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Sabbatical Report

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Introduction

In the fall of 2018, I entered the doctoral program at the College of Education at Oregon State University, with the specialization of mathematics education at the undergraduate level. The purpose of my return to school is to give me the tools I need to be a researcher in math education - I want to be able to study teaching innovations and their effects on student learning in undergraduate math courses. Some questions that I am especially interested in are: how do students learn math online? In what ways does reducing the cost of required course materials help or hurt student learning? How can we increase student engagement in math and other STEM courses?

I was awarded a one-term sabbatical from Lane, divided between three terms so that I had a reduced workload while I was taking classes at OSU. I attended OSU full-time, taking 12 credits per term. After successfully completing my first year of coursework, and about to start a second year as a part-time student, I am writing this report about what I've learned and what I'll be doing in the future.

Course of Study

Classes I took during my first year in the doctoral program and their course descriptions are listed below. My focus was on laying the groundwork for reading and conducting empirical research in the field of post-secondary mathematics education. In addition to the courses listed, I also completed three terms of a seminar course designed for first- and second-year doctoral students in the College of Education STEM program, as well as weekly seminars and meetings with my advisory group to discuss progress and coursework, peer groups to discuss writing and course projects, and a special topics group on the subject of mixed methods.

SED 580: Research and Evaluation

Analysis of qualitative and quantitative empirical research in science education, mathematics education and education in general. Development of data collection instruments for use by researchers and teachers of science education, mathematics education and education in general, including portfolio and other forms of alternative assessment.

MTH 689: Topics in Mathematics Education

Topic for Fall 2018: The history of calculus and the history of teaching calculus. Discussion of the history of calculus and the history of teaching calculus, including some of the mathematics education research relevant to this area. Examination of the history of the mathematical development of calculus, and the evolution of calculus curriculum and instruction.

SED 623: Curriculum Theory

Establishes theoretical grounding of curriculum. Includes theoretical background, practical knowledge, and skills related to science and mathematics curriculum, including the history, curriculum theory and practice.

SED 621: Survey of Research on Learning

Critical analysis of perspectives on student thinking and learning in science/math education.

SED 622: Qualitative Research Techniques

A study of qualitative research designs and analytical procedures with specific applications in science and mathematics education.

SOC 556: Science and Technology in Social Context

Study of social aspects of science and technology (values, practices, organization, impacts) by analysis of issues revealing their relationship to other social and cultural processes.

SED 612: Quantitative Research Design and Critical Analysis

A study of quantitative research designs and analytical procedures with specific applications in science or mathematics education.

ED 653: Discourse, Identity and Education

Builds a foundation in discourse theory and its applications to identity and education. Includes empirical studies that draw from particular lenses of discourse theory, exemplifying how these scholars organize the design, implementation, and discussion of research around discourse theory. Develops knowledge of discourse theory to propose a study that could be conducted drawing from discourse analytic perspectives.

PPOL 551: Higher Education Policy

An introduction to policy issues in the area of higher education and exploration of possible tensions within the policy goals of quality, equity, access and outcomes. Students will gain knowledge of the key pieces of legislation and constitutional law governing higher education policy at both federal and state levels, as well as an overview of the relevant research in this area. Begins with a short historical introduction to the U.S. higher education system and concludes with a discussion of its competing demands and functions.

Outcomes

This year of graduate study has given me a new perspective on the world of mathematics education research. I've been exposed to many of the big theories in the research world about student learning, with a focus on the fields of science and mathematics. I've also learned about how ethical and responsible research is conducted. Finally, I've learned about the skill of academic writing, and I have written papers and put together mini-projects that stretched my skills and put my research knowledge into practice. Throughout the year, my classes and advisory group afforded me opportunities to choose projects of interest to me and write reports or present at meetings.

As a former math major, writing papers was an area I had to learn to embrace. The world of educational research depends heavily on clear and concise academic writing. The papers and projects I have created over the year include:

- "Trends in Higher Education: Online and Developmental Math Courses" (10-page literature review, SED 580)
- "The Seven Bridges of Königsberg" (poster presentation, MTH 689)
- "Designing Research to Study Online Homework in Online Math Courses" (13 pages, SED 621)
- "Use of Specifications Grading in Undergraduate STEM Courses: A Qualitative Project" (16 pages, SED 622)
- "Is a Kindergartner's Self-control Related to Their Gains in Scores on a Mathematics Assessment?" (7 pages, SED 612)
- "Online Math Homework Systems: A Sociological View" (22 pages across 4 papers, SOC 556)
- "A Look at Policies Encouraging the Use of Open Educational Resources in Oregon's Colleges" (17 pages and a 30-minute presentation, PPOL 551)
- "Active Learning as a Potential Remedy for the Student Engagement Problem in STEM: Current Understandings and Areas of Opportunity" (12 pages, SED 607)
- "Opportunities Afforded by a Radical Textbook" and "Understanding What Your Students Understand: Implications of Using Specifications Grading in Undergraduate Mathematics Courses" (two talks given at the Pacific Northwest regional meeting of the Mathematical Association of America, April 13, 2019)

As an addendum, I have attached my Academic Yearly Progress report from the OSU's College of Education. This form includes documentation of my progress as a doctoral student, as well as comments from my academic advisor.

Conclusion

As a result of this year of full-time study towards a doctoral degree in education, I have built a base of knowledge that will allow me to conduct research of my own in the future. I have become a better consumer of research, with a deeper understanding about historical trends in education research and some of the current projects happening around the world. This breadth and depth of educational research knowledge helps me to be more reflective of my own practice as a teacher, and more thoughtful as a colleague. I hope to share both my findings and my original research more widely as I continue in my studies.