CURRENT TRENDS IN THE AVAILABILITY AND REQUIREMENT OF LEARNING TECHNOLOGY COURSES FOR PRE-SERVICE EDUCATORS AT U.S. UNIVERSITIES

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This multi-faceted research study examined the current approach of educational technology courses and how integrating modern learning technologies into curriculum effectively is addressed in pre-service education programs at U.S. universities. The primary goal was to explain the current trends in the reviewed pre-service programs in relation to how future educators are prepared by the universities to incorporate educational technology and use technology enhanced curriculum. This study was an exploratory, non-positivistic qualitative study that employed multi-strategy and survey research approaches in order to establish a baseline of the way that technology integration skills are being addressed in undergraduate pre-service educator programs today. Survey participants were educators within a public or private K-12 system in the U.S. The participants' level of education, university attended, educational technology experience, and technology perceptions were gathered from the survey's Likert-type and open-end questions. Current and historically statistics and data were collected for each university identified from the survey responses. Findings of this study revealed outcomes related to participants' education, perception of educational technology, and university educational technology course offerings and/or requirements for undergraduate pre-service educator programs. Results of this research study provide a solid foundation for future research in these areas within the field of education.

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CHAPTER 1

INTRODUCTION

The volatility of educational technology course offerings in “teacher education programs over the past decade has led to uncertainty about how best to train teachers to integrate computers and software into content” (Today’s Classrooms, 2018, para. 3). Due to the lack of a foundational baseline for these programs, it is difficult to identify a common or standard approach being employed. Internal and external factors may play a role in the causations of changes within the programs.

1.1 The Growth of Educational Technology

Learners of all ages are looking to take online courses at an increasing rate. The exact number of K-12 students that take online courses is not official tracked by the individual states. However, “the best guess comes from the Evergreen Education Group, a consultancy whose researchers used a variety of data sources to estimate that 2.7 million students took roughly 4.5 million supplemental online courses during the 2014-15 school year” (Herold, 2017, para. 11). This shows a dramatic increase from only 15 years prior. For the 2002-2003 school year, the U.S. Department of Education states that “K-12 students took just 317,000 online courses” (Herold, 2017, para. 12). This further demonstrates the importance of educators understanding how to use learning management system in addition to other educational technologies as a means of engaging with learners regardless of distance. Furthermore, learners and educators must understand how to use this type of learning format for the best possible outcomes to be achieved. It is important that educators have training and hands-on experience in using learning management systems and other types of learning technologies before entering the classroom for the first time.

There are possible barriers that could have negative effects on the delivery and retention of the instructional content for both the learner and the educator. Efficient integration of educational technology into the curriculum in K-12+ classrooms can be impacted by one or more of these barriers. As noted by Irvin, Hannum, de la Varre, and Farmer (2010), these barriers fall into three main categories: institutional, learner, and educator.

Over the last decade, an examination of courses at U. S. institutions of higher education show they have begun to eliminate educational technology courses in undergraduate pre-service educator programs, asking content-area (i.e. math, English, or science) instructors to cover these skills in other courses, though they may have little training themselves. Without training, this becomes a major barrier to effective educational technology integration in K-12 classrooms, reversing a trend of offering a substantial number of courses since the mid-1990s. Further examination of this barrier was needed due to the potential impact eliminating educational technology courses for pre-service education majors may have on the integration of educational technology in K-12+ classrooms.

1.1.1 The Function of Learning Technologies in Schools

In today’s educational system, technology plays an important role for both the educator and the learner. National standards from the International Society for Technology in Education (ISTE) requires that technology integrated into the curriculum throughout the academic career of the learner. The 2016 ISTE Standards for Students are:

1. Empowered Learner - Students leverage technology to take an active role choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
    a. Students articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
    b. Students build networks and customize their learning environments in ways that support the learning process.
    c. Students use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
    d. Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
2. Digital Citizen - Students recognize the rights, responsibilities and opportunities of living, learning and working in an interconnected digital world, and they act model in ways that are safe, legal and ethical.
    a. Students cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
    b. Students engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or when using networked devices.
    c. Students demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
    d. Students manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
3. Knowledge Constructor - Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
    a. Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
    b. Students evaluate the accuracy, perspective, credibility and relevance of information, media, data or other resources.

    c. Students curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
    d. Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursing answers and solutions.
4. Innovative Designer - Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
    a. Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
    b. Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
    c. Students develop, test and refine prototypes as part of a cyclical design process.
    d. Students exhibit a tolerance for ambiguity, perseverance and the capacity to work open-ended problems.
5. Computational Thinker - Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.
    a. Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
    b. Students collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
    c. Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
    d. Students understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.
6. Creative Communicator - Students communicate clearly and express themselves creatively for a variety of purposes using platforms, tools, styles, formats and digital media appropriate to their goals.
    a. Students choose the appropriate platforms and tools for tools for meeting the desired objectives of their creation or communication.
    b. Students create original works or responsibly repurpose or remix digital resources into new creations.

c. Students communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.

d. Students publish or present content that customizes the message and medium for their intended audiences.

