cycles: (1) investigation/analysis, (2) design/prototyping, and (3) evaluation/retrospection. Mixed methods were used including qualitative and quantitative data. Year one and year two represent two iterative cycles. In cycle one and two, data were collected from instructors and undergraduate students enrolled in their second year of the B.Ed program and enrolled in different sections in the eight-week interdisciplinary learning course. Table 1 outlines the participants in year one and year two.

Table 1

Participants in Year One and Year Two

	Year One	Year Two
Student Survey	210	151
Instructor Survey	6	9
Student Interview	9	4
Instructor Interview	6	5

Both students and instructors completed a repeated online survey three different times during the term and this represents the quantitative data for each year of the study. The qualitative data included 30 minute interviews with students and instructors that were conducted following the completion of the course each year and also open-ended survey responses. Quantitative data was analyzed using basic descriptive statistics (Creswell, 2012). Thematic data analysis (Miles, Huberman, & Saldana, 2014) and two cycle coding was used for qualitative data (open-ended survey responses and interviews) and includes analysis for temporal similarities and differences. Integration of qualitative and quantitative data strengthened the validity through triangulation of the different data sources.

Results

Cycle One

In year one, 210 undergraduate students and six instructors from the eight-week interdisciplinary course participated in the study. Participation included completing an online repeated survey three different times during the term and being interviewed after the course was completed. The survey included nine items with both closed and open ended questions. Table 2 outlines the number of survey respondents for each survey. There were a total of 210 student participants and six instructors who completed the survey. Three instructors (n=6) and five students (n=9) were interviewed.

Table 2

Number of Survey Respondents for Repeated Survey For Year One/Cycle One

	Survey 1	Survey 2	Survey 3
Student Respondents	81	52	39
Instructor Respondents	6	5	5

Cycle One Findings

The themes that emerged from cycle one data informed instructional designs for group assignments: relationships, formative assessment, technology, and project management. Instructional designs included opportunities to build relationships where students were able to build trust with each other and with their instructor. Formative assessment strategies were identified in survey responses and appeared to move learning forward. Technology was indicated by both instructors and students for managing group assignments. In particular, Google docs was identified by both instructors and students as important in managing group work and was used by instructors to give feedback and monitor progress, an important aspect of instructional design for group work. Students also pointed out the challenges of working with technology (e.g., building a website). Project management was another theme that emerged from the data and was identified as both a strength and weakness by instructors and students. Instructors recognized students needed support in managing projects and were sometimes lacking these skills. Instructional designs to support managing these group assignments included protocols and project management tools. Students discussed who supported or provided leadership in managing their projects and at the same time noted that managing a project was sometimes difficult for various reasons (e.g., missing or free-loading group members, personality conflicts).

Instructional Design Modifications

The findings from the first cycle informed the instructor team and the redesign of the course syllabus for year two. Following the data analysis, the instructor team met to review the year one findings to

review the year one findings to consider how instructional designs could improve the student experience in group assignments. Instructors exchanged ideas related to the emerging themes and had the opportunity to reflect on their practices and consider how instructors might improve the student experience in group assignments. A protocol was used to facilitate the reflection around instructional design. The findings also informed modifications to the survey instrument (e.g., drop-down choices based on cycle one codes) for cycle two.

Cycle Two

During cycle two, data were collected from nine instructors and 151 undergraduate students who were enrolled in seven different sections in the EDUC 520 eight-week interdisciplinary learning course. In this cycle of the study, 151 students out of a total of 479 participated in the online repeated survey. Table 3 shows how many students participated in each of the three surveys distributed over the eight weeks at three different points in time. Nine instructors participated in the online survey for the study. Table 2 shows how many instructors participated for each survey over the eight weeks.

Table 3

Number of Survey Respondents for Repeated Survey in Year Two/Cycle Two

	Survey 1	Survey 2	Survey 3
Student Respondents	121	100	60
Instructor Respondents	9	6	7

The repeated survey included questions about Wiliam’s (2011) five formative strategies used in class and challenges encountered while doing group work each week.

Cycle Two Findings

Data were analyzed using thematic analysis as described in earlier in the methodology section. In the repeated survey, students were asked to select challenges in conducting group assignments and also asked to identify formative strategies used during the course.

Challenges

The top four challenges that were identified by students included: (1) balancing workload in the project in conjunction with other classes, (2) balancing workload in the project, (3) missing group members, (4) making shared decisions and reaching consensus. Similar to cycle one findings, the top challenges from the cycle two findings show students continue to find managing the project (interdisciplinary unit design) difficult.

Instructors discussed some similar challenges in their interviews. For example, instructors mentioned attendance as a challenge and that was also noted by students in the survey (e.g., missing group members). One instructor said “I found this year attendance was quite challenging... I’m pretty sure that I maybe had one or two classes where I had 100% attendance. So there was always somebody missing from the groups” and pointed out how these group members missed “critical conversations” and the groups who had more absences seemed to be “the only two groups that had breakdowns.” Another instructor noted the same issue of attendance and stated, “I think attendance was a problem. And some of the groups had some people who were very flexible in their own life and whether they needed

to attend or not.”

During student interviews, issues around managing the project and balancing the workload came up. For example, a student shared “I would say the biggest challenge was just that, with the stress of the whole project.....Learning different people’s emotional capacity was interesting. But in terms of people following through, doing what they said they would do, all of that, there weren’t any issues.... everybody had something that they were bringing. And then also just in terms of that emotional support, different people were able to inject something that would diffuse the tension in a given situation if you haven’t really quite agreed on what we were doing for one part of our project.”

Instructional Designs Aimed at Mitigating Challenges

Instructional designs and course redesign following the first cycle were aimed at mitigating the challenges students reported experiencing while doing group work including formative assessment strategies. In the second cycle of the study, both instructors and students reported the use of formative strategies as part of instructional design and as mentioned earlier this is a way to provide contingent support or scaffolding. The following strategies overlapped as top two most frequently selected strategies by instructors and students across the three surveys: (1) Instructor feedback helped move learning forward (i.e. instructor meets with groups to provide feedback on their plans for developing an interdisciplinary unit), (2)

Classroom Activities Help Students Clarify, Share And Understand Learning Intentions And Criteria For Success

The third most frequently selected formative assessment strategy differed between instructors and students. Instructors identified engineering effective classroom discussions and students identified activating learners as instructional resources for one another (e.g., using peer feedback loops). In the analysis of the interview data, both students and instructors noted the same formative assessment strategies used during class.

Instructor feedback provided to move learning forward (i.e. instructor meets with groups to provide feedback on their plans for developing an interdisciplinary unit). One instructor discussed how meeting with students and providing feedback was used to moving learning forward, “I was sitting, meeting with each group and having conversations with smaller groups, having them provide some information to me about where they were in their understanding.” A student also shared how instructors provided feedback: “The teacher would come around whenever we were working on especially our showcase project and ask questions as we were doing that. They would make some suggestions. They would share resources of their own with us, just to give us ideas, encourage us in our own questioning and conclusions.”

Classroom Activities to Help Students Clarify, Share and Understand Learning Intentions and Criteria for Success

Instructors talked about instructional designs that included classroom activities to provide clarity of learning intentions. For example, “I use lots of conversation protocols so that students can challenge their thinking and extend their thinking and clarify their thinking.” Another instructor described an activity to support groups in managing the project and said, “I’ve used the project management tool again this year, which was effective in terms of outlining specific roles and then particular students would choose roles in their group and then have an accountability piece.”

Students provided many examples about how instructors used daily activities to help clarify learning intentions and deepen student understanding. One student acknowledged the instructor's efforts and noted, "Our instructor did a great job of assessing our knowledge before we would watch something like a video. And then she would have really constructive questions afterwards. She would have us speak to one another and then share back with the group, or work in our small groups."

Conclusion

The findings from the first cycle of this study showed that building relationships, using formative assessment to move learning forward, using technology and project management were important aspects of instructional designs supporting group work. These findings informed the second cycle and subsequent changes to the course as well as bringing instructors together to share practices linked to these aspects. The second cycle findings indicated that both instructors and students identified common challenges in conducting group assignments and that formative assessment strategies were recognized as an important part of the instructional design.

At this point, we see formative assessment strategies as a way for instructors to provide contingent support and scaffold student learning. Specifically, two findings from the study offer two examples of formative strategies that may provide this contingency: (1) instructor feedback provided to move learning forward and (2) classroom activities to help students clarify, share and understand learning intentions and criteria for success. Instructors can create opportunities within a course to provide feedback to inform groups of areas of strengths and areas for growth prior to submitting their work to scaffold their learning. In addition, instructional designs can include classroom activities such as reviewing criteria for learning tasks and providing opportunities for students to ask questions and seek clarification. In this way, targets for learning are clarified and groups can identify what work needs to be done in their assignments. This type of scaffolding appears to be an aspect of instructional design aimed at improving group work experience and may aid students and instructors in overcoming the challenges of managing projects such as interdisciplinary unit plans.

Further research is needed to explore contingent supports for instructional design. This research offers value to post-secondary instructors and K-12 teachers who are interested in instructional designs for improving group work and scaffolding through contingent supports. Leaders of professional learning could also be informed by these instructional designs to support collaborative learning.

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Exploring Mathematical Concepts in Re-Designing Tabletop Games

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Abstract

Individuals develop skills and ideas when engaged in design practices. This forms a type of literacy that may differ from the traditional ideas of literacy. The study discussed in this paper took a design-based research methodology to design and implement a game re-design approach. We observed grade three and four students who were re-designing Triominos in a classroom focused on mathematical concepts. Students and the teacher decided to change several aspects of the pre-existing game in terms of aesthetics, mechanics, and dynamics. We collected data through weekly observations of two groups of 20 to 25 students.

Keywords: game design, mathematics, state of coming together, rules, playtesting

Researchers have argued that learning could be seen as developing relationships with knowledge, tools, and people that constitute their learning environments (Baradaran Rahimi & Kim, 2019; Kafai, 2006; Kim & Reeves, 2007). Researchers also have observed that playing or designing certain tabletop games could engage learners in mathematics embedded in problem-solving (e.g., Barta & Schaelling, 1998; Guberman & Saxe, 2000; Saxe, 1992). This paper discusses how individuals develop skills and ideas when engaged in participatory game (re-)design practices. In our research, grade three and four students in a western Canada school redesigned a tabletop game, Triominos, as a paper-crafted game to explore how using different shapes and numbers or symbols change the game rules. Triominos is a two-player game with 56 triangular tiles with three numbers (between 0 and 5) in three corners. They earn points by matching two numbers on one side of the triangle, and first player to reach 400 points wins the game. According to Nemirovsky and Ferrara (2009) mathematics learning can be seen as the development of a particular type of imagination that entertains possibilities. In our research, we investigated in what ways learners engage in mathematical conversations through the process of redesigning Triominos and how their conversations indicate their re-imaginings of mathematics. We collected data throughout the six-week process of re-designing Triominos, including observation notes, video recordings of classroom, photos of students' in-progress, artifacts made by learners, and final interviews with students and teachers as the sources of data.

Theoretical Framework

Playing and creating digital games have gained attention for their learning potential to foster critical thinking and deep understanding of content in a game (Kim, Bastani, Baradaran Rahimi, 2017; Gee, 2008). One study showed that the process of exploring, developing, and creating is essential in a game-design project (Baradaran Rahimi & Kim, 2019). Since a participatory game-design project needs the incorporation of multiple ideas, learners need opportunities to think critically about the project and its problems to come up with their own solutions. Learning activities through design can deepen learners' understanding of the subject matter and how to work with and implement meaningful artifacts as part of the learning process. When learners use the content or concepts in specific situations of use, they can gain a deep and situated understanding (Brown et al., 1989; Clark, 1998; Gee, 2008). Seemingly, when such an understanding is absent, the game design could lack coherence among its aesthetics, dynamics, and mechanics (Baradaran Rahimi & Kim, 2019; Zimmerman, 2009).

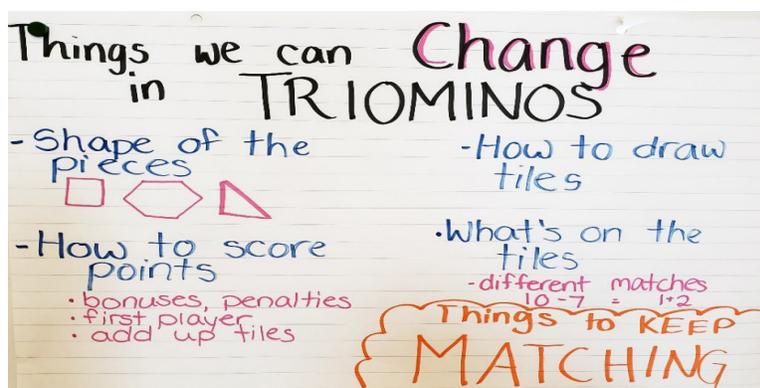
Creating learning environments that bring both teachers and learners together in their teaching and learning practices can be critical and relevant to mathematics classrooms (Kafai et al., 1998, p.149). Kafai et al. (1998) proposed game design as a "learning environment for learners and teachers to build on and challenge their existing understandings of mathematics, engage in relevant and meaningful learning contexts, and develop connections among their mathematical ideas and their real-world contexts" (p. 149). Participatory game design activities on paper can engage learners and teachers in mathematical thinking, systems thinking, and design thinking to better understand and discuss some of the mathematical concepts (Kafai et al., 1998). Participatory game (re-) design projects not only may provide an environment that brings both teachers and learners together to interact, but also offers opportunities for exploring, developing, and creating. Participatory game design in a STEM learning class can provide a situation to naturally combine issues of practice and theory, and promote reflection on those relationships. Participatory game design provides opportunities for discussion and collaboration within a meaningful context (Baradaran Rahimi & Kim, 2019).

Method

This study was part of design-based research (Brown, 1992), in which we co-designed lessons with the teachers and engaged in reflective inquiry on how students learn through creating games in a STEM classroom. The study was conducted in an inner-city elementary school in Calgary, Canada. The task was to redesign Triominos as a paper-crafted game to explore how using different shapes and numbers or symbols change the game rules. Re-designing the game took six weeks for three and four graders

Figure 1

Attributes of Triominos that Could be Changed



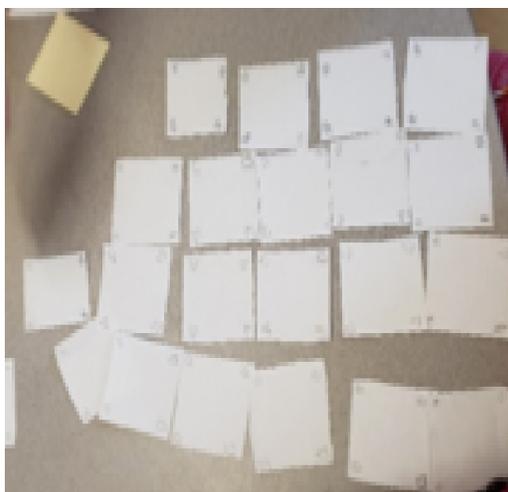
Students and the teacher decided to change several aspects of the pre-existing game (Figure 1) in terms of aesthetics (e.g., shape and size of the tiles as well as the symbols that appear on each tile), mechanics (e.g., new rules, scoring system, and score-keeping mechanism), and dynamics (i.e., the interactions of the players while playing the game). The teacher then grouped them based on the similarity of ideas. Throughout the six weeks of redesigning, the researchers collected qualitative data consisting of observation notes, video recordings of classroom, photos of students' in-progress and final game designs. Videotapes of interviews were transcribed verbatim. Observational videos during class sessions were separately logged and notes were taken based on the classroom events. The textual materials, including the video logs, transcriptions, observation notes, and students' reflections were analyzed by identifying themes within the textual materials.

