National Survey of Technology Integration Preparation in Teacher Education Programs: Characteristics of Science, Mathematics, English / Language Arts and Educational Technology Teacher Educators

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This proposed presentation will summarize the participant characteristics of a national survey of 853 pre-service teachers at 550 different institutions across the 50 US states. The purpose of the survey was to understand the state and direction of technology integration preparation in accredited teacher preparation programs. The study focused on teacher preparation faculty within the three common core areas of Science (31.7% of participants), Mathematics (36.25 of participants), English/Language Arts (28.2% of participants), in addition to Educational Technology (i.e., teacher educators who prepare teachers across multiple content areas to integrate technology) (26.4% of participants). The survey included three major areas: 1) the background and views of the participants, 2) the characteristics of the programs in which they taught, and 3) the participants' perceptions of the pre-service teachers in their programs. Figure 1 below represents the locations of the participants in the study.

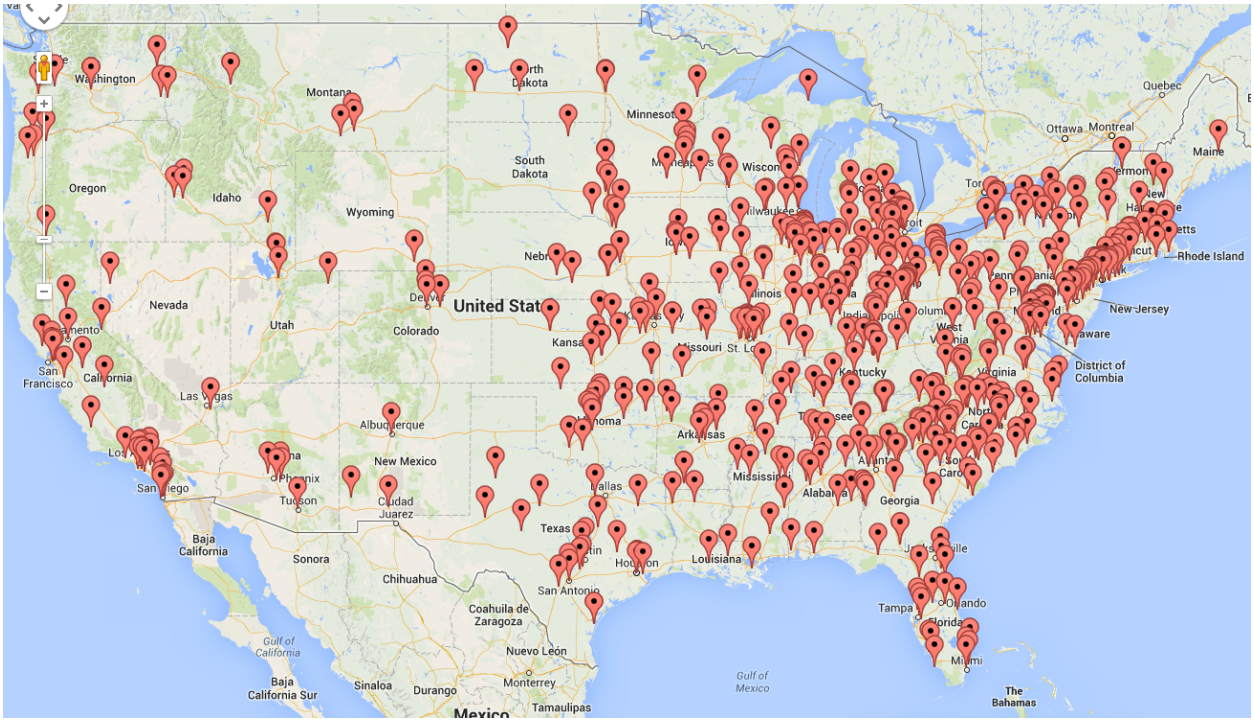

Figure 1: Location of Study Participants

The questions in the study were grounded in the Technological Pedagogical Content Knowledge (TPACK) model of technology integration. TPACK is a theoretical framework used to understand teacher knowledge as it relates to technology integration (Mishra & Koehler, 2006). In essence, TPACK addresses three types of knowledge needed to fully integrate technology into the classroom: pedagogy, content, and technology. In this framework, it is the intersection of pedagogical, content, and technological knowledge that provides the most meaningful technology incorporation within the classroom. Since its emergence in 2006, there have been more than 200 peer-reviewed articles and a dozen doctoral dissertations (Wu, 2013) that have looked at different aspects of TPACK; yet, despite the popularity of the framework, "a significant percentage of these proposals do not fully reflect best practices related to TPACK" (Dilworth et al., 2012, p. 131).