7. Global Collaborator - Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

   a. Students use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.

   b. Students use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

   c. Students contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

   d. Students explore local and global issues and use collaborative technologies to work with others to investigate solutions.

The learner and educator standards are specific and require the integration of technology into the curriculum (Barron, Kemker, Harmes, & Kalaydjian, 2003). Educators with varying levels of classroom experience are responsible for introducing and developing the technological skills of the learners under their guidance. The standards set by International Society for Technology in Education for Educators (2017) are:

1. Learner – Educators continually improve their practice by learning from and with others and exploring proven and promising practices that leverage technology to improve student learning.

   a. Set professional learning goals to explore and apply pedagogical approaches made possible by technology and reflect on their effectiveness.

   b. Pursue professional interests by creating and actively participating in local and global learning networks.

   c. Stay current with research that supports improved student learning outcomes, including findings from the learning sciences.

2. Leader – Educators seek out opportunities for leadership to support student empowerment and success and improve teaching and learning.
    a. Shape, advance and accelerate a shared vision for empowered learning with technology by engaging with education stakeholders.
    b. Advocate for equitable access to educational t4echnology, digital content and learning opportunities to meet the diverse needs of all students.
    c. Model for colleagues the identification, exploration, evaluation, curation and adoption of new digital resources and tools for learning.
3. Citizen – Educators inspire students to positively contribute to and responsibly participate in the digital world.
    a. Create experiences for learners to make positive, socially responsible contributions and exhibit empathetic behavior online that build relationships and community.
    b. Establish a learning culture that promotes curiosity and critical examination of online resources and fosters digital literacy and media fluency.
    c. Mentor students in safe, legal and ethical practices with digital tools and the protection of intellectual rights and property.
    d. Model and promote management of personal data and digital identity and protect student data privacy.
4. Collaborator – Educators dedicate time to collaborate with both colleagues and students to improve practice, discover and share resources and ideas, and solve problems.
    a. Dedicate planning time to collaborate with colleagues to create authentic learning experiences that leverage technology.
    b. Collaborate and co-learn with students to discover and use new digital resources and diagnose and troubleshoot technology issues.
    c. Use collaborative tools to expand students' authentic, real-world learning experiences by engaging virtually with experts, teams and students, locally and globally.
    d. Demonstrate cultural competency when communicating with students, parents and colleagues and interact with them as co-collaborators in student learning.
5. Designer – Educators design authentic, learner-driven activities and environments that recognize and accommodate learner variability.
    a. Use technology to create, adapt and personalize learning experiences that foster independent learning and accommodate learner differences and needs.

    b. Design authentic learning activities that align with content area standards and use digital tools and resources to maximize active, deep learning.
    c. Explore and apply instructional design principles to create innovative digital learning environments that engage and support learning.
6. Facilitator – Educators facilitate learning with technology to support student achievement of Standards for Students.
    a. Foster a culture where students take ownership of their learning goals and outcomes in both independent and group settings.
    b. Manage the use of technology and student learning strategies in digital platforms, virtual environments, hands-on makerspaces or in the field.
    c. Create learning opportunities that challenge students to use a design process and computational thinking to innovate and solve problems.
    d. Model and nurture creativity and creative expression to communicate ideas, knowledge or connections.
7. Analyst – Educators understand and use data to drive their instruction and support students in achieving their learning goals.
    a. Provide alternative ways for students to demonstrate competency and reflect on their learning using technology.
    b. Use technology to design and implement a variety of formative and summative assessments that accommodate learner needs, provide timely feedback to students and inform instruction.
    c. Use assessment data to guide progress and communicate with students, parents and education stakeholders to build student self-direction.

These technology-based skills should first be encouraged as a learner begins their schooling as "the roles of PK–12 classroom teachers and post-secondary instructors, librarians, families, and learners all will need to shift as technology enables new types of learning experiences" (Office of Educational Technology, n.d.). Scaffolding new content along with further growth of each learner's technological capabilities are the responsibility of the educator and the learner (ISTE, 2016). Due to this responsibility, it is important that educators have the opportunity to further expand their own knowledge-base of educational technologies and the corresponding affordances, even as they are being measured by the learners' achievements (Gimbert, Bol, & Wallace, 2007).