Findings

Different teams created diverse games (Figure 2). For example, one group, Squairaminos, used the square shape for the tiles and used a combination of shapes and numbers on the tiles. Another group, Riominos, went with the triangular shape and used a combination of symbols and numbers.

Figure 2

Squairaminos (right) and Riominos (right)



Game Design as a Learning Environment

As the games made by learners had a considerable number of tiles to match and combinations of numbers, symbols, and letters to pair in several occasions, teacher suggested that the students use paper and write down all the possible combinations in a game. Then, team members could follow the combinations and check the tiles to figure out which combinations are missing from or extra to their game. This was an interesting task for the students. For example, Margot who was involved in creating Riominos expressed that "I like the part when we were making sure that we have all possible symbols (combination)". Thinking about combinations recalls a more complex topic in mathematics, permutation. However, game design provided a learning environment for learners wherein they enjoyed making the combinations. We anticipate that by beginning to think about combinations and learning its importance by doing it in a game design project, this approach can pave the way for learners' better understanding of more complex topics such as permutation in later stages of their education.

On another occasion, game design provided an environment for learning calculation. The teacher asked the Squarominos team “do you remember how many tiles there are in Triominos?” Mimas responded, “a lot”. Teacher confirmed and continued “remember in Triominos with 3 numbers on each tile going from 0 to 5 there are 56 tiles. So, think about you are doing square and choosing to go up to 8 or 10, How many pieces do you have?” Mimas says “oh, a lot”. Later, teacher mentioned “you need to come up with a system to include all combinations”. The teacher suggests putting shapes in order: “circle zero, triangle three, square four, hexagon six and star ten”. Learning about these mathematically oriented issues in the game design project provided learners with an opportunity for active learning by doing.

Mathematics Conversations, Systems Thinking and Design Thinking

Many of the conversations and discussions among the team members were related to mathematics. For instance, Margot explained that “when we play the game to get points, we should count the letters and symbols”. This conversation was followed by Andrew adding that “in Triominos when you draw a card you get less points, but we did not do that to make it easier for younger kids”. Later Margot mentioned that as they do not have paper money with 12 points on it, they also have to use mathematics to combine other paper moneys to reach 12 points and pay it to a player. Margot explained “with paper money when you get 12 points, we do not have paper money with 12. We will do something plus something to get 12”. Ajax continues the discussion by providing an example “ $5+5+1+1=12$ ”.

Learners experienced systems thinking and design thinking when creating their games. For instance, learners designed Squarominos with a certain strategy that was interesting to the teacher and researchers. Teacher told Mimas “I like your strategy of using the corners to draw the edges of your tile, it makes it easier to cut the tiles. it also helps you stop wasting papers”. Mimas’ teammate, Uranus, added that “we fold the papers and then trace the tiles on the corners and then cut it”. Design thinking here led to a strategy for dealing with a complex task: making identical tiles. The strategy was unique in a sense that not only facilitated the process but also added value to their work by less paper consumption.

Process Of Exploring, Developing, and Creating

Learners went through the process of exploring, developing, and creating the game project. For example, for Squarominos, in the initial phase of exploration, learners within third team had a similar idea about the shape of the tile (i.e. square) but had different ideas about what is going on the tiles (i.e. shapes and numbers). Therefore, when they teamed up, there was an ongoing discussion between the learners in the developing phase to figure out what should go on top of the tiles. In this phase the teacher provided suggestions. For instance, the teacher suggested “you already planned with shapes, so it is easier to go with shapes than the numbers. But what if we combine them? Some tiles with numbers and some with shapes. You can match the numbers of the sides of each shape with a number on tile. For example, square has 4 sides and matches with number 4”. This could help students to make their decision and include circle, square, star, triangle and hexagon shapes. To develop the mechanics of the game based on this decision teacher asked learners to draw each shape and write down how many sides each shape has. Creating phase for this game was involved with a specific strategy for making the tiles. In a conversation, teacher tells learners to adjust their strategy for making tiles. Mimas suggests a folding strategy. Teacher then mentioned that “folding helps you to cut more at the same time, but it doesn’t guarantee that tiles would be squares”. Mimas suggested “piling the papers and cutting the tiles” to deal with this challenge. Teacher asked, “how you make sure they are all exactly the squares” and Uranus replied, “we could trace our template (square) and cut them out”. At the playtesting with these learners, all the pieces were identical and the rules for the game were elaborated enough to be playable.

Discussions And Conclusion

As a team, learners changed the mechanics, dynamics, and aesthetics of Triominos based on their knowledge and understanding of mathematical concepts. They changed the mechanics by implementing new rules, scoring systems, and score-keeping mechanisms based on simple mathematical concept (e.g., addition, subtraction, etc.). They also changed the aesthetics of the game by altering the geometry, shape, and size of the tiles as well as the symbols that appear on each tile. Dynamics was also changed. As playtesting sessions showed, the interactions of the players while playing the new version of the game could help them understand the dynamics of the game. Mathematics conversations, discussions, collaborations, and reflections to mathematical concepts were the primary sources of binding the aesthetics, dynamics, and mechanics in the re-designed versions of the game. The game design project provided a cultivating environment for learners to engage in such discussions and to learn mathematical concepts.

Based on the analysis, it seems that the game design project had some effects on the learners' application of mathematical concepts and developing a deeper understanding of them. We observed and documented that learners were able to think systematically and improve systems thinking and design thinking by doing this project. Teamwork activities and a variety of conversations were also revolving around the systems the learners implemented for their games and the mathematical concepts they used. Most often, this happened in exploring phase of the game design project. Within teams, members could help each other develop understanding of math concepts. Such conversations usually took place in developing phase of the game design project. During this phase of conversations and explanations, ideas and suggestions were exchanged to develop the project. The phase of creating included crafting and designing the elements of the game as well as playtesting. Playtesting revealed the deficiencies of the games and the weaknesses that the game systems had. It was at this point that pieces started to come together in a uniform and united structure. Teacher facilitated the process of exploring, developing, and creating by providing feedbacks and suggestions.

Playtesting was another solution that helped students to evaluate their ideas for mechanics and aesthetics while experiencing the dynamics of their game. The outcomes and findings from this study can show the role of game design projects in helping learners to develop a deeper understanding of mathematical concepts. It can also demonstrate how a game design project based on mathematical concepts can improve systems thinking in young children. The outcomes can help teachers identify strengths and weaknesses of teaming up students based on the similarity of ideas. This project can help teachers develop an improved curriculum for mathematics and STEM classrooms. Focusing on processes and solutions helps researchers to understand the development of systematic thinking in different ages and level of understanding of mathematical concepts.

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Green Economy: A Board Game to Support Systems Thinking

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Abstract

In this paper, we discuss how a board game design could support systems thinking, which is influenced by the social interactions emerge through play. We designed a board game called, Green Economy, which deals with environmental concerns of achieving wealth and has unique mechanism for players to influence the game and social system. Through two-day gameplay observations in a Master of Education course, we suggested that players were engaged in systems thinking and anticipatory analyses by interacting with the various game design elements. Reflective discussion were also important in engaging learners as part of the emergent social and complex system.

Keywords: game-based learning; game design; board game; system thinking; social interaction

Introduction

There is a substantial growth in the scholarship of game-based learning (GBL) considering its possibilities to pique learners' interest in relevant knowledge (Vos, Van Der Meijden, & Denessen, 2011) and to experience deep learning in a simulated system of rules and elements (Kim, Park, & Baek, 2009). In this paper, we focus on gaming experience in relation to the emergent social interactions that change how the various elements within the game system evolve (e.g., new experiences for every repeated play, negotiating resources, seeking alliances, creative engagement through modding). We explore how board games could be useful to support systems thinking, influenced by the emergent social system.

In this paper, we discuss a board game, called Green Economy, designed with the intention that players would understand the game mechanics better by changing its rules. This rule change is for players to become more conscious about the game rules, and therefore, engage in learning of the game mechanics as well as how the system might be influenced by the rules. Rules, as part of a formal game system, are fixed like an empty playground unless players come into the context and play with the system (Salen & Zimmerman, 2004). The players themselves, as interrelated elements in the game, make decisions which influence the whole system. The gameplay is an activity created by players with the combination of game rules. Green Economy is a game where players have the opportunity to experience the sustainable development in a simplified model of transitioning from the industrial era

of mass production to the sustainable development era. We argue that our game mechanisms provide a flexible space for the emergent social interactions, helping students (as players) to think, act, and engage as a part of the game and social system.

Systems Thinking via Gameplay

Playing a game invites the players to participate in the system itself and helps to cultivate systems thinking skills in diverse age groups and contexts. Castronova and Knowles (2015) explored how a board game about the climate system can be played by university students to learn about climate policy making. More recently, Nordby, Øygardslia, Sverdrup, and Sverdrup (2016) tested their digital game about ecosystem among elementary students. From the constructivist and situated learning perspective (Lave & Wenger, 1991), this type of games for learning situates knowledge within the modelled system and, therefore, simulates a meaningful context for systems thinking.

However, the game itself and gameplay are only a part of teaching and learning. What is more important is the reflective activities after the gameplay. In the Beer Distribution Game (Goodwin & Franklin, 1994), players acted in the roles of the factory, distributor, wholesaler, and retailer, aiming to consider the cost-effectiveness. After the gameplay, players in different positions drew a graph of the pattern of customer demand. While explaining what happened in the game, most students thought other players' behaviours had ripple effects on their game performance, but seldom noticed the impact of the larger game structure and how their own behaviours contributed to the system. After collaboratively reviewing and analyzing how the system worked with videotapes of their gameplay, students were able to understand how their behavior as a distributor (e.g., raising or reducing the quantities in their orders), for example, influenced the entire market system (Goodwin & Franklin, 1994). The study by Nordby et al. (2016) similarly encouraged elementary students' reflective practices of writing diaries on ecosystems based on their gameplay and holding debriefing sessions. The studies described above demonstrate how playing games and reflecting on the play situation engage learners in systems thinking, that is, the situated and social nature of interpreting, constructing, and negotiating decisions and their consequences. While modding or modifying the game is common social practice among the communities of gamers, it is difficult to find or realize similar practices when using digital games in education, even though educational game-making has been explored for the last 20 years (e.g., Kafai & Burke, 2015). Modding requires games to engage in systems thinking as they need "to think about how various parts of a system (e.g., different subsystems within a system) or different systems interact with each other" (Gee, 2009, p. 6), which is essential when solving complex problems.

Research Design

Green Economy invites players to experience the sustainable development during the gameplay. Players assume as nation leaders that conduct their population through two distinct evolutionary stages to build a prosperous nation. In the first stage, players must take decisions that imply in adverse consequences for the environment. They need to manage resources while their nation evolves. In the second stage, player will have opportunity to spend their resources for caring the environment, but they want to continue developing as a nation. The players manage their resources and address solutions for your environmental problems (sustainable development), and the most successful player will win the game.

Green Economy combines a board and cards. The board is formed with hexagons, and each hexagon represents a land; the cards include resources, chances, and rules cards. The game is composed of other elements that represent population, gold, factory, and army (see Table 1).

Table 1

Green Economy Game Elements

Element	Function
Board	Represents the space where players will build their civilizations
Population	Represent the people from players' civilization who live in a land
Gold	The currency of the game. 1 Gold = \$10
Factory	The factory provides Gold and environmental points (+/-) for players
Army	The army used to protect players' land, population, factories, etc., and attack other civilization
Resource Cards	The raw-material to build factories or army. Players will need mineral, technology, researcher and clean energy to win the game
Chance Cards	Cards that give a player good luck or bad luck
Rule Cards	Cards that give instructions for a player (the power) to change game rules

To understand how the board game design challenges the players to think more deeply about the game design and its rules, we used this game during summer 2017 in a digital game-based learning course in a Master of Education program of a Western Canadian University. Our board game was introduced to the students as a way to help them to think about game mechanics and to apply board games as prototypes for digital games. We had eight students who were divided into two groups. Each group had a separate game play guided by the authors.

During the gameplay sessions, we observed and took notes about players' conversations and reactions, and the strategies employed in the game. We also collected photos from two days of the observations. On the second day, the setup and play group formation remained the same, but they used the extended version of the game with rule change cards (i.e., they have chances to change the rules based on what is written on the card).

After the gameplay (one hour each day), the instructor conducted a debrief session where students engaged in a reflection discussion on the game and its rules, their experience, and the potential of using board games for learning. After the class, the students were also invited to write reflections on their experiences connecting them to their readings in a digital forum where they have an opportunity to read and comment other students' observations. With students' permissions, we are using their avatar names used in the digital forum in this paper.

Findings

We identified episodes of how the game interactions progressed over two days and how players were influencing the dynamics of the game system. We observed that students' game play has accelerated the comradarie among classmates. The students had the opportunity to interact with the game in two different ways: (1) as players as part of the game system; and (2) as players and designers after the rule change cards have been introduced. Students had the opportunity to interfere in the game design by changing the rules affecting not only the relationship of the game elements but also reshaping the players' strategies in the face of the changes promoted in the system. It provoked emergent strategies that differ from those traditionally observed in games. In general, players adapt to changes promoted

by the action of other players. In this situation, players must reframe their strategy based not only on the opponents' performance but also on the changes promoted in the mechanics of the game itself. In this sense, when players are about to change rules, they must consider not only the consequences on other players (as in a traditional game) but how the change can affect themselves in short and long terms, and how the new rule interacts with game elements producing a meaningful play.

Understanding Social Dynamics as Part of The System

On the first day, most of players were conservative and preferred to keep what resources they had with no frequent exchanges of resources or negotiations among them. They also displayed all the resources and environmental points during the game (Figure 1). During the first day, the first player who built an army was the first player who evolved to the second stage of the game. She seemed ashamed of conquering other players' land and factories using her army.

Figure 1

Green Economy at Play



The game play, however, it was an opportunity for players know each other better. Mighty Moe's comment demonstrates the social aspect of learning through games:

"[...] a classmate said that we all were able to feel more connected and had a stronger sense of camaraderie after playing a game together. The interesting part wasn't that we, in fact, did connect, as that was expected after experiencing a social interaction of sufficient time, but that we were technically playing a competitive game where we were actively trying to defeat other players."

Through the first day play, the students understood each other's personalities and preferences as players. On the second day, we offered the option to change player groups, but they wanted to compete with the same players as they had a better understanding of each other.

Negotiating and Redesigning the System

During the second game play day, as players were more familiar with the game system, there emerged more negotiations than the first day. The prior knowledge played a significant role during this game play session. The lessons learned from the previous day session allowed players played with a different

attitude, as also noted by British Bulldog:

“The rule changing changed everything! Once the rule change cards came into play the objective began to focus on how to extend or manage the play between the entire group. The change of rules began to happen to instigate events in create game play that would cause the group to interact more individually and deeply.”

Moreover, with the introduction of rule change cards, players redesigned the original rule-based system (Salen, 2007), which led to new possibilities during the game play. For example, a player used a rule change card to lower the requirement for upgrading to the second stage. As a result, it fastened the process of the whole game system, as discussed by British Bulldog:

“The rule changing changed everything! Once the rule change cards came into play the objective began to focus on how to extend or manage the play between the entire group. The change of rules began to happen to instigate events in create game play that would cause the group to interact more individually and deeply.”

