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Abstract

This exploratory case study examined teacher education faculty and pre-service teacher's perceptions of incorporating online professional development materials into academic coursework. Three institutions in the U.S. participated in a study to explore the incorporation of professional development materials, specifically online instructional modules, within programs in their Colleges of Education. Findings from faculty members indicated positive perceptions of the incorporating of the materials. The pre-service teachers reported their 21st-century knowledge, skills, and preparation for integration of technology in their teaching were enhanced through the completion of the online professional development materials.

Keywords: Teacher Preparation, Teacher Professional Development Materials, Technology Integration, Online Learning

Introduction

The challenges facing colleges of education to build capacity for technology integration and implementation of programs for 21st century knowledge and skills for teacher candidates are formidable. In times of changing standards, such as the Common Core Standards (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010), colleges of education are being called upon to transform their programs to better prepare pre-service teachers for 21st century classrooms. While many colleges of education have begun a transformation process, many faculty members are still struggling to embed technology integration into their teacher preparation coursework. The inclusion of online professional development (PD) into coursework may be one strategy to aid technology integration for teacher preparation programs that could serve both faculty and pre-service teachers.

Purpose, Rationale, and Research Questions

The purpose of this exploratory case study (Yin, 2009) was to examine education faculty and pre-service teachers' perceptions of incorporating existing online PD materials into coursework. The rationale for this study was to identify and document faulty perceptions of incorporating the online Intel Teach Elements PD materials into coursework and prepare recommendations for future use. Further, it was to gain an understanding of pre-service teacher's perceptions of online PD within their coursework. The research questions that guided this study were:

1. What are teacher education faculty perceptions of incorporating online Teach Elements PD materials into coursework?

2. What are pre-service teacher's perceptions of the online Teach Elements PD materials in their coursework?

3. What are teacher education faculty members' recommendations for future use of incorporating online Teach Elements PD in teacher preparation coursework?

Literature Review

Technology in classrooms is different today than it was even five years ago. Technology knowledge and skills are necessary for both teachers and students; keeping current is difficult. Specifically, rapid advances in technology present ongoing challenges for teacher preparation programs and teacher education faculty. Education standards reflect a shift in skill set with the inclusion of 21st century skills as reflected in Common Core State Standards framework (Common Core State Standards Initiative, 2010). Additionally, the International Technology Society for Technology in Education (ISTE) Standards for Teachers (2008) continue to emphasize the need for technology competencies among teachers. All of these standards are often foundational components of teacher education programs.

Frameworks and Standards for Educator Preparation

The Partnership for 21st Century Skills (2011) created a framework that defines the specific digital skills necessary for students. These readiness skills are divided into four areas: life and career skills; learning and innovation skills; information, media, and technology skills; and key subjects and 21st century themes. Examining each area in more depth reveals that these skills focus on "the ability to navigate the complex life and work environments" (p. 2) of a globally competitive society.

The Interstate Teacher Assessment and Support Consortium (InTASC) outlines a set of core teaching standards for pre-service teachers regarding what they should know and do to

prepare K-12 students for advanced study or the workforce. These measures are not specifically about technology, but instead are employed for evaluation.

However, the ISTE Standards for Teachers (2008) focus on supporting learning with technology to prepare students to work in a digital and global society that is experiencing increased connectedness (ISTE, 2014). With these standards, there was a shift from 'how to use to what the advantages' or value of technology might be for learning. The attention was on supporting learning with technology. The preparation of pre-service teachers includes understanding and demonstrating these standards throughout their coursework and in student teaching. The five 2008 ISTE Standards for Teachers included:

1. Facilitate and Inspire Student Learning and Creativity;
2. Design and Develop Digital-Age Learning Experiences and Assessments;
3. Model Digital-Age Work and Learning;
4. Promote and Model Digital Citizenship and Responsibility; and
5. Engage in Professional Growth and Leadership. (pp.1-2)

Online and Blended Learning

In support of ubiquitous learning, pre-service teachers should gain experience through blended and online learning during their academic program as a matter of course. Many residential teacher programs offer online courses as an option, yet often at an increased cost for the convenience. Preparing pre-service teachers ought to include learning experiences online to model sound instructional design and allow them to gain perspectives as an online learner.