Many school districts allocate funding to purchase different educational technologies. However, if the educator is not prepared to properly integrate technology into the curriculum then the desired technology-enriched lessons may not be successful. For successful learning technology integration to occur, educators across all grade levels must have a minimum level of understanding of how technology can be integrated into the curriculum and how to use it to support the effective content delivery (Ingersoll, 1999).

Over the last 20 or more years, instead of offering or requiring stand-alone educational technology courses universities have redesigned undergraduate pre-service educator programs to address the curriculum-technology integration from the standpoint of the educator as the subject-matter expert. These programs focus on the design of the curriculum and the integration of technology. The requirement that undergraduate education majors complete one or more technology integration courses specifically designed for educators, has been expected to result in the acquisition of these skills. Yet, these hands-on educational courses are being eliminated or are no longer required by many undergraduate pre-service educator programs. It is important that educators have hands-on experiences to learn and have the opportunity to see the affordances that can be found within technology integration in curriculum (Borup & Stevens, 2016).

1.2 Theory and Research

Theorists and researchers have long sought to understand the role of technology in supporting education, delivering instruction, and ensuring knowledge retention. Taking a broad look at the integration of educational technology into curriculum, one can see that the field of education is in fact a larger teaching system that has impacts on a global scale. The overall goal of efficient educational technology integration for many educators is to make learning more efficient, accessible, and effective. Therefore, the next step is determining the most conducive, productive, and effective means of integration. “The procedure of working backwards from goals to the requirements of instructional events is one of the most effective and widely employed techniques” (Gagne & Merrill, 1990, p. 128). Methods for effectively integrating educational technology into curriculum should be a focus within undergraduate pre-service educator programs. Educators should understand how to effectively integrate educational technology before developing curricular activities (Hammonds, Matherson, Wilson, & Wright, 2013). Viewing the educator as an integral part of the integration of educational technology is important, as the elimination of the educator could be the difference between success or failure of effective integration (Mandell, Sorge, & Russell, 2002; Bitner & Bitner, 2002).

Typically, educational technology courses allow pre-service educators to learn a multitude of different technologies that are not content specific to prepare them for their future classrooms. This type of stand-alone course in educational technology should allow these future educators to view and use these technologies within a variety of content areas. Learning to use a variety of technologies across media platforms should aid in expanding the users’ knowledge-base in effectively applying and integrating the technologies in a cross-curricular environment.

1.3 Kindergarten through 6th grade Educators and Systems

According to the Bureau of Labor Statistics (BLS) report on educators for the United States Department of Labor (2018), currently there are 1,565,300 elementary school educators in the United States. The BLS estimates there will be an additional 116,300 elementary educators by the year 2026. Furthermore, existing educators will be retiring, meaning many of these educators will be new to the profession.

Educators at the elementary school level lecture on a wide range of content areas each day (Bureau of Labor Statistics [BLS], 2018). They are responsible for teaching math, science, social studies, and art, among others. Proper training on educational technology use to support these areas should aid in ensuring that learners in elementary schools receive technology-enriched content information.

Based on research findings, Angeli (2005) recommended that newly certified educators should be exposed to different technology applications during their schooling. Prior exposure to technology integration into lesson plans and classroom lectures has the potential to allow the educator to establish a knowledge base (Wang & Hannafin, 2009). This preexisting knowledge baseline permits the educator to scaffold their existing integration knowledge into new methods once they are in a classroom of their own (Wang & Hannafin, 2009). Experienced educators may know the basics of some educational applications. However, they may not have the learned skills of how to effectively use educational technology in an instructional capacity (Mishra, Koehler, & Kereluik, 2009).

There has been a shift to eliminating educational technology courses and integrating different technology components into content-based courses. In the 1980’s, Lee Shulman introduced the concept of teaching future educators through a construct that focused on pedagogical content knowledge or PCK (Shulman, 1987). A revised version of this construct included the introduction of educational technology in content-focused courses expanded the method to TPACK (Mishra & Koehler, 2007). Determining whether stand-alone educational technology courses or TPACK provide better learning opportunities for future educators continues to be debated.

Technology focused content courses allow educators to view the technology in action and gain a better comprehension on how to successfully use it for a specific subject (Bielefeldt, 2001; Moursund & Bielefeldt, 1999). Yet, other researchers have found the opposite to be true. Stand-alone educational technology courses have been found to be important, as they provide pre-service educators with opportunities to learn and use technology within multiple content areas (Gronseth et. al., 2010; Kleiner, Thomas, & Lewis, 2007; Wang & Hannafin, 2009). When comparing the content-specific course with a stand-alone educational technology course, it was found that there were increased gains when comparing pre-test and post-test scores for the educational technology course participants, versus those in the content specific course (Anderson & Borthwick, 2002).