Another instance is the rule change of the army moving limits each turn. In order to prevent other players from winning the game, one player attempted to destroy a clean factory of others by increasing the limits for an army’s move in each turn (one hexagon). Meanwhile, the player with a clean factory but lacking armies bought a rule change card to reset the rules (decrease the army moving limit and slowed down the pace of attacks) and made a deal with another player to seek army protection. The knowledge that emerged from these interactions and the interpretation of the environment helped them to made alliances and work as a team. Players started to change the system to avoid the quick ending as observed by British Bulldog:

“The group collaborated to attack a player who was projected to win given the attainment of points. The rules were changed to enable this attack and it was successful.”

The follow-up reflection indicated that the strategy of one player had an impact on other players’ strategies. For example, every other player started to build armies after one player built an army. Through these emergent strategies and follow-up reflection on the decision making during the game play, we can see that they were involved in systems thinking such as recognizing elements and relationships in the game, as well as organize those components and the process of the game system (Ben-Zvi-Assaraf & Orion, 2010). The in-service teachers as graduate students were also able to reflect on their own learning process in relation to using using games in the classroom, as noted by Arctic Fox:

“The game allows for divergent thinking, but then there needs to be the reflection piece (with all learning) to help with that convergence process and help students ‘get it.’ Games offer an awesome platform to co-construct!”

Conclusions

Games are considered as systems that evolve over time as a result of players’ actions. Any player’s decision promotes changes in the system of play, which makes the opponent facing a different scenario each turn. Game play requires a constant strategy reformulation to accommodate the challenges presented by the current context and the desired outcomes. However, what characterized games is the rules structure. Distinctive from real life, for example, game rules usually do not change; consequently, it is often possible to anticipate possible moves and the resulting outcomes. Our game design subverted this fundamental game concept by introducgin a game element that made possible for players to change the rules of the game during play. This component embedded in Green Economy invited players to a continuous reflective practices beyond the natural responses to opponents maneuvers. In our game, players were also invited to reflect on and with the system structure in order to propose changes that may positively affect their outcomes in order to win the game.

This reflective practice of considering the interaction of different game design elements supported players' social interaction and the formulation of emerging strategies. It also helped us to see how players were engaged in systems thinking through a social gaming experience. We also identified that students interpreted the game rules and the game play as a system and understood how a small change of an element in the game could influence the whole game system (Gee, 2009). Our work demonstrated not only how players' decisions modify the game, but also how players transformed and shaped a new entire system proposing new rules.

It is important to note that the learning possibilities that emerge from this type of game-based learning activity are not restricted to the play time. The discussions facilitated by the educators after the game play had an important role in deepening their learning, through the recapitulation of the decisions made during the game, the changes in the system and, in particular for the Green Economy, the sustainable development.

We believe that our approach of redesigning game rules during play has an implication for the research seeking to deepen how players may develop design thinking. Games viewed as systems offer opportunities for students to develop their competencies in any discipline (Kafai, 2006; Kafai & Burke, 2015; Kim & Bastani, 2017).

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Leading Collaborative Professional Learning for School Systems

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Abstract

Given that effective leadership at the central office and school level can make a difference in student learning, there is a demand for ongoing leadership professional learning. In this two-year action-based research study, researchers collaborated with a school jurisdiction as part of a research-practice partnership to design and explore a collaborative professional learning model aimed at addressing new leadership standards. Findings from the year one survey are non-significant with only a small sample size with a modest increase in leadership growth. Findings from the first year of this study will be used to develop an action plan for year two after qualitative analysis is complete and integrated with quantitative data.

Keywords: leadership learning; collaborative professional learning; action-based research

Introduction

Many school jurisdictions in Alberta are currently working to develop professional leadership learning based on the competencies identified within Alberta Education's (2018) Leadership Quality Standard (LQS). The fundamental understanding is that school leadership directly impacts teaching practice and is second when compared to classroom instruction in its impact on student learning and achievement (Davis, Darling-Hammond., LaPointe, & Meyerson, 2005; Leithwood, Louis, Anderson, & Wahlstrom, 2004; Leithwood & Louis, 2012; Waters, Marzano, & McNulty, 2003). The LQS states, "quality leadership occurs when a leader's ongoing analysis of the context, and the leader's decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all students in school" (Alberta Government, 2018, p. 3). School jurisdictions, specifically central office leadership, are developing models that engage school leaders and jurisdictional leaders in ongoing inquiry and analysis that aligns to both the LQS and effective professional learning. This paper illustrates how one school jurisdiction, with researchers from a university, worked collaboratively to develop and implement a collaborative professional learning model. We report on the survey data collected during the first year of the study to examine the following research question: How does the collaborative professional learning model contribute to leadership development related to meeting the leadership quality standard?

Theoretical Framework

There is widespread agreement among educational researchers and educational leaders that the primary role of the principal is to align all aspects of schooling to focus on the improvement of teaching in order to impact the effects on student achievement (Davis et al., 2005; Hallinger, 2011; Heck & Hallinger, 2014; Robinson, Lloyd, & Rowe, 2008). This research clearly indicates that effective school principals can play a critical role in developing teaching practices (Robinson, 2010; Spillane & Diamond, 2007). Within this research, it is important to consider the support being offered principals and other school-based leaders in supporting teaching and student success. Given leaderships influence on teaching practice and student learning, there is a need for a sustained focus for leadership development (Davis et al., 2005; Goldring, Preston & Huff, 2012) and for ongoing opportunities for leadership professional learning. While there are leadership development and preservice programs linked to certification requirements (McCarthy, 2015), in-service opportunities that support sustained learning are necessary (Goldring et al., 2012; Grissom & Harrington, 2010; Mendels & Mitgang, 2013).

Engaging in quality preparation and ongoing learning experiences over time, both prior to assuming the principal position and once in the role, can have a positive impact on the effectiveness of the school leader's ability to influence teaching and have significant impact on student learning (Davis et al., 2005; Mombourquette & Bedard, 2014). While leadership preparation programs contribute to the development of the knowledge and skills of school leaders, the challenge is in providing ongoing professional development (Goldring et al., 2012; Grissom & Harrington, 2010; Mendels & Mitgang, 2013). Research has demonstrated that leadership development through ongoing professional development can provide support in maximizing the impact on teaching and ultimately on student learning (Davis et al., 2005; Knapp, Copland, Honig, Plecki, & Portin, 2010). Grissom and Harrington, (2010) found that principals perceived the ongoing support as helpful in refining their practice and applying knowledge with structures, tools, and protocols learned through the professional development provided. Darling-Hammond et al. (2008) stated that "exemplary in-service programs offered a well-connected set of learning opportunities that were informed by a coherent view of teaching and learning, grounded in both theory and practice" (p. 7). These exemplary in-service programs are organized around continuous learning and informed by specific professional practices that included developing "shared schoolwide goals and directions, observing and providing feedback to teachers, planning professional development and other learning experiences for teachers, using data to guide school improvement, and managing a change process" (p. 7).

However, there are limited studies focused on professional learning frameworks centered on developing effective leaders (Barnes, Camburn, Sanders, & Sebastian, 2010; Davis et al., 2005; Grissom and Harrington, 2010). What research has indicated is the important role that school districts play in designing and establishing the appropriate support structures (Barnes et al., 2010). An effective leadership development framework requires significance resources, especially human resources, to support learning embedded in practice. These resources need to centre on policy and procedural development that need to be addressed by the school districts in order to create a balanced approach to leadership development (Darling-Hammond et al., 2008). Further, a recent study on professional learning in Canada noted an important aspect related to support and sustainability for professional learning was having supportive and engaged leadership which has implications for system leaders in supporting professional learning for school leaders (Campbell et al., 2016).

Research Methodology

An action-based research approach (Creswell, 2012; Mills, Huberman, & Saldaña, 2014) was used to design and implement a collaborative professional learning model with the goal of determining its effectiveness in helping leaders meet their identified goals for the LQS. Action based research brings educators together to solve problems of practice (Creswell, 2012). In this study, a university and a school jurisdiction teamed up to support a long-term collaboration and research-practice partnership around leadership development, a problem of practice (Coburn & Penuel, 2016). The university and school jurisdiction engaged democratically (Mills, 2013) in ongoing dialogue to set goals for a leadership professional learning series and then implemented and tested out ideas around collaborative professional learning during year one. As part of this action based approach, the data collected and analyzed will be used to make improvements and to design an action plan (Creswell, 2012) to support leadership development for year two.

Mixed methods, when combined with action research, can produce more scientifically sound results with a higher degree of transferability (Clark & Ivankova, 2016; Ivankova & Wingo, 2018). In order to address the research questions, data collection followed a defined cyclical process, a suggested model for action based research (Creswell, 2012), that integrates multiple quantitative and qualitative data. Qualitative and quantitative evidence were gathered using an online pre- and post-survey during year one. At the end of year one's professional learning series, participants were also invited to share further insights through semi-structured interviews and focus groups. This paper focuses on the pre and post survey quantitative data from year one which has been collected and analyzed at this point.

Data Sources and Evidence

In year one, data were collected from 50 central office and school leaders in one school division in Alberta. These participants were part of a year-long Division Leadership Academy (DLA) and professional learning series in the school district. The researchers created the surveys for this study and recognized the need to validate these. A pre-survey was administered in Fall 2018 and a post-survey was administered in May 2019. In each survey, leaders reflected on their growth using a Likert scale (e.g., beginning, developing, achieving, excelling) in relation to specific leadership competencies based on the new leadership quality standards in the province of Alberta. The surveys also had open-ended questions that asked participants to select a focus, provide a rationale with related strategies, and asked them to reflect on how they built capacity in their focus area and how the professional learning impacted their growth.

The pre-survey had 50 responses (91% response rate). For this phase of the data analysis an Exploratory Factor Analysis was first used to determine the validity of each item. The Cronbach's alpha measure was used to determine the internal consistency and reliability of the multiple items in the survey as connected to each leadership competency (Creswell & Creswell, 2018). The optimal range being set to 0.700 or higher (Kline, 2016). As a result, two of the questions were rejected from further analysis. We then used descriptive statistics to calculate the frequency and central tendency for each survey items to establish our base line.

The post-survey had 41 responses (75% response rate). The analysis used a paired or matched approach using participants' pre- and post-survey responses. Individual responses were also matched to one of the five identified areas of the LQS based on their declared area of professional growth in the pre-survey. The compared mean value indicated a moderate increase in the central tendency of responses based on matched areas of professional growth. A Wilcoxon Signed Ranks Test was conducted and found that there was not enough evidence to declare that there was statistical

significance. One of the possible reasons for this non-significant result was the fact that there were smaller number of participants in each of the five sections of the survey. Another possible reason is the different characteristics of the population given the varying roles of leaders (e.g., school leaders, central office leaders) participating and how this may have contributed to their interpretations of the questions. Once the qualitative data from the study's focus group and interviews is analyzed then this data will be integrated which will triangulate the data and strengthen the findings.

Results

Due to the small sample size we recognize that the paired quantitative results from pre and post-survey are not statistically significant. While the results could indicate a modest increase in perceptions of growth in leadership dimensions this may suggest that there was no change in growth. Further, it may be difficult to analyze perceptions and any modest increase could be due to the Hawthorne Effect (McCambridge, Witton, & Elbourne, 2013) and moving forward the researchers need to consider whether the participants are responding in a positive way because they are being observed. When quantitative analysis is complete the next step is to integrate this data with the quantitative data in order to triangulate findings and to see if there is any evidence of leadership development or any impact from the collaborative learning design.

Significance

This study has influenced both the university researchers and the school district in promoting dialogue around professional learning and growth in relation to leadership development. On a broad level, these initial quantitative findings serve to inform researchers considering creating and validating their own surveys.

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Conceptualizing and Enacting Overall Instructional Leadership in the Alberta Context

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Abstract

This descriptive case study provides reports on the advancement of leadership development in Canadian Rockies Public Schools (CRPS) through the provincially funded *Nurturing Excellence in Instruction and Leadership* (NEIL) initiative. Data gathered and analyzed over a four-year period from interviews, focus groups, field notes, artifacts, and classroom observations indicate that the NEIL initiative's iterative cycles of collaborative inquiry and evidence-informed professional learning are positively impacting the overall instructional leadership practices of school and division leaders. An unrelenting focus on educator and student learning in combination with a widely shared approach to instructional leadership, and the transparent, unthreatening, improvement-oriented consideration and application of classroom, school, and division evidence are strengthening relational trust and enabling a flourishing learning culture. Leadership development in CRPS has been framed by the application of Alberta's 2018 professional standards, with a more specific focus on enacting, extending, and embedding four key leadership competencies that we argue are foundational to evidence-informed overall instructional leadership.

Keywords: overall instructional leadership; leadership development, professional learning

Enacting Overall Instructional Leadership

Despite the widely documented evidence that the work of principals and assistant principals is increasingly complex and demanding (Canadian Association of Principals, & Alberta Teachers' Association, 2014; Castle, & Mitchell, 2001; Cattonar et al., 2007; Pollock, Wang, & Hauseman, 2015), school leaders in Canadian Rockies Public Schools (CRPS) continue to bolster their practices as instructional leaders and engaging supervisors through the provincially funded *Nurturing Excellence in Instruction and Leadership initiative*. We used the construct of overall instructional leadership (Brandon, Hanna, & Negroptes, 2015; Fullan, 2014) to frame and illustrate the ways that iterative cycles of design-based professional learning (Chu, Brown, & Friesen, 2020; Friesen & Jacobsen, 2015) and collaborative inquiry are advancing leadership development in the division. These ongoing, evidence-informed and adaptive approaches are enabling leaders to more successfully confront two persistent obstacles to supporting and assuring quality teaching: (a) the complexity challenge and (b) the learning challenge (Brandon, 2005, Brandon et al., 2015; Brandon, Hollweck, Donlevy, & Whalen, 2018; Brandon et al., 2018a).

The paper unfolds in six parts, beginning with a short description of recent educational reform efforts in Alberta through the implementation of new superintendent, leadership, and teaching standards. An account of two major obstacles to instructional leadership and supervisory practice is followed by a substantive overview of the conceptual framework that situates the study in the relevant research literature. An outline of our descriptive case study research design then bridges to the results section, wherein five key findings are presented along with their implications. The concluding section sheds light on ways in which these larger themes may be helpful to the development of leadership in other settings.

Educational Reform Through Professional Practice Standards in the Alberta Context

The Canadian province of Alberta is considered among the world's top performing education systems (Coughlan, 2017; OECD, 2019). With the February 7, 2018 Ministerial approval of three professional practice standards, a strong throughline was established in the professional practice expectations for all Alberta teachers, principals, and superintendents. The three Ministerial Orders conceptualize professional practice in consistent ways through the following standard statements:

The Teaching Quality Standard (TQS)

Quality teaching occurs when the teacher's ongoing analysis of the context, and the teacher's decisions about what pedagogical knowledge and abilities to apply result in optimum learning for all students. (Alberta Education, 2018c)

The Leadership Quality Standard (LQS)

Quality leadership occurs when the leader's ongoing analysis of the context, and the leader's decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all students in the school. (Alberta Education, 2018a)

The Superintendent Leadership Quality Standard (SLQS)

Quality superintendent leadership occurs when the superintendent's ongoing analysis of the context, and the superintendent's decisions about what leadership knowledge and abilities to apply, result in quality school leadership, quality teaching and optimum learning for all students in the school authority. (Alberta Education, 2018b)

In each standard statement professional practice is based on the professional's reading of the context and the application of the professional's judgement about the professional knowledge and skills that will most likely lead to optimum learning for all students. All three standard documents are structured in the same manner: one standard, six to nine required competencies, and several optional indicators.