As we know, online learning and blended learning has transformed the traditional classroom environment and made learning ubiquitous (Allen, Seaman, Poulin & Straut, 2016). Online learning refers to mode of delivery that is readily available through a website, Learner

Management System (LMS), or other digital system. Online learning typically is completed as an individual with some opportunities to interact and collaborate with a community of learners.

One issue with online learning is the isolation that frequently occurs, due to the lack of physical interactions with other students. Blended learning addresses the participants' needs to interact with one another in a traditional learning environment. Based on recent research, the inclusion of a blended learning model promotes social interaction and collaborative learning among individuals. The blended learning approach may be facilitated by faculty who wish to include an online component to an otherwise face-to-face course. As a mode of delivery or a supplement to traditional face-to-face instruction, pre-service teachers should engage in blended education and online models of instruction (Beglau et al., 2011).

A blended model of instruction includes teaching strategies delivered through online and face-to-face modes, typically through an LMS such as Blackboard or Moodle (Tallent-Runnels et al., 2006). The use of an LMS allows faculty to organize and sequence instruction in logical ways, while permitting users to interact with content and other students as they reflect on their experiences within the course (Mullinix & McCurry, 2003). With this body of evidence, it is imperative that colleges of education commit to offering online and blended experiences to their pre-service teachers. This will ensure new teachers know how to effectively create and deliver online courses and blended instruction to their future K-12 learners.

Professional development is an ongoing concern related to technology integration. Since technology changes rapidly, it is imperative that K-12 educators remain current in the field to prepare students. Implementing online professional development options, such as the Intel Teach Elements, provide teacher educators with established and innovative curriculum. In

addition, pre-service teachers are exposed to well-established content and experience online and blended instruction.

The Online Professional Development Curriculum Used in the Study

The online PD materials used in this study were the Intel® Teach Elements (hereafter referred to as the Teach Elements). The Teach Elements are online, just-in-time PD courses, and are available for free to educators worldwide.

Background on the Teach Elements

Intel® has a history of providing content PD for teachers and with reduced budgets in education, this aids them in staying abreast of new developments in education and technology. Current technology skills are a perpetual challenge for teachers. Recognizing this difficulty, Intel partnered with Ed Tech Leaders Online (ETLO) for the creation of the Teach Elements PD materials to empower K-12 teacher to engage students with digital learning content. ETLO is one program of the Educational Development Center, a not-for-profit organization addressing urgent challenges in education to develop PD materials for online learning opportunities for K-12 teachers. Further, the modules content was designed in short sections, interactivity was maximized, and rich resources were provided within.

While the Teach Elements were originally developed for online use with practicing K-12 teachers, there has been some exploration toward using them in a blended learning environment within teacher preparation programs. Costa and Shand (2010) found that, during an evaluation of the Teach Elements Faculty Review, a "hands-on review of content and design" (p. 2617) of the Teach Elements, faculty members felt that they were effective and worthwhile materials for use within teacher education.

Faculty reported that their participation in the review of the Teach Elements built their capacity to use technology with the curriculum as they prepared pre-service teachers (Mishra & Koehler, 2006). Faculty in Costa and Shand's study reported they were likely to use the Teach Elements in the teacher education courses with 92% stating they would recommend the Teach Elements to their colleagues. In a related study, Todorova and Osburg (2009) stressed the use of the Teach Elements as an implementation option. Todorova and Osburg (2009), in a partnership with Intel®, found that overall, teachers were pleased with the Teach Elements courses after using them. Teachers highlighted how the use of the Teach Elements enabled them to collaborate more with other teachers; several of these groups continued after the study concluded. Todorova and Osburg (2009) also determined that teachers who were more inclined or favored e-learning had a better experience than those who favored other mediums of learning.