Educators have an important role in determining how educational technology is incorporated in the classroom and how this technology influences each learner's retention of new information (Darling-Hammond, 2010). This is in part because educator practices and learner outcomes have been found to have a direct correlation (Lei & Zhao, 2007). Despite research showing that the use of technology in education can increase a learner's achievement of scaffolding new information and retention potential, there is still hesitation or resistance to educational technology integration from the public, parents, and educators. “Our new, digital technology is dictating not only our kids’ future, but also the new paradigm for educating them. Our educators need to begin understanding this, and moving with its tide” (Prensky, 2007, p. 3).

Increased technology-based curriculum can lead to learner success (Lei & Zhao, 2007). Technology can be an important support tool to increase learning and retention of the course material in the classroom environment (Gülbahar, 2007) and should not be viewed as a detriment to learning. Educators should attempt to reach each learner through a medium that they understand and that motivates their time-on-task for deeper learning.

1.4 Conclusion

“Our nation owes its citizens the benefit of a marketable education, so we may continue to be productive members of society” (Rawe, 2013, p. 61). We must provide educational material and coursework in a way that is conducive to the manner in which they live and learn. In the 21st century, this means integrating educational technology in an effective and engaging manner to create active lifelong learners.

State and Federal standards of curricular technology integration will not become less stringent; rather, educator requirements will continue to increase. It is important therefore, that they know how to effectively integrate educational technology into the required curriculum as dictated by their state standards. To meet or exceed in these standards, pre-service education majors need to gain as much experience and knowledge as possible during their coursework with regard to educational technology incorporation. Researchers, educators, and other educational experts should work as a cohesive team to find the most effective methods to ensure technology enriched curriculum is being delivered. The ultimate goal should be an effective education and proper preparedness of each learner for the workforce they will encounter upon graduation.

Currently, U.S. universities are attempting different techniques to address educational technology within undergraduate pre-service educator programs. Due to the varied changes occurring in academia, it is virtually impossible to determine a level of positive or negative impact of these models on pre- and in-service educators. Continued review and further research on an annual basis could allow researchers to determine trends associated with these changes.

It is, however, imperative that course and program offerings and requirements by U.S. universities be studied and analyzed in order to establish a foundation of current trends in undergraduate pre-service educator programs. This foundation could serve as a basis for future longitudinal research focused on change over time in undergraduate pre-service educator programs.

> Technology is not a silver bullet, it's only as good as the teachers who are there using it as one more tool to help inspire and teach and work through problems. We want every teacher in every school to understand from soup to nuts how you can potentially use this technology. And that oftentimes requires a training component that makes sure that the technology is not just sitting there but is actually used and incorporated in the best way possible (President Obama, 2014).

Each person in education has an important role in seeing that learners reach their desired level of success. Maintaining a significant level of educational technology incorporation within the classroom will aid in supporting an active learning environment for learners regardless of age or their level of schooling. Today’s learners deserve the best education possible and educators, researchers, and instructional designers need to work together to make this possible.

CHAPTER 2

LITERATURE REVIEW

“Whether one is excited, challenged, or terrified by the influx of technology in schools, the fact remains that emerging technologies are increasingly being infused in school cultures and do have a major effect on teaching and learning” (Rogers, 2000, p. 455). For this literature review, all references to ‘technology’ will refer to electronic technology such as computers, software, applications, etc. A clear and concise path for technology integration has not yet been devised for our educators. When understanding how courses and instruction about the use of learning technologies should be delivered, considerations associated with the integration of technology should involve more than the mere availability of technology itself.

2.1 Barriers for Educators and Learners

This review of literature will focus on, educator-based and learner-based barriers (Liu, Lin, Zhang, & Zheng, 2016). Educator barriers may vary due to levels of experience, motivation, and technological implementation limitations (Nyagowa, Ocholla, & Mutula, 2013; Orlando, 2013; Peeraer & Van Petegem, 2012). Educators should work with learner barriers in addition to their own (Ertmer, 1999). Barriers for learners include: motivation, digital divide, and socioeconomic status (Orr, 2003). Establishing resolutions to these barriers should enable the educators to better incorporate educational technology in their curriculum so that each pupil becomes an engaged learner and enhance the learner’s desire to learn (Jones & Warren, 2013;

Jones, Warren, & Robertson, 2009; Warren, Barab, & Dondlinger, 2008; Warschauer, 2006).