In preparation for required implementation in September 2019, and in partnership with education stakeholders, Alberta Education invested significantly in implementation readiness initiatives, structures, and frameworks to "build, support and assure the enactment of quality leadership and quality teaching that results in optimum learning for all students" (Brandon et al., 2018a). CRPS received provincial funding support to pursue the following overarching research question: *In what ways are the Nurturing Excellence in Instructional Leadership (NEIL) initiative's iterative cycles of collaborative inquiry and evidence-informed professional learning impacting the overall instructional leadership practices of school and division leaders?*

Two Persistent Obstacles to Supporting and Assuring Quality Teaching

Within the context of the implementation of the Alberta leadership standards, superintendents and leaders are expected to work with teachers to build, support, and assure quality professional practice. Two enduring obstacles to such instructional leadership and supervision are outlined in this section: (a) the complexity challenge and (b) the learning challenge.

The Complexity Challenge

Inadequate time to provide instructional leadership and supervision is a consistently identified impediment by school administrators (Brandon, 2018a; Canadian Association of Principals, & Alberta Teachers' Association, 2014; Pollock, Wang, & Hauseman, 2015; LeFevre, & Robinson; 2014; Lortie, 2009; Marshall, 2013). Time needed to attend to such matters as budgeting, student and parent concerns, preparing reports, other bureaucratic requirements, and more immediate organizational tasks often take precedence over working to support instruction. These management concerns are frequently cited as inhibitors to having sufficient time to adequately provide supervisory or instructional leadership. Issues associated with the interpersonal politics of instructional supervision, expectation ambiguity for school administrators, along with the intellectual and interpersonal demands related to understanding and supporting quality teaching and teacher growth contribute to the first enduring obstacle to effective supervision and evaluation – the complexity challenge (Brandon, 2005; Brandon et al., 2015; Brandon et al., 2018a; Darling-Hammond, L., 2012, 2013; LeFevre, & Robinson; 2014; Leithwood, Sun, & Pollock, 2017; OECD, 2016; Zepeda, 2017).

The Learning Challenge

The absence of ongoing attention to the development of instructional leadership knowledge and skills has been a major obstacle to effective supervision and evaluation. Insufficient attention has been devoted to the development of supervisory knowledge and skills in many schools and districts we have studied, creating the learning challenge (Brandon, 2005, Brandon et al., 2015, Brandon et al., 2018a). Attendance at conferences and one-shot presentations by headline speakers can be stimulating, but the evidence is that much more in the way of ongoing support is needed (Brandon et al., 2015; Darling-Hammond, 2010, 2012, 2013).

Conceptualizing Overall Instructional Leadership

The research literature on overall instructional leadership is informing the efforts of CRPS educational leaders to further develop and share their capacity to support leader and teacher learning through reflective questioning based on evidence of leadership quality, teaching quality, and student success. Leaders are enacting, extending, and embedding four key professional practice competencies required of Alberta school leaders within a manageably coherent and research-informed approach to overall instructional leadership. We now turn to the evidence from the research literature that supports this course of action. As the SLQS document indicates, leaders “must be informed by current, relevant educational research, with a focus on career-long improvement” (Alberta Education, 2018b, p. 3). Much of the instructional leadership and instructional supervision literature focuses on what Fullan (2014) described as direct instructional leadership – principal actions that directly impact instruction (Hallinger 2003, 2011). In contrast, much of our work has aimed to better understand and illuminate what Fullan (2014) called overall instructional leadership – the wider range of purposefully employed leadership practices designed to positively impact teaching and learning in schools (Brandon et al., 2015, Brandon et al., 2018; Robinson, 2011, Robinson, Lloyd, & Rowe, 2008).

Wahlstrom (2012) grouped overall instructional leadership practices into two complementary categories: *Instructional Ethos* and *Instructional Actions*. School leader efforts in the *Instructional Ethos* category aim to build a culture that supports continual professional learning. “Principals whose teachers rate them high on Instructional Ethos emphasize the value of research-based strategies and are able to apply them in the local setting” (p. 68). Wahlstrom found that setting a tone and developing a vision for student learning and teacher growth is present in high-performing schools of all grade levels, K-12. The second category– *Instructional Actions* – involves explicit engagement with

individual teachers about their own professional growth and is more evident in elementary schools than in secondary settings.

It is within this approach that CRPS educational leaders are enacting, extending, and embedding the following four key leadership competencies: (a) embodying visionary leadership (b) leading a learning community, (c) providing instructional leadership, and (d) building leadership capacity.

By no means is it suggested that these four specific competencies should be thought of as separate and distinct areas of endeavour. In fact, professionals generally practice in more integrated and fluid ways (Brandon, McKinnon, & Bischoff, 2014; Schoen, 1983). It is, however, helpful to mindfully think and act one's way forward though the guidance of research informed images of coherent and impactful practice (Brandon, 2005) as represented in the conceptual framework in Figure One. Though the framework was guided by research from a variety of sources that could be structured in other ways, we have organized it within four competencies critically applicable to overall instructional leadership (Brandon, et al., 2015; Fullan, 2014).

In CRPS, educational leaders are engaging in ongoing collaborative inquiry to fully achieve all three proposed Alberta professional practice standards, with heightened emphasis on the Leadership Quality Standard (LQS), "Quality leadership occurs when the leader's ongoing analysis of the context, and the principal's decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all students in the school" (Alberta Education, 2018a, p. 3).

The four competencies within this standard are now addressed in separate sections. Each section begins with the competency statement itself, followed by what the research suggests are the critical indicators of practice selected from those listed in the LQS document (Alberta Education, 2018a). Next, aspects of research informed leadership practices related to the competency are provided. Though not offered as magic bullets, these best evidence practices are being used to encourage CRPS to more consistently build their leadership actions on a research foundation.

Figure 1

Four Key Areas of Overall Instructional Leadership Practice



Embodying Visionary Leadership

The Competency

A leader collaborates with the school community to create and implement the school's shared vision for student success, engagement, learning, and well-being.

Four Critical Indicators

Attention to establishing a vision that is widely shared and sharply focused on student success is critically important and well supported in the research literature. The following LQS indicators describe leadership practice related to a research informed visionary leadership competency.

1. communicating a philosophy of education that is student-centred and based on sound principles of effective teaching and leadership;
2. collaborating with other principals and superintendents to address challenges and priorities; supporting school community members, including school councils, in fulfilling their roles and responsibilities;
3. promoting innovation, enabling positive change, and fostering commitment to continuous improvement.

Research Informed Leadership Practice: Visionary Leadership

Leadership practices aimed at creating a widely shared sense of purpose that focuses on teaching and learning can have a significantly positive impact (Fullan, 2011; 2014; Fullan & Quinn, 2016; Leithwood; 2010, Louis et al., 2010; Robinson, 2011; Robinson, Lloyd, & Rowe, 2008). The challenge is achieving a focused vision that is, in fact, widely shared and implemented. Leithwood (2012) described the core practice of setting direction in four specific leadership practices “building a shared vision, fostering the acceptance of group goals, creating high performance expectations, and communicating the direction” (p. 59). These practices are intentionally “aimed at bringing a focus to the individual and collective work of staff members in the school” (Leithwood, 2012, p. 60).

In the seminal study by Robinson, et al., (2008), establishing goals and expectations was found to be one of three leadership dimensions that have the greatest impact on student learning outcomes, with a moderate effect size of 0.42 (p. 659-661). As Robinson (2011) commented, translating a shared vision into worthwhile coherent action is founded on strong relationships and involves “deciding what goals to set, gaining the commitment of those responsible for achieving them, and communicating them to all those with an interest in their achievement (p. 45).

Focusing on a few clear, widely understood teaching and learning priorities can lead to powerful results for the learning, engagement, and welfare of all children. Focused schools and jurisdictions have a limited number of defined priorities that are clearly articulated, collaboratively developed, and effectively communicated. It is important to avoid the “Christmas tree” glitter of numerous innovations and initiatives that invariably lead to “initiative fatigue” and lack of coherence. It is also important to ensure staff members are active and participate in building the shared vision and help to shape practices toward achieving the goal (Fullan & Quinn, 2016). Participants in all six settings recently studied by Brandon, et al., (2015) “articulated that their jurisdictions were highly focused on student success: learning, engagement, and wellbeing. Educators at every level indicated that their work was guided and, in many cases, inspired, by a clear learning vision that was understandable, attainable, and forward looking” (p. 66).

How to operationalize such a shared sense of educational purpose was the subject of a study conducted by Davis, Sumara, and D'Amour (2012), which concluded: “Dynamic learning systems I

cannot be forced or legislated into existence. The best one can do is to create the conditions that will permit their emergence” (p. 374). Highly centralized networks do not appear to foster organizational learning; on the other hand, fragmented systems can have pockets of strength that are never shared or leveraged outside of their own networks.

Leading a Learning Community

The Competency

A leader nurtures and sustains a school culture that supports evidence-informed teaching and learning.

Critical Indicators

A large body of research underlines the positive impacts of collaborative school cultures that nurture evidence-informed professional learning that supports evidence informed teaching. The following critical indicators describe leadership practice related to this competency.

1. fostering in the school community equality and respect with respect to age, ethnicity, culture, religious belief, gender, gender identity, gender expression, physical ability, cognitive ability, family status and sexual orientation;
2. creating an inclusive learning environment in which diversity is embraced, a sense of belonging is emphasized, and all students and staff are welcomed, cared for, respected, and safe;
3. developing a shared responsibility for the success of all students;
4. cultivating a culture of high expectations for all students and all members of the school staff;
5. creating meaningful, collaborative learning opportunities for teachers and support staff;
6. establishing opportunities and expectations for the positive involvement of parents/guardians in supporting student learning;

Research Informed Leadership Practice: Leading a Learning Community

With an effect size of 0.82, promoting and participating in teacher learning and development has a large impact on student learning outcomes. “The leader participates in the learning as leader, as learner, or both” (Robinson et al., 2008, p. 663). This leadership dimension is referred to as leading teacher learning and development in Robinson (2011) and focuses on the provision high quality and primarily collaborative professional learning opportunities with and for teachers. Robinson’s research underlines the importance of effective professional learning communities (PLCs), wherein teachers take on both individual and collective responsibilities for the learning of all students in the school (2011, p. 107). Educational leaders who see leading professional learning as a fundamental component of their work engage in new instructional strategies alongside teachers so that they can experience “the challenges the learning presents and the conditions teachers require to succeed” (Robinson, 2011, p. 105). In this way “effective professional development is a collective rather than individual endeavour” (Robinson, 2011, p. 106).

Several recent studies have shown the benefits of collaborative professional inquiry on student learning (e.g., Lee, Zhang & Yin, 2011; Tichnor-Wagner, Harrison & Cohen-Vogel, 2016; OECD, 2016). As Wiliam (2016) determined, “When all teachers embrace the idea that they can improve, not because they are not good enough, but because they can be even better, this creates a natural collegiality that supports all teachers in embracing the need for continuous improvement” (p. 239).

Evidence of similar leadership effects were reported by Anderson (2012):

Principals’ sharing of leadership with others in planful patterns of leadership distribution is probably a worthwhile way to approach improvement in student learning, but needs to be coupled with leader efforts to motivate commitment to common directions for improvement

and to develop teacher working conditions (especially professional community) that more directly support improvements in the quality of instruction and learning. (p. 56)

Louis and Wahlstrom (2012) also found that a higher level of trust increased teacher engagement. There is no doubt that trust creates a “stronger sense of professional community” (Robinson, 2011, p. 34) that permits the staff to be innovative, engage in reciprocal dialogue, and take risks in their own learning (Lee et al., 2011; Louis & Wahlstrom, 2012; Robinson, 2011; Tschannen-Moran, 2016). Trust creates the “social glue” (Fullan & Quinn, 2016, p. 73). Generally, it binds people to develop a collective responsibility and a shared commitment towards improving student achievement (Fullan & Quinn, 2016; Tschannen-Moran, 2016).

When leadership is widely shared, principals can create the conditions for teachers to use their pedagogical expertise to build each other’s instructional capacity while developing collective capacity in overall instructional leadership (Fullan, 2014, Schleicher, 2015; Wahlstrom, Louis, Leithwood, & Anderson, 2010).

Providing Instructional Leadership

The Competency

A leader ensures that every student has access to quality teaching and optimum learning experiences.

Critical Indicators

The research on overall instructional leadership provides guidance to principals striving to ensure that every student has access to quality teaching and optimum learning experiences. The following five critical indicators describe leadership practice related to this competency.

1. building the capacity of teachers to respond to the learning needs of all students;
2. implementing professional growth, supervision and evaluation processes to ensure that all teachers meet the Teaching Quality Standard;
3. demonstrating a strong understanding of effective pedagogy and curriculum;
4. ensuring that student assessment and evaluation practices are fair, appropriate, and evidence-informed; and
5. interpreting a wide range of data to inform school practice and enable success for all students; and
6. facilitating access to resources, agencies, and experts within and outside the school community to enhance student learning and development.

Research Informed Leadership Practice: *Instructional Leadership*

Planning, coordination, and evaluating teaching and the curriculum is the third of three most impactful leadership dimensions identified by Robinson et al. (2008). It was found to have a moderate effect size of 0.42 on student learning outcomes and is referred to as ensuring quality teaching in Robinson (2011). The dimension links closely to common descriptions of instructional leadership, such as the following offered by Hallinger (2003) “the role of the school principal in coordinating, controlling, supervising, and developing curriculum and instruction” (p. 331). Robinson et al. (2008) reported that the practices of leaders in higher performing schools were distinguished by four interrelated subdimensions: (a) collegial discussion of instructional matters, (b) active oversight and coordination of the instructional program, (c) involvement in classroom observation including the provision of feedback to help improve teaching, and (d) ensuring that teachers systematically monitor progress to provide student feedback to adjust their teaching.

Wahlstrom’s notion of instructional actions also includes direct observations and conversations with teachers in classrooms and in team meetings. Similarly, a second feature of overall instructional is the

three-component research-based image of supervision as varied, *informed instructional support* we have synthesized from both the seminal and the more recent teacher supervision literature. Component one is the idea that teacher supervision should be varied. Both seminal and current literature support the contention that supervision should differentiate according to the pedagogic expertise, developmental stages and learning needs evident in the community of professional practice (Brandon et al., 2018; Glatthorn, 1997; Le Fevre & Robinson, 2014, Marshall, 2013; Ozyildirim, & Bilgin Aksu, 2017; Pajak, 2003; Robinson, 2011; Timperley, 2011; Zepeda, 2017).

The second component is that supervision should be informed by evidence gathered from multiple sources – classroom observations, pedagogic dialogue, artifacts – to both inform supervisors about instruction and at the same time form the basis for deepening instructional leadership practice (Brandon, Saar, & Friesen, 2016; Glatthorn, 1997; Marshall, 2013; Marzano, Frontier, & Livingston, 2011; Pajak, 2003, Robinson, 2011; Timperley, 2011). “If increased instructional leadership is to make a difference to student outcomes, leaders’ practices need to be informed by defensible and evidence-based understandings of how to improve teaching and learning” (Le Fevre & Robinson, 2014, p. 60). Glickman’s (1985) developmental supervision is based on matching initial supervisory approaches with the teacher’s or the group’s developmental levels, expertise and commitment (Glickman, Gordon, & Ross-Gordon, 2017). Pajak (2003) identified four options: collegial supervision (peer coaching and cognitive coaching), self-directed supervision, informal supervision, and inquiry-based supervision or action research. Zepeda’s (2017) instructional supervision model indicates that teachers should be given opportunities to transfer information and to construct deeper understanding of their own practices within a capacity-building learning community. Such supervision is a reciprocal process that respects the differing developmental learning needs of novices and veterans.

