

## Chapter 13

# Improving Teachers' Self-Confidence in Learning Technology Skills and Math Education through Professional Development

**Taralynn Hartsell**

*The University of Southern Mississippi, USA*

**Houbin Fang**

*The University of Southern Mississippi, USA*

**Sherry S. Herron**

*The University of Southern Mississippi, USA*

**Avinash Rathod**

*The University of Southern Mississippi, USA*

### ABSTRACT

*Using technology tools in math instruction can help stimulate problem-solving skills and understanding of math concepts. However, teachers need to be confident in their abilities to use technology tools. This study investigated whether or not a four-week in-service professional development institute that addressed the use of technology in math education helped improved the teachers' attitude and confidence in applying technology. Findings indicated that as the teachers explored and used the available technology tools relevant to math instruction during the institute, the more proactive and motivated they became to continue their professional development in using technology for classroom instruction. They realized that they were able to use technology and desired to continue their education in this area.*

### INTRODUCTION

Technology is a tool that could be used in the mathematics classroom to enhance learning (NCTM, 2000). There are many forms of technology that can assist in teaching mathematics, supplement instruction, and remediate mathematical skills

that require reinforcement. Tools such as spreadsheets, databases, educational software programs, drill-and-skills programs, scientific calculators, interactive whiteboards, and other applications are appropriate methods to teach mathematical concepts. The problem lies in that some teachers do not know how to use the technology tools

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or feel that they possess the ability to integrate technology effectively. Hence, teachers need to obtain the knowledge and skills that would help improve their self-confidence in using the technology at hand (ISTE, 2008). Mitchem, Wells, and Wells (2003) state that, "Research on schools and teaching has suggested for decades that student success and achievement are intricately associated with students' interactions with effective teachers" (p. 1). If this is true, then mathematics teachers are the key agents to bringing out reform toward technology integration (Garofalo, Drier, Harper, & Timmerman, 2000). But, the way to effectively prepare teachers to become change agents is another issue. Professional development is a primary factor toward helping teachers become self-adept in learning the knowledge and skills required of them when teaching math content. This study investigates whether professional development could promote math education teachers' self-confidence in using and applying the technology tools learned back to the classroom. In-service teachers participating in a Math Summer Institute are the participants in this particular study, and the researchers explore whether completing a four-week intensive professional development institute has improved the participants' knowledge, skill sets, attitude, and self-confidence in applying what they have learned.

## **Literature Review**

The effective preparation of teachers to teach mathematics in K-12 education is recognized as a vital factor toward students' academic success. In conjunction with the curriculum, teachers are the key in assisting students to learn required information necessary to succeed in the mathematics curriculum (Schmidt et al., 2001). Several professional organizations note the importance of teacher preparation and professional development as a means toward improving the aptitudes of math education teachers, especially in regards to technology integration. The National Council of

Teachers of Mathematics (2000) considers technology as being essential "in teaching and learning mathematics; it influences the way mathematics that is taught and enhances students' learning" (p. 2) as one of their six principles of school mathematics. Furthermore, the Association of Mathematics Teacher Educators (2006) goals includes one to promote the recognition of the ever-increasing impact of technology on mathematics teacher education and has made a position statement on the importance of preparing math teachers to meet the current standards of integrating technology. If one reviews the Association of Mathematics Teacher Educators newsletter called *Connections* (2008), the content solely concentrates around technology and why these tools should be utilized in the math classroom. If organizations such as these recognize the importance of technology, then teacher preparation and professional development need to include a demonstration that goes beyond just the "how to use technology," but how to integrate.

Reasons behind using technology in the mathematics curriculum are numerous. Heid (1997) cites that technology when used in conjunction to teaching math could (a) make learning more student-centered, (b) give students the experience of being mathematicians themselves, (c) provide an avenue for reflection, and (d) make available constant access to the instruction, meaning that the instruction is no longer restricted when the teacher teaches. Contextual learning in constructive environments is critical when applying technology in math education. Students need to apply learning in novel and authentic situations so that they can practice skills, knowledge, and decision-making, while experiencing the implications or repercussions of certain decisions (Dyer, Reed, & Berry, 2006). Constructive or contextual learning environments actively engages the students as they (a) relate learning to one's life experience, (b) experience and learn by doing or through exploration and discovery, (c) applying the concepts to actual scenarios, (d) cooperate with others in terms of sharing, responding, and

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