



Code: Hawes

APD 1210 RESEARCH PRACTICUM COURSE

PROJECT DESCRIPTIONS 2022-23

FALL/WINTER

Name and Title: Zachary Hawes, Assistant Professor.

Lab Website: <https://discover.research.utoronto.ca/16546-zachary-hawes>

TITLE OF RESEARCH PROJECT: Top 10 Most Common Student Misconceptions in Elementary Mathematics

NUMBER OF STUDENT PLACES AVAILABLE: 1

PRIMARY MODE OF RESEARCH PLACEMENT PARTICIPATION (circle one option and describe):

☐ IN PERSON

☐ REMOTE (ONLINE)

☒ HYBRID/FLEXIBLE

Please describe: This project involves both independent work as well as collaborative group work (working with a small team of 3-4 others). For any independent work, the candidate will have the option of working from home or the lab. Group work will consist of both in person meetings and online meetings (over Zoom). NOTE: At the candidate's request, arrangements can also be made to participate in this project entirely online/remotely.

OBJECTIVES AND METHODOLOGY: This project aims to describe and shed light on 10 of the most common misconceptions held by students in elementary mathematics (Kindergarten to Grade 6). For example, decades of research reveal misconceptions about the meaning of the equal sign (=). Children often interpret the equal sign as an operational symbol that means "to get the answer" rather than a symbol of mathematical equivalence (as a symbol that means the "same as"). Such misconceptions reveal insights into children's past learning experiences (where do these misconceptions originate?) as well as potential paths forward (what can be done to correct/reroute these misconceptions?). This project will involve working with a small team to research and generate a list of the most common misconceptions that children endorse in Kindergarten to Grade 6 mathematics. For each misconception identified, a short literature review will be written that describes/illustrates the misconceptions, what is known about its origins (how do these misconceptions develop), and the instructional implications associated with each misconception. The ultimate goal of this project is to write an evidence-based teacher resource (to be written up as a blog and peer-reviewed journal article) that highlights the most pressing misconceptions in the elementary mathematics classroom. In doing so, this project aims to



provide deep insights into children's mathematical thinking and the implications this knowledge has for the teaching and learning of mathematics.

DESCRIPTION OF STUDENT PARTICIPATION: There will be opportunities and options to participate at a variety of levels of this project. For example, duties may include:

- Conducting a large literature review to identify common student misconceptions about mathematics
- Conducting more focused literature reviews on each of the specific misconceptions identified (e.g., children's understanding of the equal sign)
- Writing up the findings in clear and accessible ways
- Creating figures to illustrate the various misconceptions identified
- Working with others to interview children and video record 'live' examples of these misconceptions
- Working with members of the Robertson Program for Inquiry-Based Teaching in Mathematics and Science to create lessons/activities that address the identified misconceptions (<https://wordpress.oise.utoronto.ca/robertson/>)

For all duties, training will be provided. It is expected that involvement in this project will take about 8 hours per week. The candidate will learn skills related to conducting literature reviews and key skills related to knowledge dissemination and the translation and application of research to practice. In addition, the candidate will gain insights into and knowledge of the field of mathematical cognition and education.

DESCRIPTION OF PREFERRED SKILLS/BACKGROUND (OPTIONAL): Preferred skills include an interest and desire to learn more about children's mathematical thinking and the various factors that influence mathematics performance. Creative contributions in how to best translate research to practice as well as flexibility and openness to learning concepts/skills will also be of value.

DAY AND TIMES OF LAB MEETINGS: Unknown at this time, but the candidate can expect a mix of one-on-one meetings (approximately every other week) and fairly regular (also about once every two weeks) meetings with the other team members that are working on this project.