Research shows gaps between what preservice teachers are taught in their programs and how teachers use technology in real classroom settings (Tondeur et al., 2012). Indeed, "if the teacher education faculty members who prepare future teacher do not fully understand the practical implication of this framework, there is little chance that tomorrow's teachers will be

able to employ technology effectively" (Dilworth et al., 2012, p. 130). This study therefore was motivated by a desire to provide an updated and representative analysis of the current state of technology integration in teacher education programs from the perspective of teacher educators. This proposed presentation will focus on one of the three major areas of the study, the characteristics of the participants including their views about educational technology, their teaching backgrounds, and the degree to which they integrate TPACK principles into their teaching.

Methods

This study targeted institutions that possessed some combination of NCATE, TEAC, and CAEP accreditation. Focusing on these institutions provided a way to assure a certain degree of uniformity across programs and thus allow a better basis for comparisons across institutions and across the entire dataset. Using a list of institutions provided by these three accreditation agencies, participants for this study were identified using information found on each university website, calling the university, and emailing relevant personnel (e.g., program coordinators, program chairs, etc.) at each institution. Contact information including name and email address were collected for up to four (4) teacher educators at each institution who were in four target content areas – Mathematics Education, Science Education, English / Language Arts, and Educational Technology. Mathematics, Science, and English/Language Arts are all subjects addressed by common core standards. Because common core standards are being adopted by a large number of states (approximately 43)[1] and are relatively recent they provided more common ground with which to compare programs and look across the dataset. Educational Technology faculty were selected because many programs still utilize stand alone technology integration courses taught by Educational Technology faculty (Tonduer et al., 2012). The online survey used a branching logic so that participants were only asked questions related to the content areas in which they taught.

[1] http://www.academicbenchmarks.com/common-core-state-adoption-map/

Approximately 2600 individuals were solicited to take the online survey. The solicitation included an incentive to complete the survey – entry into a drawing with a 1 in 30 chance of winning a $50 Amazon gift certificate. The protocol for the administration of the survey followed Dillman's Tailored Design Method (Dillman, Smyth, & Christian, 2008). Participants were sent an introductory email before receiving the link to the survey. Two follow-up emails were sent to all individuals who did not complete the survey. The survey was administered in two rounds between April and June, 2014. The 853 participants who responded yielded a 32% response rate and represented over 50% of the accredited teacher educator programs in the US.

This survey borrowed from a validated instrument developed to measure preservice teachers' self-assessment of their TPACK knowledge (Schmidt et al., 2009). In addition, the survey asked about preservice teacher preparation practices in online, hybrid and bricks-and-mortar classroom environments. Previous researchers have used the survey method to analyze the state of virtual school preservice teacher education (Kennedy & Archambault, 2012) and preservice teacher knowledge as it develops throughout the teacher education program (Chai, Hwee, Koh, & Tsai, 2010; Hofer & Grandgenett, 2012). This study focused on faculty members' perspectives on their teacher education programs. Compared to pre-service teachers, less TPACK research has looked at teacher educators.

Findings

The 853 participants were divided across the following content areas: Science Education: (31.7 %), Mathematics Education (36.2%), English / Language Arts: (28.6) Educational Technology: (26.4%). Eighty (80) participants (10.4)%, mostly educational technology teacher educators, had never been a classroom teacher. Before becoming teacher educators, participants spent, on average, 10.6 years as K12 classroom teachers while averaging 16.4 years as teacher educators. They held the following positions at their institution:

	Frequency	Frequency
Tenure-track Faculty	608	71.3%
Non-Tenure Track faculty	25	3%
Instructor	42	4.9%
Clinical Faculty	25	2.9%
Visiting Faculty	3	.4%
Program Coordinator	43	5.2%
Graduate Teacher Education Coordinator	9	1.1%
Undergraduate Teacher Education Coordinator	14	1.7%
Adjunct Faculty	37	4.5%
Other	48	5.8%
Total	853	

Table 1: Positions held by participants

Participants reported the following number of Undergraduate and Graduate students who attended their institution as of the 2013- 2014 academic year?