The third component of supervision as varied, informed instructional support is that the focus of supervision should be on instructional support that seeks to improve learning, teaching, and shared instructional leadership. The seminal study conducted by Blase and Blase (2000) reported the now widely held view that “the facilitation of learning and growth should be the number one responsibility of an educational leader” (p. 14). This consensus on the purpose of supervision is well supported in the literature (Brandon, Saar, & Friesen, 2016; Glickman, Gordon, & Gordon, 2017; Ozyildirim, & Bilgin Aksu, 2017; Pajak, 2003; Robinson, 2011; Sullivan & Glanz, 2013; Timperley, 2011; Wiliam, 2016; Zepeda, 2017).

Instructional leadership is more effective when shared among teachers, school leaders, and system leaders. Louis and Wahlstrom (2012) claimed “leadership practices targeted directly at improving instruction have significant effects on teachers’ working relationships and indirectly on student achievement” and that “when principals and teachers share leadership, teachers’ working relationships are stronger and student achievement is higher” (p. 25). The effect occurs “largely because effective leadership strengthens professional community, a special environment within which teachers work together to improve their practice and improve student learning” (p. 25). Range, Pijanowski, Duncan, Scherz, and Hvidston (2014) found shared instructional leadership increased the capacity of teachers through coaching, modeling, and providing job-embedded professional development” (p. 280).

Persistent senior leader commitment to scaffolding overall instructional leadership is becoming more widely evident in Alberta (Brandon et al., 2015; Brandon et al., 2017). Increasingly, leaders at a variety of levels are working to improve instructional leadership practices in what Wahlstrom (2012) found to be two complementary categories: *Instructional Ethos* and *Instructional Actions*. These leaders are

working broadly to build professional community to generate benefit through the establishment of school and jurisdiction cultures that support continual professional learning. At the same time, they are working to enhance school leader capacity to supportively engage with individual teachers to promote professional growth in classroom settings. Such efforts align with a growing research base that provides direction about how to do this important work well (Anderson & Louis, 2012; Barber, Whelan, & Clark, 2010; Louis & Wahlstrom, 2012; Robinson, 2011; Robinson, Lloyd, & Rowe, 2008, Wahlstrom, 2012).

Brandon et al. (2015) found that 95% of the principals and middle level jurisdiction leaders surveyed indicated that senior leaders were both focused on instructional leadership and have similar expectations for school leaders. The expectation that principals must be knowledgeable about the quality of their teachers' instruction was universally understood and applied in all six of the study's jurisdictions. Many principals saw their work as part of instructional leadership teams within and beyond their schools. Vice-principals, learning coaches, and learning leaders were working together in distributed and shared forms of leadership in many of the systems. The case-by-case qualitative data suggested that ongoing support of jurisdiction based instructional leaders added to this sense of team leadership.

Educational leaders indirectly impact student learning through their actions in supporting and guiding teachers to ensure quality teaching (Leithwood & Louis, 2012; Robinson, 2011; Robinson et al., 2008). In Robinson's conception, the "principal is an instructional leader and a leader of instructional leaders" through shared instructional leadership (2011, p. 82). Shared instructional leadership is manifested through engagement in professional learning communities to conduct open-to-learning conversations and evidence-informed dialogue on multiple matters related to curriculum and instruction. Such efforts build relational trust, apply relevant knowledge, and solve complex problems enroute to establishing high performing schools (Robinson, 2011, p. 38).

The research is also clear about the need to devote ongoing attention to improving instructional leadership expertise. Louis and Wahlstrom (2012) found that "in schools with higher levels of trust, principals are also more likely to be engaged in instructional behaviors and to be actively involved in discussions about instructional improvement" (p. 32). Such actions are important but can be more effective when combined with supervisory and pedagogical expertise. Wahlstrom (2012) found "teachers and the principals were telling somewhat different stories" (p. 75). Wahlstrom's study indicated that when principals reported they were visiting classrooms and providing feedback, in many instances, teacher responses revealed the feedback was neither plentiful nor all that helpful. Principals were frequently getting into classrooms but were not being "intentional about each classroom visit and conversation" (p. 83).

Le Fevre and Robinson (2014) argued that if "increased instructional leadership is to make a difference to student outcomes, leaders' practices need to be informed by defensible and evidence-based understandings of how to improve teaching and learning" (p. 60). Engaging teachers in critical, evidence based, and reflective conversations about their practice helps teachers to generate insights to formulate actions along an improvement continuum. In this manner, principals work with teachers to support changes in practice (Robinson, 2011, p. 38). The data collected and interpreted together can help the teacher reflect and move student learning forward.

Developing Leadership Capacity

The Competency

A leader provides opportunities for members of the school community to develop leadership capacity and to support others in fulfilling their educational roles.

Critical Indicators

The following five indicators describe important and research informed leadership practices related to the competency of developing of leadership capacity.

1. demonstrating consultative and collaborative decision-making that is informed by open dialogue and multiple perspectives;
2. identifying, mentoring and empowering teachers in educational leadership roles;
3. promoting the engagement of parents in the school council and facilitating the constructive involvement of the school council in school life;
4. creating opportunities for students to participate in leadership activities and to exercise their voice in school leadership and decision making; and
5. promoting team building and shared leadership among members of the school community.

Research Informed Leadership Practice: Developing Leadership Capacity

Streams of research on evidence informed inquiry, reflective practice, and collaborative leadership provide guiding insights for leadership capacity development. Instructional leadership and shared leadership are “complementary approaches” (Louis & Wahlstrom, 2012, p. 38). “Principals who learn alongside their teachers tend to be found in high-performing schools” (Robinson, 2011, p. 26). Moreover, shared leadership increases the influence and participation of teachers through collaboration and dialogue, which improves practice (OECD, 2016). Range, Pijanowski, Duncan, Scherz, and Hvidston, (2014) found that shared instructional leadership increased “the capacity of teachers by coaching, modeling, and providing job-embedded professional development” (p. 280). Hargreaves and

Fullan (2012) concluded that enhancing professional capital within teacher leaders develops teachers and “is vital for the future of the teaching profession and of society” (p. 102).

Fullan and Quinn (2016) claimed that principals cannot create organizational change one teacher at a time; rather, they must change the culture to one that embraces focused collaboration “by becoming the lead learner” (p.132). Kirtman and Fullan (2015) emphasized the value of engaging teachers in leadership and learning teams to build capacity that “empowers staff to make decisions and get results” (p. 14). They view teachers as the “real instructional leaders” (Kirtman & Fullan, 2016, p. 97) when they work together on shared leadership teams. Such teacher leadership teams optimize teaching quality and enhance student outcomes when they focus on instructional leadership practices (OECD, 2013, p. 81). The same international study underlined the need for more distributed leadership practices to assist principals in leading learning to impact teaching quality and student learning outcomes (OECD, 2013). Such practices are becoming more widespread, as reported by Brandon et.al (2015):

A shared approach to instructional leadership was also evident in several instances. Many principals increasingly see their work as part of instructional leadership teams within and beyond their schools. Vice-principals, learning coaches, and learning leaders are working together in distributed and shared forms of leadership in many of the systems. (p. 68)

Other studies reinforce the importance of leadership efforts to model lifelong professional learning and capacity building (Brandon et al., 2017; Fullan, 2014; Wahlstrom et al. (2010) highlighted the importance of shared, distributed, and collective approaches to leadership that develop two forms of professional efficacy “a belief about one’s own ability (self-efficacy) or the ability of one’s colleagues

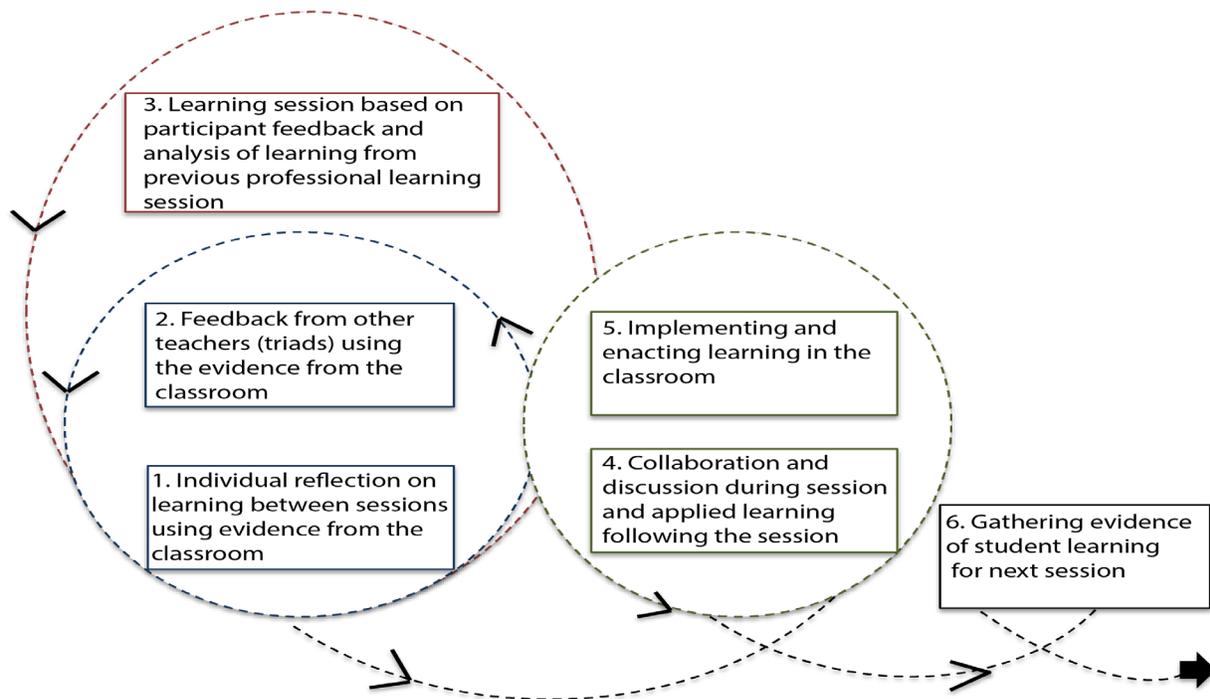
(collective efficacy) to perform a task or achieve a goal” (p. 15).

The research informed leadership practices related to each of the four critical competencies presented in this section that were offered as best evidence practices. As such, they form the basis of the design-based professional learning used to encourage CRPS to more consistently build their school based leadership actions on strong research foundations.

Design-based professional learning involves cycles of knowledge creation/building (Bereiter & Scardamalia, 2014), design (Dorst, 2019), collaborative inquiry (Katz & Dack, 2013; Timperley, 2011), and complexity (Kaput, Bar-Yam, Jacobson, Jakobsson, Lemke, & Wilensky, n.d.) (see Figure 3). The iterative learning processes involved in design-based professional learning is based on recent research on learning (Bransford, Brown, & Cocking, 2000; Dehaene, 2020; National Academies of Sciences, Engineering, and Medicine, 2018) acknowledging that the conditions needed to maximize learning requires attention, active engagement, error feedback, and consolidation. District leaders in CRPS took collective responsibility for continually improving of each others’ ideas and actions by making these visible to all members of the community to create shared leadership practices that led to optimum learning for all students.

Figure 2

Design-based Professional Learning: One Cycle



Research Methods

The overriding purpose of this descriptive case study (Merriam, 2009) was to examine and illustrate the ways through which system and school leader collaborative inquiry and professional learning are mobilizing evidence-informed overall instructional leadership to positively impact teaching practice. In keeping with the principles and assumptions of qualitative case study research (Creswell, 2012; Merriam, 2009; Merriam & Tisdell, 2016; Stake, 2005, 2006). A case study is an in-depth exploration of a bounded system based on extensive data collection (Creswell, 2012). “Bounded means that the case is separated for research in terms of time, place or some physical boundaries” (Creswell, 2012, p. 465). The issue under investigation within the bounded system of the Canadian Rockies Public Schools in 2015-19 school years as the impact of collaborative inquiry and professional learning on overall instructional leadership and teaching practice.

Research Questions

The central question that guided this research is as follows:

1. In what ways are the NEIL initiative’s iterative cycles of collaborative inquiry and evidence-informed professional learning impacting the overall instructional leadership practices of school and division leaders?

The study was further guided by two related, but more specific research questions:

2. In what ways are evidence-informed conversations through NEIL leading and learning
3. In what ways are evidence-informed conversations through NEIL leading and learning cycles impacting school leader learning?

Data Sources

Data were gathered interviews, focus groups, field notes, artifacts, and classroom observations over a four-year period from 2016-2019 to provide a rich and textured understanding of the research questions. A constructivist approach to research interviewing is being employed. Such methods are understood to be flexible, context sensitive, and dependent on the personal interrelationships of the interviewers and interviewees (Brinkman & Kvale 2015, p. 198).

Data Analysis

Analysis of the data was informed by the view that “coding is deep reflection about, and, thus, deep analysis and interpretation of the data’s meanings (Miles, Huberman and Saldaña, 2014, p. 72). In first cycle coding, summaries and field notes from the interviews and focus groups were read in their entirety to a get a sense of their content and context, without imposing a specific analytic lens. Subsequent readings of the texts looked for themes to determine coding categories and to become familiar with the overall content and to determine the level of interest in relation to the research questions. Emerging themes were identified and analyzed. In second level coding, pattern codes were developed (Miles et al., 2014, p. 86-104), which then led to more detailed pattern codes – larger categories or themes – created to form the basis for the analysis.

Results

Analysis of the data generated the five key findings presented below under the study’s three research questions.

Research Question One: *In what ways are the iterative cycles of design-based professional learning impacting overall instructional leadership practice?*

Finding 1: Research participants embrace the four-competency approach to overall instructional leadership within the LQS. The interactive involvement and reciprocal learning among school leaders, teachers, and central office personnel is supporting a learning focused overall leadership model within CRPS. Educational leaders are enacting four key leadership competencies: (a) embodying visionary leadership (b) leading a learning community, (c) providing instructional leadership, and (d) building leadership capacity.

Finding 2: The development of strong relational trust is foundational to the NEIL initiative's success. School leaders, division leaders, and teachers report that the heightened focus on evidence of student, teacher, and leader learning is generating excitement, engagement, and efficacy. A fifth LQS competency, Fostering Effective Relationships is recognized as an important aspect of overall instructional leadership. Through design-based professional learning (Chu, Brown, & Friesen, 2020; Friesen & Jacobsen, 2015) overall instructional leadership practice is being developed with participants rather than for them. Participants at every level appreciate the ways in which the NEIL planning team continuously incorporates their feedback into the design of iterative and overlapping leader and teacher inquiry and knowledge-building cycles that connect session learning to leading and teaching practices in schools.

Finding 3: Modelling professional learning is a major component of NEIL initiative's success. A sixth LQS competency, Modeling Commitment to Professional Learning, is also recognized as an important aspect of overall instructional leadership. NEIL Cycles provided a design-based professional learning mechanism for principals and vice-principals to work with each other and teachers to strengthen their comfort, confidence, and competence in leading evidence informed conversations. In so doing their visibility and vulnerability in classroom settings enhanced their credibility in the eyes of participating teachers.

Research Question Two: *In what ways are evidence-informed conversations through NEIL leading and learning cycles impacting teacher learning?*

Finding 4. Transparent, unthreatening, improvement-oriented opportunities for teachers to bring forward evidence of learning to their teacher and leadership colleagues as part of their teacher inquiry and knowledge-building cycles is contributing to a flourishing learning culture. In the NEIL design-based professional learning sessions, through professional growth planning, and in a number of other contexts, teachers are sharing evidence of student learning in multiple forms with their colleagues. These evidence-informed conversations based on relationships of respect and challenge generate specific and helpful feedback related to the five principles of effective teaching detailed in Friesen's (2009) Teaching Effectiveness Framework (TEF) that is now being used in each of the six schools. The focus on TEF is a key link in the process of improving teaching practice that deepens student engagement and strengthens student learning.