The technical skills of teachers who use technologies in their instruction improved, while teachers with lower technical abilities experienced more positive gains in their technical abilities. There was a slight improvement in teacher instruction and an indirect effect where students were more motivated, when engaged in tech-enhanced lessons.

Methodology

The exploratory case study (Yin, 2009) method was to examine the perceptions of teacher education faculty and pre-service teachers regarding incorporating online PD materials into academic coursework. Further, a focus on building capacity for technology integration and enhancing 21st century knowledge and skills in teacher preparation programs was explored. The constant comparative method (Glasser & Strauss, 1967) was used to analyze individual responses and coded for themes.

Participants

In this exploratory study, three institutions that were members of the American Association of Colleges of Teacher Education (AACTE) by way of the Innovation and Technology Committee commenced a study focused on integrating the Teach Elements modules into teacher preparation coursework. To ensure a diversity of institutions and geographic regions, the participating colleges of education were in the Southeast, Midwest, and West regions of the United States, respectively. There were 3 faculty members who participated in the study. The agreement for the multiple site study of the three intuitions included:

- The incorporation of a minimum of one module from a Teach Elements course in their teacher preparation coursework during an academic semester.
- The participation of a dean (or another department leader) and two faculty participants each of whom received ETLO online facilitator training.
- The commitment from one faculty participant from each institution to attend all webinars and online forums convened by AACTE and the participating institutions for collaboration. Sharing of curricula design, syllabi, tools or other artifacts related to the use of the Teach Elements modules.
- Participation in AACTE Annual Conference sessions and collaboration by sharing the findings of the evaluation and recommend next steps with AACTE and their respective colleges.

Module Selection

The faculty participants had the option of using the entire Teach Element course (5 modules) or individual modules, mixing and matching. The Teach Elements intend to empower "teachers to integrate technology effectively into their existing curriculum, focusing on their

students' problem solving, critical thinking, and collaboration, which are...the skills required in the high tech, networked society in which we live" (Intel®, 2014). The Teach Elements courses covered key areas of instruction, including: Project-Based Approaches, Assessment of 21st Century Skills, Educational Leadership, Thinking Critically with Data, Collaboration, Science Inquiry, and Designing Blended Learning. They have been provided through participating statewide entities, such as Intermediate Service Agencies, free of charge to educators (Intel®, 2014). For this study, the Teach Elements course modules were translated from their original online format into a series of files that could be incorporated into any learning management system and made available to the faculty for this study. This process facilitated the individual module selection by the study faculty and easily integrated in academic coursework.

Data Collection

Data were collected from faculty participants and pre-service teachers through multiple means as a method of triangulating the findings. Data were collected from faculty participants through two sources. The first source was a Level of Use Survey (see Table 1). The second source was a set of four open-ended reflective prompts about faculty member's integration of the Teach Elements in their courses (see Appendix A).

Data were collected from pre-service teachers about the online PD Teach Elements materials in their courses. Pre-service teacher and faculty perceptions of the Teach Elements were analyzed, along with themes that emerged during the data analysis.

Analysis

In case studies, units of analysis must be established to focus the inquiry (Yin, 2009). In this study, the units of analysis included: faculty use of the Teach Elements material in their teacher education course(s); pre-service teacher's perceptions of the Teach Elements material in

their coursework; faculty perceptions of the Teach Elements materials; and faculty recommendations for future use of incorporating Teach Elements materials in teacher preparation coursework to enhance technology integration and enriching 21st-century skills.

The constant comparative method (Glasser & Strauss, 1967) was used to analyze individual responses and then coded for themes. Two reviewers completed coding independently, compared results, and negotiated differences.

Findings

The findings and recommendations of this study focus on the faculty use of the Teach Elements, the perceptions of pre-service teachers, and the perceptions of faculty. These findings are analyzed and summarized in the following paragraphs, with specific recommendations for the future use of the Teach Elements in relation to 21st century skills.

