PREPARING SPECIAL EDUCATION TEACHERS TO USE EDUCATIONAL TECHNOLOGY TO ENHANCE STUDENT LEARNING

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ABSTRACT

New standards require teachers to integrate the use of technology in their teaching and preparing teachers at the preservice level to integrate technology into the classroom is key. The way in which this is accomplished varies across institutions though often a technology tools course stands as an individual course with the hope professors are modeling the use of technology in their own teaching. In this paper we describe a process of integrating technology knowledge, pedagogical knowledge and content knowledge within a block one course in a special education teacher preparation program. In addition, we use a pre/post and follow-up survey to assess the change in perceptions and use of technology surrounding the course and at the end of the 5-semester program upon completion of student teaching in real world classrooms. Results show teacher candidates report learning about educational technology tools and the integration into their teaching as important and necessary. Learning about and using educational technology integration had statistically significant positive impact on their teaching as well as enhancing the engagement of k-12 students. Specifically, proficiency with Smart board and Movie Maker was positively impacted by the knowledge and skills they developed from the course. The importance of collaboration between teacher preparation programs and field experiences in ensuring the appropriate use of educational technology for learning is emphasized.

KEYWORDS

Educational Technology, Special Education, Teacher Preparation.

1. INTRODUCTION

Successful technology integration into pedagogy can improve student learning (Wright & Wilson, 2012; Gupta & Fisher, 2012). Relevant studies concluded that using technology in educational settings benefits student learning in k-12 environments (Gülbahar, 2007; Kim & Hannafin, 2011 in Liu, S-H. 2011). Effective technology integration happens across the curriculum in ways that deepen and enhance the learning process. In particular, technology integration must support four key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to content and real-world experts. Technology should be implemented in the classroom only if its role in a given instruction is determined along with pedagogical issues related to a given instructional task (Okojie et al, 2006). This also helps to define active learning. Specifically, active learning includes hands-on tasks and authentic activities that include experiential learning, collaborative learning, context-based learning, and computer-based learning. Authentic learning values learner-centeredness; the learning tasks revolve around learning experiences that are connected to real-world situations. Students should be encouraged to work with information to derive meaning and understanding, form new mental representations of the material, and construct and reconstruct new knowledge based on their experiences (Keengwe, & Georgina, 2013). Effective technology integration is achieved when the use of technology is routine and transparent and when technology supports curricular goals.

The move from traditional education courses and programs towards technologically enhanced traditional classrooms and pedagogies has been slow. The result of this slow movement seems to suggest that while low level use of technologically enhanced pedagogy is wide-spread, high-level use is more sporadic (Georgina & Olson, 2008). Even with the slow adoption recent research is finding that technology integration strategies can be associated with gamification and game-based learning practices in Math and Science (Luminea, 2013). Preparing teachers at the preservice level to integrate technology into the classroom is needed to stimulate this change and must become an increasing focus for teacher education programs (Chai, Koh & Tsai, 2010). The way in which this is accomplished currently varies across institutions though often a technology tools course stands as an individual course with the hope professors are modeling the use of technology in their own teaching. Although new teachers report higher levels of comfort with technology; more experienced teachers report using technology more often in the classroom when delivering instruction or having students engage in learning activities (Russell, O'Dwyer, Bebell, & Tao, 2003). Findings such as this motivated the development of a course that integrated instruction of educational technologies with special education content: SPED 401.

In this paper we describe a process of integrating technology knowledge, pedagogical knowledge and content knowledge within a block one course in a special education teacher preparation program. While our research addresses four questions described later, we focus on one in this paper: 1) What impact does participating in SPED 401 (*special education course that integrated educational technology)* have on teacher candidates' perceptions of proficiency with hardware and software immediately following the course and two years later? We use a pre/post survey to assess the change in perceptions and use of technology surrounding the course as well as at the end of the 5-semester program after student teaching in real world classrooms. Keengwe and Georgina (2009) noted that simply using technology does nothing to enhance pedagogy; rather than viewing technology as merely a tool for delivery, it should be seen as a means to improve learning. Supporting this view our early results indicate teacher candidates report learning technology skills that both enhance presentation of material and facilitate student learning in the classroom.

