
Mathematics and Mathematics Education: Two Communities in Conversation
Mathématiques et éducation mathématique : deux communautés en conversation
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ANDIE BURAZIN, University of Toronto Mississauga

In the middle . . .

A large and growing community lives in between mathematics and mathematics education. And strong, symbiotic relationships can be created, if the three groups – mathematicians, mathematics educators, and the group “in between” work together. How do members and myself of this in between community think about themselves and their work contributing to improve and further the teaching and learning of mathematics will be discussed.

LAUREN DEDIEU AND A. PAULINO PRECIADO BABB, University of Calgary

Inside Mathematics: An Undergraduate Course for Mathematicians and Educators

For centuries, both mathematical inquiry and mathematics learning have been assumed to be principally logical. However, recent studies of the processes of human cognition and the nature of mathematical insight have revealed that mathematical learning and research are highly analogical. Moreover, the specific analogies that are made available can either help or hinder the development of mathematical knowledge. In 2019, the University of Calgary began offering the course Inside Mathematics, intended to address cognitive and ontological aspects of mathematics relevant for both future teachers and people interested in pursuing a career in mathematics. This course focuses on helping students learn about both the human nature of mathematics and how to communicate mathematical ideas effectively to different audiences, including K-12 students. Participants in the course not only need to develop their expertise in mathematics, but also need to learn how to think like a novice when they become experts. To achieve this goal, the expertise from mathematics and education are combined in a way that transcends both disciplines.

In this presentation, we will introduce the course, its underpinning ideas and teaching strategies, and the modifications we made based on student feedback. We will discuss how the course differs from other math courses and how the expertise from mathematics and education complement each other toward fulfilling the learning outcomes of the course.

BRIAN FORREST, University of Waterloo

Mathematicians Engaging with Teachers: The Master of Mathematics for Teachers Program

There are many ways that mathematicians can engage with mathematics teachers. In this talk I will talk about my experience working with teachers in a fully online professional masters degree program in mathematics which I started a little over a decade ago at the University of Waterloo. After briefly describing the history and structure of the program, as well as our goals in setting it up, I will talk about the lessons I have learned from the 600+ teachers I had engaged with while teaching in the program. I will also try to make the case for why I believe it is so important that mathematicians and mathematics teachers continue to build bridges between our two communities.

KSENIYA GARASCHUK, University of the Fraser Valley

Two sides of a coin

I meet future teachers in two courses: first-year math for elementary teachers and an upper-level history of math course. On the surface, the two courses cannot be more different in terms of mathematical content, prerequisites, the students' level of academic and mathematical maturity, to name a few. Yet, despite vastly dissimilar syllabi, the courses aim to mathematically engage those who will later teach math to others. What overarching learning objectives must they share? How can they tap into more than a cognitive learning domain? How can we ensure such courses are effective – what does effective mean in this setting and what evidence can we collect for the purpose of improving these courses?

ANDREW KERCHER, Simon Fraser University

Designing and Implementing Lessons That Connect Undergraduate Mathematics to Secondary Teaching

Teaching mathematics requires both content knowledge and pedagogical knowledge. The line between these two realms, however, has become increasingly blurred as researchers continue to identify and describe how mathematical content knowledge is used by practicing teachers in their classrooms. Of particular interest are the ways that secondary mathematics teachers use advanced content knowledge to enhance their pedagogy, and how undergraduate mathematics courses can deliver this advanced content knowledge in such a way that highlights its potential uses in a secondary school classroom. The META Math project has created a number of lessons for undergraduate courses that incorporate connections between advanced mathematics content and teaching activity at the secondary level. I discuss the design principles used to create these lessons, provide examples of the applications to teaching that they highlight, and examine the outcomes of the lessons' implementations in terms of both student work and instructor feedback.

IGOR' KONTOROVICH, The University of Auckland

Not just conversing but dialogically engaging with each other

On the one hand, mathematicians and MathEd researchers are genuinely interested in mathematics teaching and learning. On the other hand, the cohorts practice distinct academic discourses, which often leads to substantial gaps in their communication. In this presentation, I will propose that mathematicians and MathEd researchers can communicate with the aim of understanding what the other is saying rather than reaching a consensus. I will use my recent research collaboration with a topologist to illustrate what such an engagement may look like and what it can offer to the communicating partners from the perspectives of educational research and instructional practices.

AMI MAMOLO, Ontario Tech University

Collaborative Adventures in OER Design for Undergraduate Mathematics

In this session, I discuss a current VLS eCampusOntario funded collaboration with a team of three mathematics educators, three mathematicians, and me. The open educational resources we are developing intend to help undergraduate mathematics instructors, tutors, and teaching assistants enhance their skills for leveraging interactive digital technologies to support inclusive learning and student understanding. Our adventures have taken us into new terrain, helped us bridge familiar divides, and opened up pathways for future research. At its core, our journey is about striving toward a common objective of enriching the mathematical experiences and understanding of students. I share some of the vision behind this initiative and reflect on the current state of the project and how it has been shaped through engaging our two communities in conversation.

XIAOHENG KITTY YAN, University of Toronto

Advanced Mathematics for Teachers: Vision and Considerations of Mathematicians

Mathematicians often act as teacher educators de facto, without explicitly identifying themselves in this role. Acknowledging their contribution to teacher education, we examine 24 mathematicians' views on the value of advanced mathematics for secondary mathematics teachers. By providing rich examples that could shape and expand teachers' understanding of mathematics, the majority of the participating mathematicians emphasized the value of mathematical investigation and connections across mathematics domains. Notably, when drawing connections between advanced and school mathematics, examples provided by the mathematicians were relatively scarce. We sought and provided possible explanations.

RINA ZAZKIS AND VESELIN JUNGIC, Simon Fraser University

Mathematicians and Mathematics Educators: Conversation Continues

We will offer a brief summary of the session, invite the audience for additional comments, and share some of our thoughts about the future of the conversation between our two communities, mathematics and mathematics education.