Faculty Use of the Teach Elements

Each of the Teach Elements courses contained five modules. Faculty participants integrated the Teach Elements courses in their entirety or selected modules to augment their existing academic courses at their respective institutions. Faculty participants varied considerably in their implementation of the Teach Elements content using from one to all five Teach Elements modules, with five teacher education courses using all five modules. In total, 38 modules were used within the three institutions piloting the Teach Elements incorporation into academic coursework (see Table 1).

Faculty participants were able to integrate all Teach Elements courses, or as few as one into their education courses. The study allowed for freedom of choice of entire courses or individual modules among the faculty participants, to provide optimum flexibility for each institution to determine what was best for their programs and courses. The faculty selections are

displayed in Table 1, the number of modules varied for each faculty member at the different institutions.

Perceptions of Pre-service Teachers

The pre-service teacher responses (as analyzed by faculty) were based upon the reflective prompts. Themes emerged from the pre-service teacher perceptions of the Teach Elements courses or modules that were used in coursework.

Overall, pre-service teachers' perceptions were positive and related to content and module design. There was agreement among participants that the Teach Elements module objectives were attained. Pre-service teachers perceived that effective strategies were modeled in the Teach Elements modules and the design of the Teach Elements modules were visually appealing and easy to navigate. Furthermore, pre-service teachers remarked that the Teach Elements modules incorporated extensive and valuable content resources and included concrete, real-world classroom examples. One pre-service teacher stated, "I thought the additional resource material was very beneficial for future reference."

Pre-service teachers perceived the Teach Elements modules improved their content knowledge and increased their skill level. Learning about the 21st century skills were addressed by the pre-service teachers as valuable content. Regarding collaboration, one participant stated, "I found the modules helpful in learning new ways to teach in a collaborative environment."

Another responded that data should be presented as "thoughtful, systematic, thorough, and unbiased." Data could be used to teach critical thinking skills by analysis of data, organizing data in a logical manner, and "comparing and contrasting data from all subjects."

Another pre-service teacher commented, "That kids we will be teaching are expecting different education tools than we did when we were in school. We need to blend technology

with our traditional ways to help engage students in the classroom." Another stated, "I really understand how technology can be used to help set personal goals that are different for each student instead of class goals. This way, everyone is learning at their own pace and being challenged at their level." The pre-service teacher's perceptions provided a lens for faculty to view the Teach Elements modules in relation to content and modules' design.

Perceptions of Faculty

The faculty participants' responses analyzed by the researchers were based upon the reflective prompts. Several themes emerged, based on the faculty perceptions of the Teach Elements courses or modules from their feedback.

First, faculty members remarked that the Teach Elements modules and courses were effective resources to promote technology integration and build capacity among pre-service teachers. Second, faculty found that the Teach Elements course and module content and activities promoted 21ˢᵗ century skills, including critical thinking and reflective practices. Third, the modules and courses possessed consistent design and materials to support instruction.

Technology integration is a continuous process. Students need support and exposure to technology in a blended learning environment to understand the dynamics of online learning and instruction. Using the Teach Elements, students were able to experience blended learning. One faculty member commented that the Teach Elements were a "great way to introduce blended learning to candidates." Other faculty commented that the "[Teach Elements] seems to be the best match for advancing [pre-service] teacher knowledge and collaboration." In support of the Teach Elements content, yet another professor commented that it was an "ideal environment for integration of technology" and "we [faculty] needed to include preparing candidates to teach in online/blended environments, and the Intel® Course [Teach Elements] was a perfect fit."

The theme of promoting 21st century skills, including critical thinking and reflective practices, emerged from faculty comments and feedback. One faculty member remarked, "The thinking critically aspect offered insight into 21st century skill development, a topic that I stress in my courses." Another faculty member commented, "Enhancing technology and focusing on the needs of 21st century teachers is addressed directly in the modules." The inclusion of the Teach Elements modules was consistent with the intent of building 21st century knowledge and skills by students and faculty. Faculty all agreed that the Teach Elements courses and modules provided pre-service teachers the opportunity to experience online and blended learning in their residential programs.