1.1 Technology Integration

Technology integration is the implementation of technology during teaching. Technological Pedagogical and Content Knowledge (TPACK) model is used by teachers, instructional designers, and instructors to facilitate the determination of learning strategies which align and integrate technologies with content-based objectives. TPACK framework has five progressive stages which serves to guide teachers through integration practices. These five stages include recognizing technology, accepting technology, adapting lesson delivery and assessment methods, exploring and implementing technology, and advancing and reflecting on technology implementation and lesson content (Niess, Ronau, Shafer, Driskell, Harper Johnston, & Kersaint, 2009) According to Niess et al., the model is used for examining the interrelatedness of content knowledge, pedagogical knowledge, and technological knowledge (2009). The TPACK model approach encompasses many different philosophies and styles of teaching (Mishra & Koehler, 2009). The TPACK framework is usually illustrated by a Venn diagram which reveals the intersections of technological knowledge, content knowledge and pedagogical knowledge. It is the overlap of the three types of knowledge that allows for the efficacious integration of technology into pedagogy (Graham, Borup, & Smith, 2011). A transformative affect occurs, increasing the integration of technology into pedagogy, as teachers move from one TPACK level through the next (Puentedura, 2013).

In our knowledge-based education system and professional society, 21st century skills are essential (Trilling & Fadel, 2009).

In SPED 401, special education teacher candidates learn technology skill-based approaches to lesson plan development. For example, these approaches include personal learning mobile devices like iPads, which accentuate collaboration and personalization in classrooms (Manuguerra & Petocz, 2011). Technology tools already enhance and support learning for special needs students (screen readers, magnify, speech to text…). TPACK framework outlines a process for selecting and integrating technology into specific content. Knowledge of this process is needed by special education teachers of the 21st Century.

1.2 Teaching Technology Integration in Preservice Teacher Preparation Programs

The National Council for Accreditation of Teacher Education (NCATE) developed the National Education Technology Standards for Teachers (2008); these standards require that teachers use technology in their classrooms, and design learning environments and experiences that support teaching, learning, and curricula (Liu, 2011). The standards have also led teacher education institutions to acknowledge the need for teacher preparation to ensure new teachers know how to use technology as an effective instructional tool. Liu (2011) and others indicate that teacher education institutes are natural places for training teachers how to integrate technology into daily classroom learning. Liu (2011) states that empirical evidence indicates that teacher education programs have not taught new teachers how to use technology effectively; that is, preservice teachers still lack the ability and knowledge needed to teach successfully with technology (Angeli, & Valanides, 2008 in Liu, 2011).This finding coincides with the U.S. Department of Education's *Blueprint for Success*, which states the need for schools and districts to optimize the use of technology, recognizing educational Success, professional excellence, and collaborative teaching (2013).

Chen, R-J (2010) found preservice teachers' self-efficacy of teaching with technology had the strongest influence on technology use, which was mediated by their perceived value of teaching and learning with technology. School's contextual factors had moderate influence on technology use. Moreover, the effect of preservice teachers' training on student-centered technology use was mediated by both perceived value and self-efficacy of technology. It is essential for teachers to see the value of educational technology and build their competence to use technology effectively. Teacher educators need to reconsider their training approaches in order to cultivate positive attitudes towards education technology and develop preservice teachers' competence in using educational technology for teaching and learning.

When preservice special education teachers are trained in technology skill development, there is a direct alignment with their delivery of content which impacts student learning outcomes (Ferreira, Baptista, & Arroio, 2013). Long (2013) suggests that the students should work directly with both the subject content and the technology tools and platforms in order to ensure a more comprehensive understanding of ideas, concepts, and practices. Teacher pedagogical beliefs are important when exploring technology integration. These beliefs play a critical role in successful technology integration (Ertmer, 2005; Hermans, et al., 2008; Tondeur, van Keer, van Braak, & Valcke, 2008). Beliefs about teaching can be called "preferred ways of teaching" (Teo, Chai, Hung, & Lee, 2008). Technology integration is the implementation of technology during teaching. Therefore, beliefs of preservice teachers about technology integration potentially influence their teaching methods when using technology.