Research Question Three: *In what ways are evidence-informed conversations through NEIL leading and learning cycles impacting school leader learning?*

Finding 5. Principals and system leaders are bringing evidence of teacher learning forward to their teacher and leadership colleagues as part of their leader inquiry and knowledge-building cycles. In the NEIL design-based learning sessions, through professional growth planning, and in a number of other contexts, school and system leaders are sharing evidence of their leadership learning in multiple forms with their colleagues. These evidence-informed conversations based on relationships of respect and

challenge generate specific and helpful feedback related to the LQS and research-informed aspects of leading professional learning (Fullan, 2014; Robinson, 2011; Timperley, 2011). NEIL Cycles provided a mechanism for principals and vice-principals to work with each other and teachers to strengthen their comfort, confidence, and competence in leading evidence informed conversations. In so doing their visibility and vulnerability in classroom settings enhanced their credibility in the eyes of participating teachers

Concluding Thoughts

We used the construct of overall instructional leadership (Brandon, Hanna, & Negropones, 2015; Fullan, 2014) to frame and illustrate the ways that leadership development is advancing in this school division. Iterative phases of design based professional learning and collaborative inquiry are helping to enhance the quality of CRPS leadership and the capacity to analyze their contexts on an ongoing basis, so that their research informed “decisions about what leadership knowledge and abilities to apply, result in quality teaching and optimum learning for all students in the school (Alberta Education, 2018b, p. 3)”. Evidence-informed professional learning through the NEIL initiative is positively impacting the overall instructional leadership practices of school and division leaders.

An unrelenting focus on educator and student learning in combination with widely shared leadership are strengthening relational trust and enabling a flourishing learning culture. Concentrating leadership efforts on four overlapping areas of practice provides a manageably coherent approach to the overall instructional leadership fuelled by three forms of evidence: (a) evidence from students (formal and informal); (b) evidence of professional practice (linked to evidence from students); and (c) evidence from educational research to inform practice and amplified by relationships of respect and challenge (Kaser & Halbert, 2016; Timperley, 2011).

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Supervision as Teaching Practice: Lessons from the Field to Enhance the Efficacy of the Supervision Triad

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Abstract

Practical field experiences are an important part of any teacher education program. Thus, the supervision provided student teachers while engaging in practicums is integral to their professional growth. In this case study research, the efficacy of supervision was investigated by exploring the experiences and perspectives of 33 student teachers and 17 university supervisors. The results highlight the importance of relationship building and the provision of specific, balanced, dialogic feedback to enhance professional learning. Above all, the findings demonstrate the importance of viewing supervision as an extension of one's teaching, requiring ongoing, critical reflection.

Keywords: teacher education; supervision; relationships; feedback; dialogic approach

Introduction

Literature in the field of teacher education emphasizes that practice teaching is important in the development of new teachers and that it is an influential experience in a teacher education program (Beck & Kosnik, 2002; Zeichner, 2012). However, that influence can be variable often depending on the supervision provided by classroom teachers and university supervisors (Britzman, 2003; Ogilvie & Dunn, 2010). This paper reports on the findings of a research project that aimed to explore the influence of supervision on practicum experiences and the professional growth of student teachers. The primary question addressed by the research was: How did the supervision dynamic influence the professional semester practicum experience?

Research Design/Methodology

A case study (Stake, 1995) approach was adopted so that specific attention could be paid to the depth and richness of the context in which university supervisors and student teachers experience practicum supervision. Data for the study was collected at a mid-sized teacher education program in western Canada during the Fall Term of 2016, with a total of 33 student teacher participants and 17 university supervisor participants. Data was collected over a five-week field experience practicum through reflective journal writing and semi-structured interviews. Student teacher and university supervisor participants completed five weekly reflective journals and individual exit interviews after the practicum experience had concluded.

The data collected from the interviews and reflective journals were analyzed for themes and patterns using the thematic network technique as a tool for identifying, reporting, and analyzing patterns within that data (Braun & Clarke, 2006). This approach to data analysis was used because “the thematic networks technique is a robust and highly sensitive tool for the systematization and presentation of qualitative analyses” (Attride-Stirling, 2001 p.1).

Results

The thematic analysis of data resulted in a number of themes being identified that influenced the experience of student teachers in the field and their opportunities for professional growth. This paper will focus on two of the themes that were prominent among many of the respondents and had an impact on the practicum experience: relationships matter and balanced, dialogic feedback facilitates professional growth.

Relationships Matter

Relationship building is generally recognized as an important aspect of a productive learning environment (Stengel, 2004). While it is most often applied to a classroom setting, the respondents in the study overwhelmingly articulated the significance of supervision as a relational endeavour to promote professional learning. Throughout this paper we use the term ‘relational’ to conceptualize the application of relational pedagogy to the realm of supervision (Bingham & Sidorkin, 2004). One important area that was influenced by the adoption of a relational approach was the communication between members of the supervision team. Establishing a relationship with students prior to the practicum facilitated easier communication. For example, Dale¹, a university supervisor, commented: “Communication ultimately happens better through established relationships than it would kind of as a cold delivery.” Alyssa, a student teacher, echoed the sentiment: “I think it made it easier ... I knew him before, so going into this I knew what he expected.” Understanding expectations also assisted with the process of receiving feedback. Isabella explained: “When you are receiving feedback, you know how to take it or how they mean it a little bit more.” Hence, developing a relationship enabled more precise communication to take place, thus minimizing interpretive discrepancies. This, in turn, inevitably contributed to enhancing the atmosphere of professional growth. Relationship building was not only important in enhancing the communicative process, but also enabled broader conversations about education to take place. Jacob stated: “I felt that we could really talk about not just how my teaching is going, but we could talk about the education system in general or issues,” For this student teacher, having a well-developed relationship with his supervisor enabled him to engage in conversations that enhanced his understanding about the profession.

Another aspect of supervision that was enhanced by a relational approach was in making students feel more comfortable making the transition from student to student-teacher. Engaging in field experiences is a time of transition in which students’ identity and personal assumptions/beliefs are challenged on an ongoing basis, making it a very stressful experience (Danyluk, 2013). Supervisors and student practitioners from our study commonly expressed the importance of developing strong bonds to reduce anxiety related to performance during the practicum. For example, Louise, a supervisor, commented: “*I think just the fact that I know them as students and as people makes it more relaxed, and they feel comfortable knowing the fact that their [supervisor] is somebody that they know already.*”

¹Self-selected pseudonyms have been used to protect the identity of participants.

According to Louise, the comfort promoted through having established a relationship with students resulted in a smooth transition into the practicum: *“It facilitates an ease of moving into that practicum, which is already fairly stressful.”* This notion was also supported by a number of student teachers. Alyssa commented: *“I feel since my [supervisor] was also my seminar instructor, I feel that we have built a good relationship... I feel as though he knows me quite well and so when I was teaching the lesson, I was not as nervous.”* Reduced anxiety as a result of relationship building was attributed by Alyssa as leading to improved performance, while for other students a strong relationship with their supervisor provided them with confidence. For example, Phoebe articulated: *“Knowing that I have people to support me, makes a difference and gives me confidence.”* Phoebe further articulated that the relationship with their supervisor encouraged risk-taking: *“[The supervisor] gave me a safe place where I could see what works best for me and for my students – even if this meant that some of my lessons might have flopped.”* Hence, a relational approach allowed students to *“take risks and challenge their comfort zone”* as articulated by a supervisor named Wilbur.

In addition to supporting affective dimensions of the practicum, relationship building also contributed to improved teaching during the practicum. One benefit of having already established a strong relationship was that it facilitated productive professional growth immediately. Leo, a supervisor, commented: *“I think that an established relationship really expedites the process of getting down to what needs to be worked on.”* Rather than having to establish a rapport with students prior to engaging in meaningful professional discussion, Leo felt developing a relationship prior to the practicum enabled a deeper level of dialogue about professional practices early on. Relationships also facilitated adaptations to be made in the supervision approach adopted. In commenting on the feedback provided after a particularly difficult lesson, Phoebe stated: *“[My supervisor] would often call me a perfectionist and say that I was my own worst critic. So, he didn’t really emphasize it [my struggles] more because he knew I would give myself grief.”* In this example, familiarity with the student enabled the supervisor to adjust his approach so as not to overly discourage the student, thus creating a positive learning environment.

Balanced, Dialogic Feedback Facilitates Professional Growth

In addition to establishing professional relationships with students, another area where supervisors can have an important influence on the practical experience of students is in the feedback provided. In contrast to most educational settings, field experiences are very unique in that the supervisor typically has limited opportunity to engage in explicit instruction prior to the student completing practical tasks. On the contrary, field experiences typically follow extensive instruction at the university so that the application of the concepts learned does not occur until a substantial amount of time has lapsed. Hence, one of the primary means through which university supervisors influence professional development is the response provided to performance, as it can address the gap between what is understood (the current state of practice) and what is aimed to be understood (the desired practice) and, therefore, has an instructional quality. Thus, carefully crafted feedback provides an ideal opportunity for supervisors to support the professional development of students.

One of the key characteristics of feedback to foster growth is the specificity of the information provided. For a number of the students in our study, the absence of detailed feedback undermined the potential for growth during the practicum. For example, Phoebe commented: *“I desire to grow in my teaching abilities but if my feedback is consistent with ‘you are doing well’ then I do not know if I have been equipped to grow.”* The generic nature of the feedback provided, thus, did not provide clues to

facilitate professional development. For other students, the lack of specificity was manifested in the absence of judgment statements as part of the feedback. Blanche explicated that meaningful feedback was not received, but rather *“just a recap of what I did.”* Blanche further explained: *“I had hoped for more criticism and room for improvement, however, all [my supervisor’s] notes were simply watching what I was doing instead of commenting on what I was doing.”* Therefore, the absence of guiding statements undermined the ability of the student to identify gaps in practice that could be addressed.

Another characteristic of effective feedback is that it includes a balance between the identification of positive characteristics of performance and areas for growth. Birkenmaier and Timm (2003) labeled areas of growth as “growth edges” and defined the concept as “areas just beyond current abilities where growth could most easily occur” (p.13). Therefore, the identification and utilization of growth edges as the basis for feedback was deemed essential to stretch students’ abilities to new levels. However, equally important was the provision of positive comments to balance the feedback. The absence of a balanced approach can adversely affect the emotional state of students and their relationship with the supervisor. One student, Bijan, relayed: *“My [supervisor] made me feel as though I was not doing anything right... She would continuously focus on one thing I would do wrong in a lesson and not really comment on things I did right.”* Rather than instilling a sense of hope for future progress and empowering the student to improve practice, the feedback had a demoralizing effect. Similarly, Ally felt personally compromised by the feedback received from their field-based instructor. In commenting on the feedback received, Ally stated: *“It’s a new perspective that could help me become a better teacher, but I also felt a little attacked. There were few positives when she gave me her review, she never told me the lesson was crap, but I felt that that is how she saw it.”* Although Ally recognized the value of the feedback in promoting growth, the absence of affirming comments detracted from the positive character of the feedback and led to a generally negative perception of performance. This affirms Birkenmaier and Timm’s (2003) assertion that “an imbalance in either direction [positive or negative] has the potential to prevent change, as the receiver of feedback can discount either the growth edges or the positive feedback provided as unimportant in light of the large amount of contrasting feedback provided” (p.13). Based on the findings of our study, an imbalance can also inhibit change by diminishing trust in the supervisor and promoting a defensive disposition among students.

Balance in the feedback provided also needs to be struck between a focus on contextual and holistic information. Participants in the study strongly articulated that university supervisors and mentor teachers have different strengths in the type of feedback they can provide. A university supervisor, Pepper, exclaimed: *“I personally believe that my students get more from their teacher associates than they do from me. I also believe they respect their [mentor teachers’] comments and feedback more.”* This sentiment was grounded in the fact that mentor teachers have intimate knowledge about the school context, enabling them to provide feedback that could support students’ immediate performance in the classroom. While feedback on performance in a particular setting is important in the teacher induction process, so is support that helps student teachers reflect on larger educational concerns and make connections between theory and practice. This is where university supervisors’ feedback can be important. In commenting on the feedback provided to the students, Louise stated: *“I am not challenging what they are doing as much as I am challenging them to look at their teaching and to see how they can continue to grow as a teacher.”* Similarly, Hermione commented on their role in promoting praxis: *“Hopefully, I have been that bridge between theory and practice for them.”* Thus, for feedback to foster professional growth, it needs to focus on performance in the specific setting as well as more holistic growth as an educator.

A final characteristic of feedback that promoted professional growth was an interactive, dialogic approach. Jane commented that the approach adopted by the supervisor helped Jane to flesh out the reasoning for practices adopted. Jane explicated: "Most conversations with my [supervisor] were more discussion based and not just a list of do's and don'ts... I was very appreciative that my [supervisor] was able to turn these sorts of things into open discussions rather than a direct 'yes' or 'no' about it." For Jane, the dialogic approach adopted by the supervisor legitimized Jane's knowledge and led to mutual exploration of ways to improve practice. This provided a much more productive avenue to investigate professional practices than passively listening to a list of suggestions. The dialogic approach also helped students to consciously analyze their practices. Alyssa reported that the supervisor "pointed out some other things I had been doing that I was aware of, but questioned me on the reasoning behind them. The feedback he was giving me helped me realize that I need to question myself." Therefore, a dialogic approach helped Alyssa to be more cognizant about the foundations supporting their practices. This supports the assertion in Korthagen, Loughran, and Russell (2006) that "one does not learn through experience, but through reflection on experience and through interaction with others" (p.1025). The deeper learning fostered through this approach was apparent to Duncan, a university supervisor: "It's the probes and the thought-provoking ideas that I jot down... That kind of thing dropped in can kind of spark their thinking, their reflective thinking on the lesson." Duncan did not view his role as simply providing technical support, but rather encouraging reflection to help students identify "why they are doing, what they are doing."

Conclusion

Historically, the supervision of teachers began with lay committees periodically inspecting schools to ensure that instructional standards were being maintained. As the size of schools expanded beyond the one classroom schoolhouse, the role of supervising teacher performance was assigned to a more senior teacher within the school, known as the 'principal teacher' (later to be shortened to 'principal') (Acheson & Gall, 1997). Although supervision has evolved, the evaluative, directive, hierarchical practices associated with this early form of supervision continue to influence the support provided novice teachers. Ironically, the data from this study suggests that such traditional practices need to be critically analyzed, as university supervisors and student teachers articulated the effectiveness of dialogic engagement, relationship building, and specific, balanced feedback in promoting professional growth. This further suggests that supervision be viewed as an extension of teaching, requiring ongoing critical praxis to ensure high quality teacher education is taking place during all facets of programs.

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Exploring Gifted ESL Students' Linguistic Socio-Cultural Strategies

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Abstract

This study explored students', parents', and teachers' views on the gifted English as second language (ESL) journey of linguistic development through discussions on socio-cultural influences. Exploration used a single case study and gave voice to a purposive sample of four students, two parents, and three teachers. Findings suggested that the 'good' gifted language learner consciously deploys socio-cultural influences for linguistic development. The study initiates discussions and invites new research on pedagogies that enable academic language expansion among gifted ESL students.

