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Honors in Education Thesis

Layperson Summary

*Access and Barriers: Technological Pedagogical Content Knowledge in Elementary
Mathematics*

Background

Pedagogical Content Knowledge (PCK) was developed by Lee S. Shulman, who suggested that teachers develop a deeper understanding of how to teach by blending their knowledge of content and their knowledge of the ways in which to teach content (Shulman, 1986). By extension, Mishra and Koehler (2006) established the concept of Technological Pedagogical Content Knowledge (TPCK). TPCK is defined by the knowledge of technology, pedagogy, and content, which all depend on one another. It has been widely accepted as an effective pedagogical approach for incorporating technology into education (Ward & Benson, 2010). The TPCK framework can be used to incorporate technology effectively. However, many teachers experience barriers that inhibit accessibility to technology, which makes implementation much more challenging (Keengwe et al., 2010). Barriers include: lack of time, lack of teacher training, lack of equipment or lack of access to equipment, unreliability of equipment, and lack of technical support (Keengwe et al., 2010).

Rationale

While research has shown that there are effective ways to integrate technology, few have expressed the ways in which elementary teachers have been able to overcome the barriers that exist, effectively implement technology in their math instruction, or provide an explanation for their decision-making processes. This study serves two purposes. First, I will examine the ways that teachers overcome barriers and find ways to effectively implement technology in elementary math classrooms. Second, I will also look at the ways in which technology integrated instruction in elementary classrooms meets the TPCK criteria. I will use the following questions to guide my research. What are the ways in which elementary teachers are able to overcome the existing barriers, adapt their content knowledge, and adapt their instructional strategies, in order to implement technology in their math classrooms? In what ways do elementary teachers purposefully integrate technology in their math curricula? How do they decide which technology works best? How does TPCK guide their decision-making? What systematic issues and barriers influence teachers' decisions?

Research Method

According to Creswell (2014), a case study is a detailed investigation of an activity, event, process, or individual(s). More specifically, an instrumental case study emphasizes a specific issue, like the barriers that elementary teachers face when implementing technology in their math instruction. To examine these cases, I will interview 4-5 third grade teachers, conduct focus groups, and observe classroom instruction in order to collect data regarding their perspectives on overcoming barriers to technology accessibility, decision-making processes, the use of TPCK criteria, and how TPCK can positively influence teaching methods when implementing technology in math instruction. I will triangulate the data that I collect during the interviews, focus groups, and observations by providing evidence of these individuals'

perspectives using detailed descriptions of people, places, and events and in vivo codes, which are described as a participant's actual words (Creswell, 2014). I will establish themes based on the topics and codes that emerge most frequently within the interviews, focus groups, and class observations. I will be conducting this research in an elementary school in a southeastern metropolitan area of the U.S. between the months of January and April, 2016. This research thesis will be completed and presented in May, 2016.

Expected Outcomes

During the research process, I anticipate the teachers' level of education, the teachers' backgrounds, the school setting, the relationships within the school, and the community of learners to influence the themes and descriptions that arise during each interview, focus group, and observation. I also expect each teacher to have a differing perspective on the presence of barriers to technology, on the best decision-making process for technology integration, on the importance of meeting TPCK criteria, and on the level of impact TPCK can have on their teaching approaches.

By conducting this research, I will raise awareness for the ways in which technology can be purposefully integrated in elementary math curricula despite the various barriers teachers face. Not only will this research benefit teachers, administrators, and educational leaders within the field of elementary education at large, but it will also influence the way I teach once I become an elementary teacher by further establishing the importance of technology integration, regardless of its challenges. This research will encourage educational leaders to empower emerging administrators and teachers to incorporate technology by pushing past the barriers and boundaries in order to successfully prepare young minds for the future.

References

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