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# Foreword: Designing for Innovation

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# **FOREWORD: DESIGNING FOR INNOVATION**

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IDEAS 2016, Designing for Innovation, is the fourth annual teaching, learning and research conference co-hosted by the Werklund School of Education and the Galileo Educational Network at the University of Calgary. We have invited presenters from the IDEAS conference to contribute their manuscripts to this peer-reviewed conference proceedings as a way to enhance knowledge mobilization. IDEAS 2016 proceedings is a collection of selected representative works that showcase six key themes: 1) Design Thinking, 2) Higher Education Teaching and Learning, 3) Indigenous Education, 4) Language and Literacy, 5) Leadership, and 6) STEM (Science, Technology, Engineering and Mathematics) Education.

The conference mandate is to share the study of innovative teaching practices that support engaging student learning experiences in K-12 and post-secondary. The conference creates opportunities for presenters to share how research informs practice and practice informs research. It provides a forum to build on, and to thoughtfully engage in, contemporary ideas of learning and teaching. It is through coming together to study learning and teaching in dynamic relationships, that we create new practice, new knowledge and new research questions.

## **DESIGNING FOR INNOVATION**

The concept of innovation is somewhat complex and not easily defined. As we take up the challenge of designing for innovation, what does it look like in practice and why is it important?

Washor (2009) explained innovation in the following manner:

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From our perspective, innovation means first different, then better. That is, innovating is a fundamentally different way of doing things that result in considerably better, and perhaps different, outcomes. Both the 'different' and the 'better' must be significant and substantial. Educators need to think of innovating as those actions that significantly challenge key assumptions about schools and the way they operate. Therefore, to innovate is to question the 'box' in which we operate and to innovate outside of it as well as within. (para. 4)

As noted by Sawyer (2007) innovation results “from a series of sparks – never a single flash of insight” (p. 7). He goes on to state that “[s]uccessful innovations happen when organizations combine just the right ideas in just the right structure” (p. 24). Within our educational institutions, educators along with researchers are working in creative and collaborative ways to develop intellectually engaging learning opportunities for students. Within such learning contexts, students are being challenged to be innovative thinkers, creative problem-solvers and collaborators. As noted in the Government of Alberta’s (2010) *Inspiring Action on Education* document, “[c]reativity and innovation are central to achieving excellence in education” (p. 8). A number of competencies strongly related to “creativity and innovation” (p. 9) were also identified within the document. The development of such competencies will enable students to actively participate and live well in a knowledge society.

Designing for innovation takes many forms. The innovativeness may reside in instructional strategies, pedagogical approaches, technological integration, and/or assessment strategies. This conference brings together thought leaders and researchers/practitioners in the education community who rise to the challenge of designing for innovation. In the six sections of this proceedings, corresponding to the key themes of the conference, educators and researchers showcase the innovative practice that is occurring in today’s classrooms.

## **SECTION ONE: DESIGN THINKING**

Under the topic of Design Thinking, we received four papers. Gabriela Alonso-Yanez, Barb Brown, Sharon Friesen, and Michele Jacobsen provide two methodological frameworks – Social World-Arenas Analysis and Social Network Analysis – which can enable teachers/researchers to examine complex adaptive systems in education and envision new educational transformation. Sandra Becker, Liz O’Connell, and Liz Wuitschik draw on the concept of makerspace and teaching effectiveness, and describe how the design challenge implemented in Grade 1 to 3 classrooms transformed teaching. Diali Gupta, Stefan Rasporich, and Beaumie Kim demonstrate how high school students in an art immersion school engaged in learner-generated designs through Minecraft. Finally, Beaumie Kim, Diali Gupta, and Jerremie Clyde describe the design and multiple iteration of a game-based graduate course and discuss how the gameful environments fostered critical thinking and high student engagement.

## **SECTION TWO: HIGHER EDUCATION TEACHING AND LEARNING**

The following five papers discuss issues unique to Higher Education Teaching and Learning. Barb Brown, Meadow Schroeder, and Sarah Elaine Eaton review the relevant literature to examine their online teaching experience and discuss how instructors in the online environment can maximize student interaction during synchronous online discussions according to the notion of online community of inquiry. Amy Burns and Patricia Danyluk discuss the professional development and experiential learning of two pre-service teachers during a non-traditional student teaching placement on a housing construction site. Their study demonstrates an enriched pre-service teaching environment that provides the opportunity to create rich inquiry-based interdisciplinary lessons. Annusha Kassin and Amy Rose Green discuss the importance of integrating experiential learning and self-reflection into the training of counselling psychology

students, especially for the development of multicultural counselling competencies. Marlon Simmons, Gale Parchoma, Michele Jacobsen, Dorothea Nelson, and Shaily Bhola, based on a scholarship of teaching inquiry, report a collaborative redesign of an online doctoral research course and present thematic analysis of student engagements with the redesigned course. Jon Woodend, Lisa Fedoruk, Avis Beek, Xueqin Wu, Sylvie Roy, Janet Groen, and Xiang Li – graduate students and academic staff members who participated in the international, interdisciplinary collaboration among three institutions (University of Calgary, Queensland University of Technology and Beijing Normal University) – engage in polyethnography to discuss their experiences.