Finally, a theme which emerged from faculty comments was focused on the Teach Elements content. Overall, faculty found that the Teach Elements modules and courses supported existing course goals and learning objectives. A faculty member noted the, "Content supports course goals and provides resources and examples." Another faculty noted this and commented, "[the Teach Elements] includes effective strategies, reinforcement, and modeling" and it "corresponded to the current curriculum."

Further, yet another faculty member observed, "I found the content of the module very thorough and relevant" and "I find these modules to be highly valuable to teacher preparation." The Teach Elements modules and courses were consistent with the course goals and objectives as supported by faculty comments and feedback. Faculty provided insight about the integration of the Teach Elements in future courses.

Recommendations for Practice and Future Research

Based on this study and reflection by the participating teacher education faculty, several recommendations were suggested for refining the use of the Teach Elements and next steps,

including future research. The recommendations were focused on professional development, 21st century skills, and continued use and integration of the Teach Elements.

Professional Development and Effective Instructional Design

The Teach Elements provided a model of effective instructional design and demonstrated the appropriate integration of education technology and resources. Faculty noted that the increased opportunities for them to engage in professional development was beneficial. Specifically, facilitator training by ETLO on blended and online instruction, completion of each Teach Element course, and the inclusion of meaningful reflective practice that supports instruction. The Teach Elements provided the tools and opportunities for faculty PD.

Regarding course design and the inclusion of the Teach Elements modules in coursework, the pre-service teacher's experience and skill level should be considered. At the graduate level, faculty should consider the abilities of in-service teachers who have the background knowledge to apply the content and require less scaffolding to successfully work with modules. In contrast, undergraduate students may require more scaffolding and often as they may possess limited classroom experience. Faculty may need to provide pre-service teachers with supplemental instruction and support to ensure clear comprehension of content.

21st Century Skills

The inclusion of 21st century skills and ISTE Standards for Teachers were evident in the Teach Elements modules and provided another resource to reinforce these essential skills that pre-service teachers should possess to meet the demands of teaching. The Teach Elements modules enhanced students' critical thinking and knowledge. Faculty recommended that students need numerous experiences learning in digital networks and collaborative endeavors, as well as applying concepts. The Teach Elements modules, interspersed in the face-to-face course,

provided concrete examples presented in a scenario-based format provided students to be observers of conversations exhibiting critical thinking, collaborative problem solving, and decision making. All of the aforementioned equipped students with learning experiences outside of their typical instruction.

Continued Use of the Teach Elements

Faculty unanimously expressed interest in continued use of the Teach Elements PD courses to leverage their experience and provide a blended learning opportunity for pre-service teachers. Faculty indicated that when considering the inclusion of the Teach Elements, careful and thorough review all modules and their course content for optimal placement of in their courses as essential. The faculty reported that integrating the Teach Elements modules into their coursework initially was an experience they will use to refine the placement of the modules within the course and in determining enhanced scaffolding pathways. All faculty participants expressed a strong desire to continue using the Teach Elements modules to leverage lessons learned to increase pre-service teacher preparation for 21st century teaching.

Future Research

Replication of the study with a larger sample size is recommended to determine if results would be consistent. Conducting the study at additional universities in both rural and urban settings may contribute to understanding the viability of incorporating PD materials and online learning experiences into academic coursework to improve teaching and learning. Further, the revised ISTE Standards for Educators released in June 2017 identify key areas of impact and research of the Teach Elements incorporation into coursework with the new standards needs to be explored.

Discussion

Faculty and students' perceptions of incorporating the Teach Elements, overall, were positive. The pre-service teacher's perceptions were positive about the Teach Elements content of critical thinking, collaboration, 21st century skills, design, and the resources included. For pre-service teachers who had not taken an online or blended course, this provided an introduction and experience for them.