Teaching preservice teachers how to critically analyze their beliefs about technology use in classrooms influences their technology integration practices (Valcke, Sang, Rots & Hermans, 2010); that is, the pedagogical beliefs of preservice teacher directly predict their technology integration during practice teaching (Sang, Valcke, van Braak, & Tondeur, 2010. In addition, literature reveals that teacher education courses may shape pedagogical beliefs of preservice teachers and enhance their technology skills, rather than the ability to integrate technology while teaching. As a result, teacher education courses shape preservice teacher beliefs and, further, beliefs are predictive of technology integration and worthy of exploration.

2. METHODS

2.1 Participants

The participants in this study included teacher candidates participating in a teacher preparation program designed to prepared special education teachers for a new license in the state of Minnesota. As part of the program, teacher candidates were enrolled in a newly designed course intended to integrate an introduction to special education, individual education programs, working with school personnel and learning about educational technology and how to integrate it into their teaching. There were twenty-five students in the cohort beginning January 2012; 22 participated in the pre-course survey, 24 in the post-course survey and 15 in the survey at the end of the program. Eighty-seven percent of the participants were female.

2.2 Procedures

SPED 401: Individual Education Program (IEP) Writing and Professional Practice is a blended course including face-to-face, computer lab sessions enhanced with online activities and discussions. The course was developed in alignment with Minnesota Board of Teaching (BOT) standards. Eighteen standards from three groups were included: Core Special Education, Academic and Behavioral Strategist and Standards of Effective Practice. The course is included in the first semester (Block 1) of the preparation program for students who want to become licensed in Minnesota's new cross-categorical area, Academic and Behavioral Strategist (ABS). The ABS program prepares new special education teachers to work with students with mild/moderate learning disabilities, emotional/behavioral disorders, developmental disabilities and autism spectrum disorders. SPED 401 was developed using face-to-face, computer lab and online components and covers a variety of special education related topics while building in the knowledge, and use, of educational technology as a tool to enhance and support curriculum. This reinforces the promise the today's teachers must have the 21st Century skills needed to integrate technology into their teaching throughout their lessons. SPED 401 introduces teacher candidates to these concepts and practices, as well as, provides them with the foundational skills to do so. New tools were introduced and time was provided throughout the duration of the course for practice and support of how to use the tool in pedagogy.

In an effort to address our research questions we provide teacher candidates with a pre-test to assess their perception of their own proficiency with hardware (e.g., Smart board, digital cameras, etc.) and software and uses of software (e.g., Movie Maker, PowerPoint, image capture software, etc.). In addition the survey addressed perceptions of the extent to which technology contributes to student learning and more. Our longitudinal study addresses the following four research questions: 1) What impact does participating in SPED 401 (*special education course that integrated educational technology)* have on teacher candidates' perceptions of proficiency with hardware and software immediately following the course and two years later?; 2) How do teacher candidates report their knowledge and skills related to educational technology impact their teaching?; 3) What relationship exists between how teacher candidates perceive technology influences their teaching and their proficiency with educational technology tools?; and 4) To what extent do teacher candidates perceive k-12 student engagement is enhanced due to the integration of technology into teaching and learning? This paper will mostly focus on question one: What impact does participating in SPED 401 (*special education course that integrated educational technology)* have on teacher candidates' perceptions of proficiency with hardware and software immediately following the course? Our initial time frame is two years after the SPED 401 course.

3. RESULTS

3.1 Description of Data Analysis

The sample population (N) was small (N=15-22 teacher candidates) so the statistical tests used to examine differences had to be appropriate for the sample; therefore, a chi-square test was used to complete the statistics for the data set. The chi-square test is used to determine whether there is a significant difference between the expected frequencies and the observed frequencies in one or more categories using a chi-square value of less than .05. The data set used had numerical data comprised through Likert scale responses. Means for a subset of the items are shown in Table 1 (Hardware) and Table 2 (Software) for the pre-test (survey done before the course), post-test (survey done after the course) and follow-up (survey done at the end of the program at the completion of student teaching). The chi-square analysis compared counts of categorical responses between two independent groups. First a brief overview is provided for each research question and then the remainder of the paper and discussion focuses on research question 1.

In examining the initial findings, the data concluded that there was a significant change in students' proficiency with camera usage between the pre-test and post-test, which addresses research question 1. The chi-square analysis showed positive significance in the extent to which students believe technology skills influence their learning when comparing results before the course and after their student teaching, which addresses research question 2. Further, a T-test was conducted evaluating questions within the follow-up survey questionnaire to address research questions 3 and 4.