	Frequency	Percent
Under 1,000	25	3.1%
1,000 – 9,999	426	52.8%
10,000 – 19,999	185	22.9%
20,000 – 29,999	92	11.4%
30,000 – 39,999	38	4.7%
40,000 - 49,999	20	2.5%
50,000 – 59,999	10	1.2%
60,000 – 69,999	5	.6%
70,000+	6	.7%

Table 2: Size of participants' schools

Answering a number of questions from a modified version of the TPACK assessment, participants reported their opinions about their competencies within each of the three aspects of the TPACK model (Technological Knowledge, Pedagogical Knowledge, and Content Knowledge) and their intersections. When asked if they integrate TPACK concepts into how they prepare students, 37.5% answered 'Yes', 30.6% answered 'No' and 27.9% didn't know. The finding that almost 60% of the participants either did not integrate TPACK concepts into their teacher preparation practice or were not familiar with the TPACK model was significant.

Nevertheless, because the participants answered a number of questions related to TPACK, it was still possible to form a sense of the participants' perspectives on each element of the model. Beginning with technological knowledge (TK) the participants expressed a fairly high degree of confidence in their technical skills as shown in Table 3.

	Somewhat Agree	Agree	Strongly Agree
I have the technical skills I need to use technology.	14.9%	44.4%	36.9%
I have the technical skills I need to use technology.	15.7%	40.4%	40.4%
I keep up with important new technologies.	27.5%	38.0%	28.2%
I frequently experiment with technology.	23.8%	32.1%	31.6%
I know how to solve my own technical problems	32%	30.9%	22.0%

Table 3: Answers to technical knowledge (TK) related questions

While there is not enough space here to report on the specifics of the findings, the paper will summarize the participants' rating of the importance of the following skills and technologies in relationship to pre-service teachers preparedness to integrate technology:

- Video Production
- Digital Audio Production
- Digital Citizenship
- Online Research Skills
- Presentation Software

- Spreadsheets
- Word Processing Software
- Computer Troubleshooting
- Mobile Device Operation (e.g. cell phones and tablets)
- Using Social Media in a Professional Manner
- Familiar with Intellectual Property Issues (e.g., Fair Use)
- Use a Course / Learning Management System (e.g., Blackboard)
- Send / Receive Email Attachments
- Basic Web Operations (i.e., surfing, bookmaking web sites)
- Ability to Play Audio and Video File

Participants placed a high value on basic computer skills including online research skills, office applications, and web skills, but slightly less importance was assigned to skills including using a course / learning management system, using social media in a professional manner, and mobile learning device operation. Data related to the participants perceptions of their pre-service teachers literacies and technology ownership will be presented in relationship to the data on how the participants valued different technical skills.

Because the participants were both veteran K12 teaches (average of over 10 years of time in the classroom before becoming teacher educators) and long-time teacher educators (average of over 16 years of experience as teacher educators), the participants expressed a high degree of confidence in their content knowledge (CK) and pedagogical knowledge (PK). In a question related to content knowledge at least 85% of the participants rated their content knowledge at 8.1 or higher on a 10- point scale, while answering a question related to pedagogical knowledge at least 85% of participants rated it at 8.4 or higher on a ten point scale. This confidence did not always carry over when it related to the common core standards. Questions about the common core standards indicted that many teacher educators in the study were still learning how to adapt their content and pedagogical knowledge to the new standards. Some of this had to do with the staggered way that the common core standards are being introduced (ELA first, Math second, and Science just being adopted).

The complete paper will look more closely at the intersections of the three aspects of TPACK. These intersections will include TPK (Technological Pedagogical Knowledge) and

TPACK (Technological Pedagogical Content Knowledge). Preliminary analysis of open-ended questions related to these intersections indicates a number of factors that both influence participants' knowledge and how that knowledge is translated to programmatic decisions in regards to integrating TPACK and TPK principles. For example, while 59.4% of participants reported that technology is integrated across the curriculum in the programs in which they teach, 60.1% indicated that their programs still utilize a stand-alone technology course. To help explain this, answers to some of the open-ended questions show that a number of participants are working towards better integration of technology within methods and content courses, a process that many programs find challenging (Foulger, Buss, Wetzel, & Lindsey, 2012).

Implications

The results of this research will give teacher educators and policy makers a national picture of how teachers are being prepared to integrate technology into their teaching. Specifically, this presentation would be of value to anyone who is interested in how the characteristics and attitudes of teacher educator across the country are approaching the training of teachers to integrate technology. By situating the results within the TPACK model, attendees will have a consistent framework to understand the results. While the presentation will focus on the characteristics of the participants, other aspects of the study will be integrated into this presentation including the participants' perceptions of their students and future plans for their programs when they help to explain some of the results related to participant characteristics.

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