

# **THE ROLE OF EDUCATOR PREPARATION PROGRAMS, GOALS, AND MOTIVATION IN TECHNOLOGY USE IN MATH-BASED COURSES**

Leslie Ramos Salazar, West Texas A&M University, Paul and Virginia Engler College of Business, WTAMU Box 60768, Canyon, TX 79016, 806-651-2548, lsalazar@wtamu.edu

Elsa Diego-Medrano, West Texas A&M University, College of Education, WTAMU 60208, Canyon, TX 79016, 806-651-2612, emedrano@wtamu.edu

## **ABSTRACT**

Technology training gaps have been identified as a global problem by educator preparation programs (EPP) and the literature, especially for math-based courses (Baranchik & Cherkas, 2002). To address this gap, we investigated data provided by Schmidt (2013) via the Education Research Data Sharing Initiative. This paper examined the cross-cultural differences in EPP programs for international institutions, the predictors of technology use in math-based courses, and teaching preparation as a mediator for teaching goals, teaching motivation, and technology use in an international sample of 2,628 teachers. Analyses included one-way ANOVA, simple linear regressions, and mediation analyses. Findings revealed differences in preparation across countries. Also, teaching preparation, teaching goals, and teacher motivation predicted technology use in mathematics-based courses. Teacher preparation also served as a positive mediator of the relationship between teaching goals and technology use. Implications are also discussed to inform educators and administrators about integrating technology in math-based courses.

## **INTRODUCTION**

Technology use has become a desirable skill for 21<sup>st</sup> century educators. Despite the emergence of technology in today's classrooms, international educators face multiple challenges in integrating technology into their instructional math-based courses such as statistics (Wachira & Keengwe, 2011). Yet, technology integration in math-based courses has been shown to play an important role in developing students' learning achievement, problem-solving skills, and decision management skills in comparison to traditional forms of instruction (Thomas, 2003). For this reason, federal agencies (e.g., Education Commission of States; U.S. Department of Education) and international organizations (e.g., Agency for International Development; Molecules for Education Alliance) have begun to invest in assessing educator preparation programs (EPP) to alleviate this technology gap in mathematics and at the university level contingent to each state's requirements (Culp, Honey, & Mandinach, 2005). While educator preparation programs emphasize both mathematical knowledge and pedagogical training, programs do not always emphasize technology use across countries (Schmidt, Cogan, & Houang, 2011). For this reason, education candidates who attended an EPP that did not emphasize or teach how to utilize technology in the classroom reported being unprepared, unskilled, and unmotivated to begin integrating it once they secured a teaching position (Bauer & Kenton, 2005). Consequently without clear goals for developing or integrating technology into their lessons, educators of math-based courses may encounter teaching challenges that can negatively impact students' learning potential (Bauer & Kenton, 2005).

In a quantitative study, Czja and colleagues (2006) found that computer preparation and technology confidence were needed in educator preparation programs (EPP) to help resistant student candidates with technology use (e.g., laptops, virtual calculators, software) in their classrooms. Correlation studies have previously explored a similar relationship among teacher goals and motivation in their own professions (Neves de Jesus & Lens, 2005; Butler, 2007); however, additional cross-cultural studies are needed to determine if these constructs served as predictors for technology use in math-based courses when controlling for demographic factors such as sex, country, and age (Peklaj et al., 2012).

Although educator preparation programs strive to prepare education candidates to become successful in core subjects such as math, educator preparation programs are not always effective across countries. Several gaps have been documented regarding access to quality teaching preparation programs in foreign countries (Baranchik & Cherkas, 2002). For instance, an international study examined educator preparation programs and found that certified educators did not feel knowledgeable or competent enough to teach math-based courses without supervision or guidance (Schmidt, Burroughs, & Cogan, 2013). Another study revealed that educator preparation processes may also differ across countries. For example, Stewart (2011) reported that Finland and Singapore were found to have high-achieving educational preparation systems in comparison to England and the United States. Unfortunately, without effective educator preparation programs, educators may not be able to provide the quality education their students need to become successful in math-based courses (e.g., statistics).

To address some of these issues presented by the literature, this study serves multiple purposes. First, this study examined whether cross-cultural differences occurred in educator preparation programs for international institutions that prepare their candidates for math or statistics courses. Second, this study investigated whether teacher preparation, teaching goals, and teaching motivation significantly predict technology use in math-based courses. Third, this study explored teaching preparation as a mediator of teaching goals, teaching motivation, and technology use.

## **METHOD**

This study examined data provided by the Education Research Data Sharing Initiative in the examination of future mathematics and statistics teachers in the 21<sup>st</sup> century (Schmidt, 2013). Participants included 2,628 teacher candidates (58.8% female and 41.2% male) who were in their last year at their higher education institution. Of the participants, 87.1% were enrolled in a college or university and 12.9% were enrolled in a post-college institution. The countries of the participants included 13.5% from Mexico, 14.6% from United States, 25.4% from Taiwan, 8% from South Korea, 6.1% from Bulgaria, and 32.3% from Germany. The ages of the participants included 34.2% 18-21 years old, 37.5% 22-24 years old, 12.6% 25-27 years old, 6.5% 28-30 years old, 4.4% 31-35 years old, 2.5% 36-39 years old, and 2.3% over 40 years old. After institutional review board approval, participants were recruited at the institutional level using a convenient sampling approach by country, three from Bulgaria, five from Mexico, five from Taiwan, four from Korea, four from Germany, and twelve from the United States. Participants were asked to complete online questionnaires about their demographic information, preparation to teach math, motivation to teach math, perspectives about mathematical pedagogy, and technology use.

## ANALYSIS & FINDINGS

A one-way ANOVA, and a series of simple linear regressions and mediation analyses were run using SPSS 23.0 and Hayes' PROCESS 2.16. First, a one-way ANOVA revealed differences in teaching preparation from their institutional mathematical programs across countries, such that teachers from Germany were the most prepared and teachers from Mexico were the least prepared. Second, simple linear regressions revealed that teaching preparation, teaching goals, and teacher motivation predicted technological use in mathematics or statistics courses after controlling for the demographic variables (e.g., sex, age, country). Third, teacher preparation was found to be a mediator of the relationship between teaching goals and technology use after controlling for the demographic variables. Fourth, teacher preparation was not found to be a mediator of the relationship between teaching motivation and technology use after controlling for the demographic variables.

## IMPLICATIONS & CONCLUSION

There are several implications that can be derived from this study for future educators of business math and statistics courses. First, this study found that future educators are not equally prepared to teach math across countries based upon evidence from their educator preparation programs. Given this finding, EPP's may need to assess the quality and effectiveness of their program, specifically Mexico and South Korea. Second, teaching preparation, teaching goals, and teacher motivation predicted effective technological use in math or statistics courses. Since the use of technology has become essential in education, it is valuable to invest in focusing on candidate's preparation and ability to use technology. It is also imperative to encourage future teachers to incorporate quality technology lessons for each of their math-based courses, and maintain their motivation to teach effectively through self-reflection and goal-setting rituals. Administrators may also support aspiring teachers by developing goal-based, motivation, technology workshops and webinars to enhance their teachers' technology teaching competence. Overall, the findings of this study can benefit current and future educators of business math and statistics courses.

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