This statistical measure was used to determine if there was a correlation between responses within the final survey given. The responses resulted in significance in student perspective that technology positively impacted teaching. Specifically, proficiency with Smart Board and moviemaker was positively impacted by the knowledge and skills they developed from the course. Finally, the perception that the skills they learned through SPED 401 enhanced student engagement from the integration of technology was statistically significant. The results found through the T-test show that the SPED 401 course had a positive influence in different areas of proficiency when integrating technology into the classroom. Further examination of the analyses will add meaning.

Table 1. Perceptions of proficiency with hardware – Pre-test, post-test and follow-up

Hardware	Pre-Test *N=22*	Post-Test *N=24*	Follow-up *N=15*
Portable e-devices	3.64	3.79	4.33
Smartboard	2.45	4.00	3.80
Digital Camera	4.27	4.25	4.33
Cell Phone	4.73	4.79	4.73

Note. The ratings are based on a 5-point Likert scale with 5 the highest.

Table 2. Perceptions of proficiency with software – Pre-test, post-test and follow-up

Software	Pre-Test *N=22*	Post-Test *N=24*	Follow-up *N=15*
Online searches	4.38	4.33	4.33
Movie Maker	2.24	3.63	3.14
PowerPoint	4.23	4.63	4.70
Image Capture	2.41	3.79	3.70
Digital Information Transfer	2.64	3.71	3.50
Desire to Learn (D2L)	4.55	4.67	4.86
Facebook	4.63	4.71	4.64
Hypertext Linking	2.14	3.08	3.21
Twitter	2.91	3.17	3.50

Note. The ratings are based on a 5-point Likert scale with 5 the highest.

In addition to the survey, formative and summative assessments were used to assess the technology and special education content learning of preservice teachers (teacher candidates) throughout the course. Formative assessments took place throughout the course using discussion groups, individual assignments, papers, and technology infused student products. In addition to assessments of student special education content learning where all students achieved 90% or higher, summative assessment came from comparative analysis of the pre and post student technology surveys. The technology survey contains four sections: Student demographics, Technology Training, Technology Skills & Usage, and Learning Preferences. It was clear teacher candidates were in favor of requiring teachers to take a technology related course. The three outcomes reported most often by the teacher candidates through the content analysis of the post-test survey suggested that teacher candidates (a) learned strategies to enhance the presentation of material to k-12 students, b) learned more about ways to use technology in the classroom for teaching, and c) enhanced their skills at recognizing and using the technology tools available to them. Analysis of the narrative responses to the open ended questions on the follow-up survey has yet to occur.

4. DISCUSSION

While additional analysis is needed with the follow-up survey completed, it is clear that teacher candidates perceive the importance of learning about educational technology tools and the integration into their teaching as important and necessary. They reported that learning about and using educational technology integration had statistically significant positive impact on their teaching as well as enhancing the engagement of k-12 students. Specifically, proficiency with Smart Board and moviemaker was positively impacted by the knowledge and skills they developed from the course. Hybrid, blended, and online course designs, along with motivational impetus for personalized learning mark other pedagogical approaches which need to be studied.

There are important implications for teacher preparation to include close collaboration between teacher education programs and field experience, focusing on specific technology uses. In support of the work of Lue (2011) and Kajder (2005) when teacher candidates were asked to reflect on the use of technology in the k-12 classrooms they visited for their field experience, their individual reflections varied according to the mentor teachers they witnessed. For example, when asked how iPads were used to enhance student learning some teacher candidates indicated they were used to motivate students. Specifically, if a child completed an assignment, he or she was told he or she could use the iPad. However, in another classroom, that "motivation" was probably still true and the use of the iPad included a specific application intended to reinforce earlier instruction. These are both valuable but very different uses of technology for learning. It is clear teacher candidates must learn how to integrate the use of instructional technology in their teaching and it must begin in their preservice programs, and following the TPACK model of technology integration as the intersection of technological knowledge, content knowledge and pedagogical knowledge seems an appropriate and effective strategy. As suggested by Graham, Borup, & Smith (2011) it is the overlap of the three types of knowledge that allows for the efficacious integration of technology into pedagogy, which is the goal.

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