### **SECTION THREE: INDIGENOUS EDUCATION**

Two papers address the cutting-edge topics within Indigenous Education. Yvonne Poitras Pratt and Patricia Danyluk report the experiences of student teachers who participated in a service-learning program working in Indigenous communities throughout Alberta. These authors highlight the signature pedagogy of future educators by providing them with a focus on social justice issues in a local Indigenous context. Yvonne Poitras Pratt and Solange Lalonde introduce three educational projects where digital media provided the architecture to support the learning needs of Indigenous learners and also those wishing to learn more about Indigenous perspectives.

### **SECTION FOUR: LANGUAGE AND LITERACY**

In this section, classroom practices related to Language and Literacy are introduced by two papers. Kimberley Holmes addresses the issue of student disengagement, stress and anxiety through the life writing pedagogy that focused on students' lived experiences in the secondary English classroom. Shayla Jaques, Rita Traxler, and Erica Rae report a case study of a

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linguistically diverse school where teachers engaged in innovation using robotics, to support English language learners' learning of language and content.

## **SECTION FIVE: LEADERSHIP**

The notion of leadership is closely examined through the following two papers. Jim Brandon, Candace Saar, and Sharon Friesen report on the collaborative partnership between Canadian Rockies School Division and the Galileo Educational Network on the *Nurturing Excellence in Instruction and Leadership* (NEIL) initiative. These authors discuss how school leaders and teachers engaged in reciprocal leading and learning cycles during the 2015-16 school year as part of the jurisdiction's ongoing strategy to implement the Professional Practice Competencies for School Leaders in Alberta. Jim Brandon, Candace Saar, Sharon Friesen, Barbara Brown, and Dianne Yee discuss the concept of pedagogical leadership based on their collective case study which was based on the collaborative partnership between the Calgary Board of Education and the Galileo Educational Network to strengthen leadership and teaching practices.

## **SECTION SIX: STEM EDUCATION**

Finally, we present seven papers in the field of STEM Education. Jesús Enrique Hernández Zavaleta, Vicente Carrión Velázquez, and Gustavo Carreón Vázquez introduce a workshop with high school teachers on key mathematical notions. Drawing from the idea of decentralization, these authors share findings from the workshop utilizing NetLogo for computational modelling and discuss how scientific thinking and mathematical modelling can develop in an intertwined manner. Stephanie Nemcsok and Amy Goldberg discuss significance of fostering the “fail positive culture” by reporting the SHIFT Lab program at the TELUS Spark, which helps educators to develop design thinking experiences. Miwa Aoki Takeuchi and Jo Towers, using students' mathematics autobiographies and drawings, reveal students' images of collaboration

in Canadian mathematics classrooms. Based on their findings, these authors provide suggestions for designing group work pedagogy in mathematics classrooms that can foster creative collaboration.

We then have the following four papers from the Math Minds initiative, an innovative partnership between a school district and the University of Calgary. Ayman Aljarrah, Paulino Preciado Babb, Martina Metz, Soroush Sabbaghan, Geoffrey Pinchbeck, and Brent Davis, describe how the notion of “bonus questions” can be enacted in elementary mathematics classrooms. Martina Metz, Paulino Preciado Babb, Soroush Sabbaghan, Geoffrey Pinchbeck, Ayman Aljarrah, and Brent Davis report classroom-based research on how teachers evolve their awareness with patterns of variation to teach mathematics lessons. Paulino Preciado Babb, Martina Metz, Soroush Sabbaghan, Geoffrey Pinchbeck, Ayman Aljarrah, and Brent Davis discuss how teachers can address the challenge of differentiation in elementary mathematics classrooms, based on their classroom-based study. Soroush Sabbaghan, Paulino Preciado Babb, Martina Metz, Geoffrey Pinchbeck, Ayman Aljarrah, and Brent Davis challenge a common misconception that mathematical extensions should include many interrelated elements and impose a high cognitive load to promote deeper thinking. Focusing on “bonus questions,” these authors discuss how tasks imposing low cognitive load could engage students in novel modes of thinking.

## **CONCLUSION**

The 22 papers provide an array of examples in the six discipline areas of innovative practice in teaching and learning. The papers showcase how researchers/practitioners are drawing on literature and their own research to inform their own teaching practice and broader educational issues. Through their work, they are not only determining next steps for their own practice, but also sharing their research findings and practice with the larger educational community. Through

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presenting at the conference and the publication of this proceedings, these researchers/practitioners are making their work public. They are engaging with others in exploring contemporary thinking about designing for innovation that lives in the practice of teaching, learning and assessment.

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