Graduate Student Symposium – Presentation Proposal

By

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Introduction

I am completing a thesis as a part of my Masters of Education degree at the University of Manitoba in the department of Curriculum, Teaching, and Learning in Mathematics. The project is titled Developing Conceptual Understanding and Probabilistic Thinking through Tree Diagrams. The proposal for the project was defended successfully in the Spring of 2013 and the research was completed shortly afterwards. I am currently engaged in writing the analysis, interpretation, and conclusion of the thesis with an expected completion date of April of 2015.

Description of the study

Since the inception of the research project until now, I have been working as a high school mathematics teacher in the Winnipeg School Division. The curiosity that lead to the eventual research questions was actually sparked by some data from the province with regards to the provincial standards test for Grade 12 Applied Mathematics. The data showed that the unit on Probability had a significantly lower provincial average than every other unit in the course. Although this was a very narrow beginning, some initial exploration quickly expanded the project by identifying some key big ideas that could be attributed to the difficulty that students were experiencing with learning probability.

Similarly, while the thesis is narrowly focused on the teaching of probability, the big ideas being explored are relevant to the learning of all mathematics at many different levels.

The key issues that students faced in learned probability can be categorized as:

i) The small parts did not always add up to the big picture. By breaking down each unit into individual lessons and assigning each lesson with one new concept, students were expected to eventually piece all of the parts together. However, students were not being provided with experiences to learn with the math in context.

ii) Probability specifically posed questions and problems that are unique. Without a template or even a resemblance to problems that students had seen before in examples, context and being able to engage and think probabilistically are essential. Teaching for conceptual understanding rather than an instrumental ability to calculate correct solutions would move students towards being able to solve these problems.

Seeing the importance of learning mathematics for conceptual understanding, I designed this research project to explore learning tools that move the learner from calculating with algorithms towards conceptual understanding and the bigger picture. The term learning tool here refers to any device that students use to not only calculate a correct answer but to also show understanding. The project focused on the learning of probability. The learning tool that was used is the tree diagram. This tool aims to not only provide an
equal ability to calculate correct probabilities but to also provide the student with an understanding of the bigger picture and provides an opportunity for learning more challenging concepts.

A qualitative approach was used to collect data through interactive writing, and interviews with students. Student voice was a significant component of the data. The research was guided by the following questions:

i) How can a mathematical tool such as a tree diagram assist in moving a student’s mathematical learning from computing algorithms to conceptual understanding?

ii) Further, what role can the tree diagram have in enabling students to show their learning and conceptual understanding?

iii) How does an emphasis on conceptual understanding as opposed to a more instrumental approach impact student perception of what it means to understand Mathematics?

**Significance of research topic**

A significant theme that emerged from my experiences with the research project was the ability to make decisions by listening to students. If accepted to the graduate student symposium, this will be a key focus of my presentation. The research data so far shows various ways that students had shown their understanding of not only the math concepts being learned, but how they were learning them and how to get better at learning.

This information had a significant impact on the decisions I made as both a teacher and a researcher.

**Presentation format**

My presentation would be in the traditional format accompanied by a power point presentation that would help me show my points through student work and writing.