Keywords: English as a second language (ESL); giftedness; socio-cultural influences

Introduction

The numbers of young English as second language (ESL) learners in Canada continue to increase in parallel with the rise in the numbers of immigrants (Alberta Education, 2013; Government of Canada, 2015; Statistics Canada, 2017). Increasingly, too, these young learners are the Canadian born children of immigrants who speak another language at home (L1) and may still be in the early stages of developing their English proficiency (L2) upon their arrival in school. Research shows that Canada's educational system fails to adequately address such students' need to build their academic English language proficiency in either the mainstream classroom setting or through specialized, dedicated ESL programming (Pavlov, 2015; Toohey & Derwing, 2008). Further, some ESL students may manifest gifted potential requiring specialized support that they may not receive as a consequence of unidentified or unrecognized need (Ford, 2003; Harris, Plucker, Rapp, & Martinez, 2009; National Association for Gifted Children [NAGC], 2011). In the current study, participants were identified as high academically proficient ESL students and gifted.

This case study sought to explore gifted ESL students' experiences and investigate the impact of socio-cultural influences on the advancement of their English proficiency. The study also invited the perspectives of their parents and teachers. Its essential contribution goes beyond giving voice to gifted ESL students and pinpointing potential socio-cultural influences that expand language development. Its purpose is to initiate discussions and invite new research on pedagogies that enable academic language expansion among gifted ESL students.

Background and Context

The increasing numbers of Canadian born children of immigrants who are in the early stages of developing English proficiency upon arrival in kindergarten (Alberta Education, 2013; Ontario Ministry of Education, 2013) presents a challenge. These children have to catch up to native speakers of English (Kim & Garcia, 2014; Roessingh & Elgie, 2009); a language proficiency necessary to advance linguistically (Cummins, 2000; Cummins & Persad, 2014; Kieffer, 2008) and perform academically (Jimerson, Patterson, Stein, & Babcock, 2016; Kim & Garcia, 2014). They are forever chasing a moving target as demands of engaging with academic curricula in English accelerates over the school years; each year of educational advancement places increasing linguistic demands (Goldenberg, 2013; Hoff, 2013; Roessingh & Elgie, 2009).

To frame the discussion for this study: intellectually gifted students have an intellectual ability that is higher than average and manifest other above average personal traits (Alberta Education, 2015; NAGC, n.d.). Similar to non-gifted ESL students, gifted ESL students require special programming in order to develop English proficiency. Intellectually gifted students also need challenging work to develop their potential, since a gift will manifest itself within societal influences that offer enriched environments (Mendaglio, 2007; Subotnik, Olszewski-Kubilius, & Worrell, 2011). However, due to their low English proficiency, many gifted children may be over-looked as gifted, and their potential may go unrecognized (Ford, 2003; Harris et al., 2009). Some, however, realize their potential – they are the focus of the study at hand; what contexts for learning – both at home and at school, help to explain their linguistic achievement.

While recent research identifies specific strategies for developing L2 proficiency among ESL students (Alberta Education, 2009; Gunning & Oxford, 2014), and for supporting gifted students' learning (Aldred, 2005; Fukuda, 2004), little research is available on helping this dual-focus special needs group develop their language. Paucity of research highlights the importance of exploring these students' perspectives, and those of their parents, and teachers.

In summary, the number of Canadian born ESL students schooled in an English-speaking milieu is increasing. Many do not have the opportunity to reach and maintain a threshold of L2 proficiency sufficient to succeed academically (Jimerson et al., 2016; Kim & Garcia, 2014; Pavlov, 2015; Roessingh, 2018). The situation becomes more complex for gifted ESL students who may require additional educational interventions in order to reach their potential and acquire academic language (Robinson, 2002; Rogers, 2002; Subotnik et al., 2011; Yunus, Sulaiman, & Embi, 2013). The gap in research regarding the experiences of Canadian born gifted ESL students who succeed academically suggests a valuable opportunity for researching which socio-cultural opportunities they deploy to expand their language.

Research Purpose

The purpose of this inquiry was to explore students', parents', and teachers' views through discussions on socio-cultural influences. This informed the following research questions:

1. How do gifted ESL students deploy socio-cultural influences to advance their language development?
2. How do parents and teachers perceive their role in nurturing the linguistic development of their gifted ESL learners?

Conceptual Framework

With student participants being gifted and ESL, this case study is informed by three domains: giftedness; second language acquisition (SLA) theory; and socio-cultural theory.

Giftedness

For the purpose of this study, Tannenbaum's Star Model of giftedness has been adopted (2003). The model posits that a gift will demonstrate itself if five elements aggregate in a way that contributes towards the growth of potential and the development of secondary talents which interact to develop that gift. The five elements are (a) superior intellect, (b) potential, (c) personal traits, (d) environment, and (e) chance. The Star Model gives socio-cultural influences/environment equal status to other elements in language development and is of relevance to this study.

Environment

Personal traits are shaped by the socio-cultural environment (Pajares & Schunk, 2002; Subotnik et al., 2011). "Human potential needs nurturance, urgings, encouragement, and even pressures from a world that cares" (Tannenbaum, 2003, p. 54). Parents and teachers have the responsibility to support the development of students' potential (Colangelo & Dettmann, 1983; NAGC, n.d; Subotnik et al., 2011). Staying informed is a key strategy for parents of gifted ESL students since "parents can greatly facilitate their gifted child's development by helping him or her develop a positive attitude toward learning" (Colangelo & Dettmann, 1983, p. 24). Teachers are the daily nurturers and facilitators of academic learning; they need specialized training to acquire sound pedagogical approaches to support gift (Gallagher, 2003) and language (Lucas, Villegas, & Freedson-Gonzalez, 2008; Pavlov, 2015) development.

Second Language Acquisition (SLA)

Broad principles of second language acquisition are explained in this section, drawing especially on Cummins' (2000) and Krashen's (2009) work.

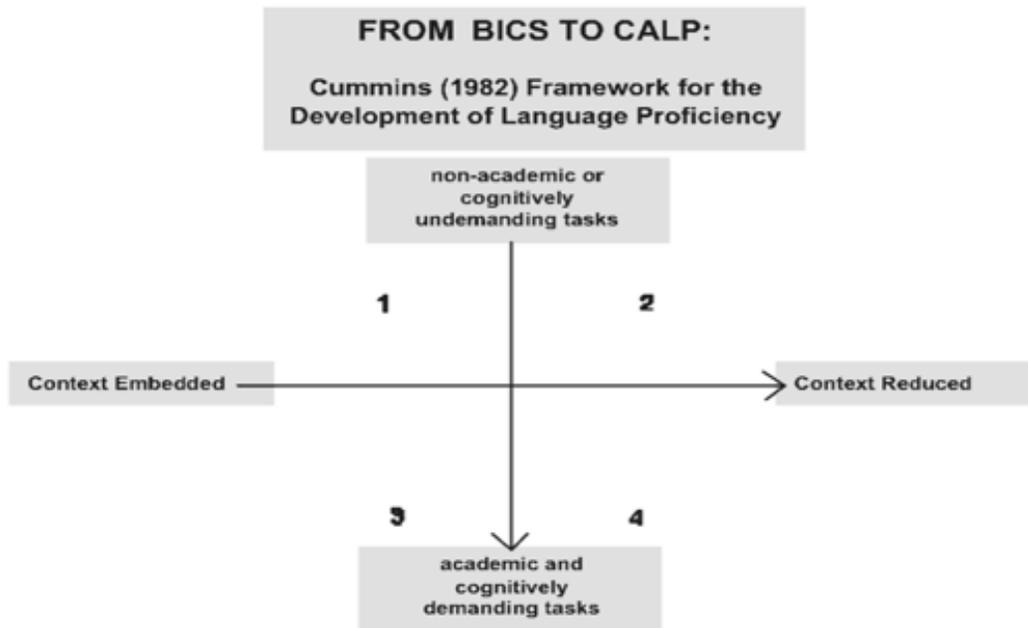
Framework of Language Proficiency

Cummins' (2000) Framework of Language Proficiency (see Figure 1) divides language development into four quadrants (see Figure 1). It assumes that students acquire Basic Interpersonal Communicative Skills (BICS) in quadrants one and two through exposure in everyday conversational contexts. In quadrant three and four, tasks become cognitively demanding, context is reduced and Cognitive Academic Language Proficiency (CALP) is required.

Progress through the four quadrants requires structured mentoring by educated professionals (Roessingh & Kover, 2003). Some scholars relate the use of CALP at home to progress in school (Hoff, 2013), and others state that a high L1 proficiency facilitates the acquisition of L2 CALP (Roessingh, 2008; Rolstad, Mahoney, & Glass, 2005). This suggests that L1 skills can be viewed as building blocks that students borrow and apply to develop L2 CALP. However, a concern remains that the L1 used at home among ESL students, may not be at a CALP level that reflects positively on the progress of their L2 (Roessingh & Kover, 2003). Research confirms the need to scaffold these students in order to build conscious awareness of L2 use (Cohen, 2012).

Figure 1

Cummins Framework of Language Proficiency. Adapted with permission from BICS-CALP: An introduction for some, a review for others (p.92)



Comprehensible Input +1 (i+1)

In order to advance language learning, Krashen (2009) posits the need for comprehensible input +1 (i+1). While Krashen acknowledges that vocabulary can be acquired without thinking about the language used, he emphasizes the importance of the clarity of the words used during interactions. His theory stipulates input that is relevant to the learner (Krashen, 2009): “when input is comprehensible, when meaning is successfully negotiated, i+1 will be present automatically, in most cases” (p. 68). In short, i+1 (Krashen, 2009) and enhancement of L1 as a strong platform for transfer to L2 (Cummins,1980) lead to explicit focus on CALP development. The ‘good language learner’ deploys these strategies to advance their vocabulary development (Cohen, 2012).

Socio-cultural Theory

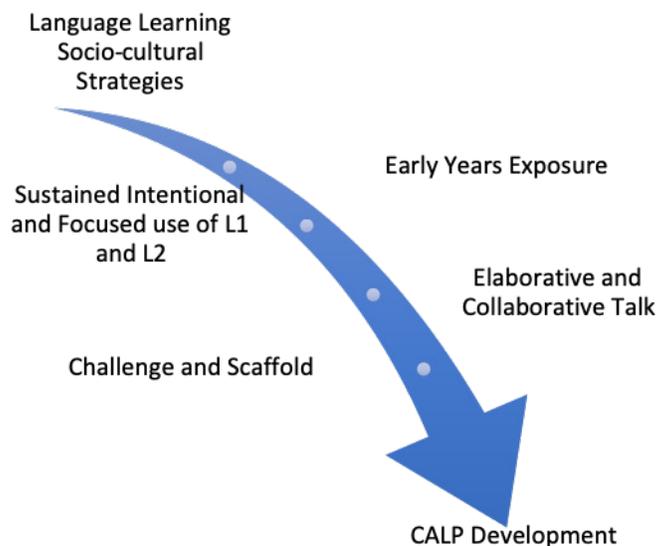
Sociocultural theory (Vygotsky, 1997) emphasizes the contributions of society to individual development (i.e., interaction with others shapes cognition and therefore language development) (see Figure 2).

Early years exposure.

Vygotsky’s (1963) theory of cognitive development explains how learning is developed by imitation and through social interaction in the early years. Parents’ role starts from infancy and their children’s linguistic proficiency is determined by their daily language use (Hart & Risley, 2003; Hoff, 2013; Lightbown & Spada, 2006). Research also shows the importance of teachers in providing structured exposure to low frequency words such as protection and equipment, in the primary years (Roessingh & Douglas, 2012). These are the years where most children cannot read and are dependent on the more knowledgeable adults to guide their learning (Hart & Risley, 2003; Hoff, 2013; Lightbown & Spada, 2006). Hence, early access to low frequency words through activities, such as reading and meal time talk, will facilitate CALP development in the later years; it provides ESL students with vocabulary

Figure 2

Socio-cultural Environment



that many native speakers of English receive at home (D'Anguilli, Siegel & Maggi, 2004; Ontario Ministry of Education, 2013). This implies that community characteristics can potentially influence students' future linguistic success.

Sustained Intentional and Focused Use of Language

Schmidt (2012) suggests that it is only through the conscious attention to language that students place on comprehending, interacting, and performing tasks that L2 will develop. This conscious focus can be taught and learned (Hsiao & Oxford, 2002; Yunus et al., 2013). It enables ESL students to use strategies that advance language proficiency (Roessingh & Douglas, 2012). Direct teaching of strategies needs to start in the early years and be sustained in the elementary years (D'Anguilli et al., 2004). Students can be guided to focus on the words used through various tasks that allow them to, "hear it, say it, read it, write it → own it" (Roessingh, 2018, p. 26).

Elaborative and Collaborative Talk

Vygotsky (1963) references students' interactions with adults as the catalysts for language learning. Interactions should include a sustained exposure and use of vocabulary that students would not encounter in everyday conversations (August, Carlo, Dressler & Snow, 2005; Francis & Simpson, 2009; Ontario Ministry of Education, 2013). This brings forward the need for direct strategy instruction (D'Anguilli et al., 2004; Gunning & Oxford, 2014) and underlines the importance of collaborative interactions (Nassaji & Tian, 2014). Direct instruction of linguistic strategy awareness remains beneficial as students get older (Gunning & Oxford, 2014; Krashen, 2009; Tong, Luo, Irby, Lara-Alecio, & Rivera, 2017). It is important to select purposeful tasks that strengthen understanding of the nuances of newly acquired words (August et al., 2005; Ontario Ministry of Education, 2013).

Challenge and Scaffold

Vygotsky (1997) distinguishes between the actual level, which is the language level that students are

at, and Zone of Proximal Development (ZPD) which is the level that is still in development and can be enhanced with support from others. He underscores scaffolding; targeting and challenging the learner by 'pitching' just ahead of 'where they're at' (ZPD), and the key role of the adult or more competent peer in providing for all of this.

Summary

Literature on giftedness focused on Tannenbaum's Star Model that highlights the environment as part and parcel of the development process. A review of literature on language acquisition identified the relevance of structured instruction that advances CALP development. Finally, the socio-cultural theory confirmed that caring adults have a responsibility to expose students to advanced language in the early years and to continue to challenge and scaffold them in the higher grades.

Examples of methods that expose children to more words as well as reinforce the words children have already learned include the use of technology, additional scripted books purposefully crafted to reinforce word meanings, games for student/student practice using picture cards and games that provide incentives for students to listen for new words or previously taught words outside of the vocabulary lesson, and word walls to display the highly imageable or most concrete words.

Methodology

A Case for Case Study

The exploratory nature of the research complemented the choice of case study (Hamilton & Corbett-Whittier, 2013; Stake, 1995; 2006) as the aim was to understand students' experiences in school, home, and community through an inductive examination of data. This case study is bounded by the experiences of gifted ESL students schooled in an English milieu. Parents and teachers were also invited to participate as stakeholders in the students' language learning journey.

A case study methodology afforded the exploration of in-depth data using three data collection tools (background survey, focus groups, and interviews). Students shared a bounded system through their similar experiences of arriving to school with knowledge of an L1 other than English (L2), being identified as gifted and ESL, and learning in a mid-senior high setting. Their shared language development experiences formed the case study (Stake, 1995).

Case study approach was pertinent since it allowed an in-depth contextual look at their particular socio-cultural environments (Stake, 2006). The flexibility to use varied methods (Flyvbjerg, 2011) provided a vital combination of data that increased trustworthiness and allowed for gathering data from different perspectives. With these clarifications, the object or unit of analysis was the gifted ESL students and the subject was socio-cultural experiences that support linguistic development.

Research Setting

Advanced Development Academy (ADA), the school that student participants attend, is located in an urban location in Alberta, Canada. It is a publicly funded and a non-denominational charter school. The school's definition of giftedness reflects a focus on outstanding performance in aptitude or competence.

English is the language of instruction in all subjects at ADA, within an environment that promotes cultural awareness and an understanding that gifted ESL learners may face language challenges and need guidance to develop their potential. This stance, along with a curriculum that differentiates for gifted learners and smaller class sizes than other public schools in the city, create a unique setting that

allows teachers to cater to the needs of their students.