All faculty participants indicated that the Teach Elements modules or courses used enhanced teacher preparation programs at their respective universities. The Teach Elements modules and courses appeared to provide experiences in a blended learning environment, while modeling best practices in teacher education preparation. The use of sound instructionally designed modules and the ability to select individual modules for integration into a course helped in a move toward a blended and online instructional delivery method that otherwise may not have occurred. Further, faculty who had not taught in a blended or online environment gained valuable perspectives and experience, which will enable them to leverage their new expertise to move forward in expanding offering for students.

Acknowledgements

Author Biographies

Dr. Smart is a faculty member in the Department of Teaching, Leadership, and Professional Practice at the University of North Dakota. She is a tenured professor with over twenty-five years of experience as a university administrator in faculty development and as a

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Dr. Gautreau currently is the Director of the Instructional Design and Technology Master of Science Program at CSU Fullerton. She is a tenured professor with over twenty years of experience as an educator. Her research focuses primarily on instructional design and technology related resources.

Dr. Thomas is a Professor and Associate Dean of Accreditation and Assessment in the College of Education at Brenau University located in Gainesville, Georgia. She is currently a member of the Board of Directors of the Georgia Educational Technology Consortium. In her current role, she is focused on working with faculty and P-12 teachers to integrate technology into the learning process and implement effective online teaching strategies in higher education.

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Table 1: Level of Use Survey Results

Institution	Teach Elements Course	Number of Modules Implemented
Southeast	Assessment in 21st Century Classrooms	5[a]
	Thinking Critically with Data	1
	Collaboration in the Digital Classroom	5 [a]
West	Designing Blended Learning	4
	Thinking Critically with Data	3
	Assessment in 21st Century Classrooms	1
Midwest	Collaboration in the Digital Classroom	5 [a]
	Assessment in 21st Century Classrooms	5 [a]
	Designing Blended Learning	4
	Project-Based Approaches	5 [a]

[a] There were five modules in each of the Teach Element online PD courses.

Table 2. Thematic Analysis of Pre-Service Teacher Perceptions

Categories	Themes
Content	Pre-service teachers perceived the module objectives were clear and attained in the modules Effective instructional strategies were modeled Concrete, real-world examples were provided that were useful Materials were easy to navigate and visually appealing The content enhanced their knowledge and instructional planning practices
Collaboration	Collaborative environments and learning additional ways to accomplish learning will be helpful to them as new teachers Collaboration is a method to share with others to meet the needs of students and their expectations of technology
21-Century Skills	Improved their understandings of 21st century skills Learning more about 21st century skills was valued

Table 3. Thematic Analysis of Faculty Perceptions

Categories	Themes
Course and Module Content	Scenario-based learning which promotes critical thinking
	Consistent design in courses and modules
	Supports existing education course goals and objectives
	Illustrated the benefits of collaboration
	Build capacity for 21-centry skill and technology integration
Promotion of 21-Century Skills	Critical thinking
	Reflective practice
	Problem solving
Design, Delivery Method & Accessibility	Provided blended and online learning experience
	Introduction of professional development available
	Future resource for pre-service teachers
	Model for solid instructional design
	Available any-time anywhere for just-in-time learning

Appendix A

Open-Ended Reflective Prompts for Education Faculty

1. Which Teach Elements courses/modules were used by faculty and in what teacher education courses?
2. How did faculty perceive the utility of the Teach Elements courses?
   a. How did instructors customize the Teach Elements courses/modules to fit their goals within their coursework?
   b. What changes did faculty need to make to make it work?
3. What were the results in terms of the Teach Elements incorporation to promote technology integration and build capacity among pre-service teachers for 21st century knowledge and skills?
   a. What did you find?
4. What would you do in the future?
   a. What are your recommendations for future incorporating or use of the Teach Elements in teacher education coursework?
   b. What recommendations do you have for how to contextualize the use of the Teach Elements courses/modules in teacher education coursework?