The application process to attend ADA includes presenting a psychological assessment with scores that meet the giftedness criteria outlined by the school district; students must achieve an IQ score of 130 +/-5 on an intelligence test. Students who qualify are invited to participate in a group activity which is used to assess how they might perform in class. Going through the admission process is an experience that students in this study have in common.

Research Participants

A total of nine participants were recruited through ADA: four students, two parents, and three teachers. Students' sample represented gifted ESL students with shared characteristics in Grades 8 and 9. The unit of analysis was an identified student from a group of students who (a) was enrolled in ADA, (b) was predominantly taught in English, (c) arrived in school with knowledge of an L1 other than English, (d) was identified by the school as gifted and ESL, and (e) was in Grade 8 or 9 at the time of the study. Their chosen pseudonyms are Andrew, Jody, Kathy and Melody. All students were born in Canada. All spoke a language other than English as their L1.

Parents and teachers were recruited based on their being a part of student participants' environment. Mother participants, Emma and Lucy (pseudonyms), were born in China and were able to communicate in English. The three teachers were Ms. Sara, Ms. Allison, and Mr. David (pseudonyms). Ms. Sara was ADA's ESL teacher who worked with student participants and had been with the school for two years. Ms. Allison was ADA's French teacher and shared her experience teaching a third language. Mr. David was the students' English teacher and had been teaching English to gifted ESL students for many years.

Data Collection

Three data collection tools included background survey and individual interviews for student as well as focus groups held separately for each group of participants. Data collection started with the students' background survey. Written responses were required for the background survey. The researcher was present when students were completing the survey and students were allowed to ask questions and encouraged to take their time.

Focus group discussions and individual student interviews were administered orally. Student and teacher data were collected on the school premises in a room used regularly by students and teachers. Parents' data was collected outside of school due to parents' working schedules. Parents' focus group discussion was conducted first and was followed by the teachers' focus group two weeks later. During that time, the researcher scheduled students' focus group and individual interviews through their homeroom teachers.

Results

Results are framed around the two over-arching questions that guided the inquiry.

Question One

How do gifted ESL students deploy socio-cultural influences to advance their language development?

The profile of students in this study showed that they were aware of various socio-cultural influencers and deployed them to advance the development of their language. The voices of Melody, Jody, Andrew, and Kathy provided rich insights into the socio-cultural strategies they use to develop linguistic proficiency.

The researcher created the background survey in order to gather data not only on students' background such as age and length of residency in Canada, but also to inspire students to begin thinking about their language use. Andrew, Melody, Jody and Kathy came from an Asian language background. All spoke a language other than English as their first language (Andrew – Mandarin; Melody – Mandarin and Cantonese; Jody – Cantonese; and Kathy – Vietnamese). Note that all participants used L1 for communicative purposes at home. Some reported using both L1 and L2 with siblings.

Students' answers during the individual interviews and focus groups exhibited typical gifted language learner behavior in their keen attempts to overcome obstacles and challenge themselves (Rogers, 2002; Tannenbaum, 2003). However, while students were capable of managing their learning, they needed environments that scaffold this learning. Students' common themes of using the language and taking advantage of resources such as registered activities and travel show what these environments provided. Moreover, their reference to knowledgeable others to develop their language highlights their importance as socio-cultural influencers.

Talk

All four students emphasized the value of using the language regularly since it was the way they developed both L1 and L2. Melody credited their confidence in L2 to it being their language of choice for communication. Jody, mostly spoke L1 with their parents, did not recall having difficulty learning Cantonese as they had been hearing it and speaking it since they were little. In order to succeed in learning a language, Jody recommended that language learners use the language daily. Andrew confirmed that he speaks Mandarin at home and sometimes English. Andrew credited their comfort speaking Chinese to their parents' continuous support. Andrew's advice to students trying to develop English proficiency was to use it on a daily basis. Kathy also spoke both English and Vietnamese with her family.

Registered Activities

Melody saw value in attending a language school. Jody recalled that growing up, most of their L2 exposure was speaking to native speakers of English in daycare. These experiences add to research on the need for structured instruction (Roessingh & Kover, 2003) and continuous communication (Hart & Risley, 2003; Hoff, 2013; Lightbown & Spada, 2006) for language development.

Travel

Kathy was confident in L1 and tested her capacity to speak it during several family trips to Vietnam. Despite their awareness that they might not know some basic L1 words, they felt certain of their ability to communicate and manage when needed with this immersion experience under her belt. Similarly, Andrew traveled to China and was confident in their conversational L1 skills.

Knowledgeable Others - Teachers

Jody reported the value of capitalizing on encouragement and or mentoring opportunities from caring adults. Kathy described herself as "interpersonal" and highlighted the efficacy of this personality for language development. Kathy explained that it emboldens them to ask for support from teachers. It also strengthens Kathy's confidence to communicate with native speakers. Kathy shared that their primary strategy for developing any language would involve working with "someone who knows the language really well and someone who has had experience teaching it".

Friends

Andrew listened to friends' suggestions when they asked for advice; did not hesitate to ask for help;

and was usually willing to work with friends to improve their language skills. Kathy added that they rarely had any issues expressing their thoughts in L2, but if the odd situation arises, Kathy would rely on friends for support.

Parents

Andrew, Jody and Melody credited their parents for helping them develop their L1. Their parents also encouraged and supported the development of English. Kathy viewed their parents as resources despite their low English proficiency and usually went to their mother when Kathy needed writing tips since they were “really good at writing”.

Question Two

How do parents and teachers perceive their role in nurturing the linguistic development of their gifted ESL learners?

Teachers and parents met students’ needs by providing environments that nurture, challenge, and scaffold for language development.

Emma and Lucy emerged as cheerleaders. They took their parental roles seriously and provided challenging home environments that value language learning and lead to language development. They intentionally spoke in L1 and L2 and their actions supported the value that research places on bilingualism (Cummins, 1980; Genesee, 2008). Their children were able to communicate in both languages and to make connections between them.

Parents also provided language development opportunities through deliberate interactions, travel, and scheduled activities. They encouraged critical thinking about language use through powerful conversations and enlightening experiences. They valued direct instruction of language and supplemented with linguistic resources at home such as workbooks and reading material.

Ms. Sara, Ms. Allison, and Mr. David introduced linguistic strategies, activities, and resources. Their actions affirmed the value they saw in direct and planned language development instruction so by providing constant challenges and continuous scaffolding. They encouraged students to make decisions and take charge of their own learning.

Teachers described working to provide fun language development opportunities that keep students engaged and cater to their interests. They met learning needs by understanding individual students’ strengths and weaknesses. For example, while students might understand the literal meaning of a word, teachers were aware that they might not understand its nuances, so they ensured that the word became fully comprehensible and relevant to students.

Summary

Students’ insights are complemented by those of their parents and teachers. Parents are responsible for orchestrating the home learning environment and affording the opportunities for their children’s language learning to be realized. Teachers are responsible for structuring the formal learning environment that advances students’ academic language. Comparison and analysis of data provided two major themes that confirm that the socio-cultural context is partially responsible for language development (Tannenbaum, 2003):

1. Students’ answers indicated that a growth in their conscious focus on linguistic strategy use was influenced by the people around them

2. Results of all three participant groups indicated the value of ongoing home-school collaboration

In short, participants' responses indicated that second language development goes beyond determining efficacious linguistic strategies. It arose as a process that is intertwined with students' deployment of socio-cultural influences to advance their language development. Any inducted possible answers would require a bigger sample to generate a theme, and this study aimed to open discussions and create opportunities for exploration where these results provided just that.

Discussion

Data was considered holistically in order to make connections to the extant research literature. Analyzing data included integrating parents', teachers', and students' perspectives. While students were capable of taking charge of their learning, they relied on environments to support this learning. These environments provided in-class opportunities to build on their interests and out of class experiences that aided in language development. The socio-cultural environment also supplied knowledgeable people who provided opportunities for elaborative and collaborative talk. Detailed analysis revealed the following consciously employed socio-cultural strategies:

- Engage in daily conversations in L1 and L2 (four students, three teachers, two parents)
- Use language enrichment resources (four students, three teachers, two parents)
- Reach out to knowledgeable others for support (three students, three teachers, one parent)
- Utilize tasks that challenge and scaffold (two students, three teachers, one parent)

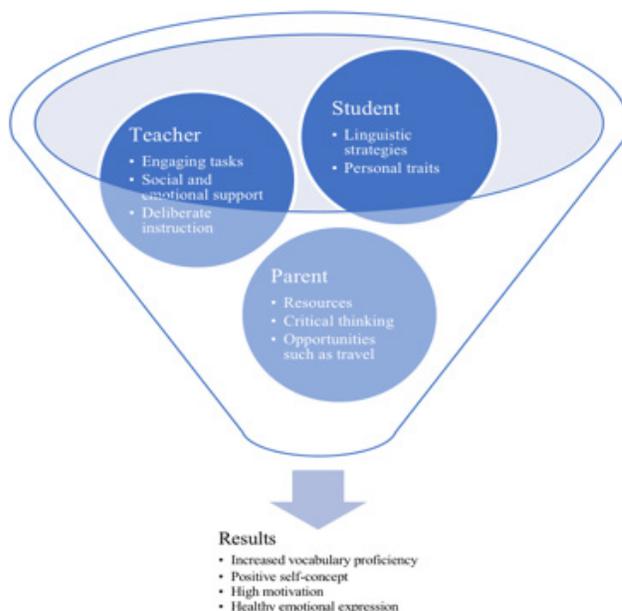
This study confirmed students' awareness of the strategies they use and a habit to engage in their learning (Costa, 2003). Their chosen strategies demonstrated the intellectual commitment, the desire, and the perseverance required to succeed (Costa, 2003; Gagné, 2003; Gallagher, 2003; Robinson, 2002). This adds to previous research (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011) which identifies these traits as important for language development. Furthermore, students' responses revealed a willingness to (a) learn (Cohen, 2012; O'Malley & Chamot, 1990; Rogers, 2002), (b) use linguistic strategies (Dörnyei, 2003; O'Malley & Chamot, 1990), and (c) challenge themselves (Li & Qin, 2006; Robinson, 2002).

Data from parents and teachers implied a need for collaboration (Colangelo, 2003). Their results confirmed research that suggests that involving parents in student language development is vital for students' and teachers' success (August, et al., 2005; Weber & Stanley, 2012). Teachers' responses suggested that motivation can be channeled to facilitate language development through a focus on students' interests (Gagné, 2003; Krapp, 2000; Nandi, 2011). This illustrated the importance of prioritizing students' interests to improve learning (Renzulli & Reis, 2003; Tomlinson & Imbeau, 2010) and suggested that further research may be useful regarding the efficacy of using student interest to enhance language development.

The role of encouraging students to deploy appropriate strategies for language development was also assumed as part of this collaboration. These results implied adding the students themselves to the equation. They also implied that a strong parent-teacher-student collaboration reflected students' high motivation (Hu & Nassaji, 2016), positive self-concept, and healthy emotional expression (Roessingh & Douglas, 2012; Subotnik et al., 2011). Figure 3 shows the interactive nature of this three-directional collaboration and mirrors research reporting that parents and teachers are the facilitators of students' learning (Colangelo, 2003; Colangelo & Dettmann, 1983; Hein, Tan, Aljughaiman, & Grigorenko, 2014; Lucas et al., 2008; Robinson, 2002).

Figure 3

Parent/Teacher/Student Collaboration Efforts and Results



In short, this study added to available research and suggested that academically successful gifted ESL language learners are: (a) confident as they persist to pursue their learning goals; (b) 'good language learners' who strive to identify and utilize linguistic strategies; and (c) in need of support that scaffolds their language learning. The strength of the three-way collaboration directly increased students' learning success. It also suggested the need for further research on the role that caring adults can play in involving students' input in this collaboration.

Conclusions

The broad idea that initiated this study sought to gain insights into socio-cultural factors' use among Canadian born gifted ESL students in an English milieu school. The purpose was to explore how the 'good' gifted language learner consciously deploys socio-cultural influences for second language development. This purpose informed two research questions.

The first question was answered by exploring socio-cultural strategy use from the students' perspective. Findings provided a glimpse of the successful student language learning profile as one who is willing to engage, commit, and learn. Elaborative and collaborative talk, reading, and a conscious focus on language development were strategies that gifted ESL students deployed.

The second question shifted gears to consider the perspective of caring adults. Socio-cultural influencers, who kept students motivated and committed; reflected an environment that supported the whole student's experience. Parents' and teachers' collaborative role in encouraging the development of students' interests and goals was key in motivating them to develop their language.

Collaboration among parents, teachers, and students was necessary. The role that parents and

teachers played in providing resources and opportunities that promote language learning was important; students reported that they reached out to the adults in their lives for linguistic support. Results thus prioritized a three-way collaboration among stakeholders as part and parcel of the language development process.

In short, the study confirmed the need for socio-cultural influencers for language development. Canada is unique in its diversity profile with challenges equally unique in addressing what is best for its ESL students who are born in Canada. The ultimate goal of the study to increase understanding of gifted ESL students' socio-cultural influences for language learning and open up discussion on the topic was accomplished.

Implications and Recommendations for Practice

This study expanded on current research and highlighted the role of caring adults as facilitators of learning. Teachers and parents viewed their collaborative actions and interactions with students as key in developing students' confidence to utilize linguistic strategies. Results identified the socio-cultural environment as the provider of strategies and opportunities to develop students' learning (Hidi & Renninger, 2006; Krapp, 2000; Vygotsky, 1997). The implications for increasing language proficiency thus identified the necessity of involving all stakeholders.

ADA provided such an environment. Teachers prioritized students' interests and encouraged the use of linguistic strategies. They sought the tools and education needed to provide this environment. Their actions were successful and warrant revisiting a differentiated curriculum that prioritizes students' interests for linguistic growth.

Parents were also supportive of their children's learning needs. They understood their children's personalities and respected their personal choices. They allowed them the space to explore their interests, to choose how to develop a second language and when to do homework, thus building their desire to learn (Pajares & Schunk, 2002). Finally, parents were continuously seeking resources to enhance their own skills and to ensure their children thrive in developing L2 proficiency to an academic level. Their responses highlighted the need to provide first generation immigrant parents with appropriate resources as well as teachers' support.

Students' confidence levels were a result of supportive environments (Pajares & Schunk, 2002). All stated that they were confident in English, reflecting the self-assurance that can result from environments that provide specifically for their learner needs. This suggested a need for a reinforcement of policy, so as to (a) make teachers' continuous education a monitored requirement and (b) encourage results-oriented parent/teacher collaboration.

Future Research Directions

Emerging from this study are questions that suggest further research regarding the learning needs of gifted ESL students and seek innovative pedagogical approaches:

1. Results prioritized a primary focus on students' interests to increase motivation and independent language learning. What role does a student interest-focused school environment play in language development? How can teachers incorporate students' stated interests into the curriculum?
2. Parents reported needing school support in finding resources and strategies to help them build their children's language proficiency. What role can schools play in supporting the home language learning environment of gifted ESL students?

3. Teachers were concerned about not being able to collaborate with parents who do not attend parent teacher meetings due to perceived language barriers. What can teachers do to get these parents into the school and engage them in their children's learning?

These questions underscore the need for a better understanding of the gifted ESL learner profile. Further exploration of learners' experiences, along with those of their mentors, would provide additional data to enable all ESL students to succeed. Student participants are lucky to be in environments that understand their gifted exceptionalities and their ESL needs. This gives a cause for concern about the circumstances of gifted ESL students whose gifted potential might not be nurtured and whose ESL needs might not be met, providing another topic for future research.

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