2.2 The Changing Face of Education in a Technology-saturated World

Today's learners are being born and raised in a time where technology advancements are unprecedented (Hughes, 2012). It is not uncommon to see toddlers using their parents' iPhones, tablets, or other smart devices and operating different applications. By the time these children enter the education system, many may have surpassed their parents and educators in their efficacy, proficiency, and usability of applications and hardware (Duffy, 2007; Oblinger, 2003; Olsen, 2005; Prensky, 2001; Tapscott, 1997). Educators can use the learners' preference for personal technology as a motivational tool for the learners to use educational technology as a means to scaffold new instructional material in an appealing manner (Prensky, 2004).

Integration barriers have existed since technology was first introduced in classrooms. "While we may not realize it, we have entered the perfect electric storm, where technology, the art of teaching, and the needs of learners are converging" (Bonk, 2004, pg. 2). The effective use of such technologies either in a personal or educational setting requires a base level of knowledge on how to operate the product (Wang & Hannafin, 2009). For educators this often means setting aside additional time to learn to use the technology before being able to integrate it into a lesson. Simply adding a technology tool to a lesson without knowing proper ways to use it, may add a level of confusion for both the learners and the educator (Mitchell, 2007).

Some schools must use the technology they have available in order to attempt to meet the ISTE standards. Outdated computers and software are substantive barrier to proper technology integration in today’s classrooms (Zhao & Frank, 2003). Older computers tend to run slowly so lessons take longer to present, or the computers cannot run video. Time is of the essence for educators, so delayed response time from current technology may cause longer than intended lessons that prohibit the coverage of other topics or subjects. Therefore, educators avoid using the outdated technology in order to deliver all of lessons for that school day, and often then discard technology altogether (Kurt & Ciftci, 2012). Thus, due to outdated technology and time constraints many educators have difficulty meeting these required standards. This results in lower technology usage in the classroom and curriculum (Laferrière, Hamel, & Searson, 2013).

2.3 Educator Barriers

The integration of technology in education is a current focus for many school districts and other government agencies. In addition to the impending integration of educational technology, there are potential concerns that may need to be addressed (Kelly, 2015). One such area, is the possible barriers encountered by educators independent of learners (Carver, 2016). Possible barriers educators face includes; financial restraints and funding, prior experience with technology, motivation concerns, professional development needs, paradigm changes, and pedagogical changes.

2.3.1 Financial Restraints and Funding

A speech in 2009 given by President Obama, addressed the need to find a resolution to the barrier of financial restraints facing United States public schools:

> To give our children the chance to live out their dreams in a world that's never been more competitive, we will equip tens of thousands of schools, community colleges, and public universities with 21st-century classrooms, labs, and libraries. We'll provide new computers, new technology, and new training for teachers so that students in Chicago and Boston can compete with kids in Beijing for the high-tech, high-wage jobs of the future (American recovery and reinvestment, January 8, 2009).

In 2014, President Obama requested $69 billion that included a 2% increase in the education budget for the 2015 fiscal year to be coordinated through the ConnectEDucator Program. This program's focus was on providing educators with additional resources. Furthermore, it aspired to fund opportunities for the creation and facilitation of individualized support of educators seeking to design curriculum. It also aimed to provide funding for the enriched personalized learning environments that K-12 learners are seeking (U. S. DOE, 2014). This additional funding is intended to aid in overcoming budgetary restrictions for equipping public classrooms with educational technology and resources.

The Internet has expanded educator and learner education opportunities. "The Internet explosion triggered an unremitting drive to make computers available to all students. Wiring schools and classrooms is another measure of learner access to new technologies" (Cuban, Kirkpatrick, & Peck, 2001, p. 816). The Internet has specifically aided in expanding learning from lectures, worksheets, and textbooks to an unlimited number of resources (File & Ryan, 2014). "Students and educators now have access to a ubiquitous learning environment where it's possible to search for, locate, and quickly access elements of learning that address immediate needs" (Duffy, 2007, p.127). Educators can search for technology-enriched lesson plans that are being shared by other educators. Additional information to expand lessons with technology is now often just a few clicks away (McCombs, 1986).

2.3.2 Experience with Educational Technology

Using a variety of technology applications during their coursework as undergraduates is beneficial for newly certified educators as they begin instructing within their own classroom of learners (Angeli, 2005). A knowledge base of basic methods for integrating technology into instruction provides the educator a more cohesive understanding of the possible benefits of educational technology in the classroom (Wang & Hannafin, 2009). This should enable educators to scaffold their current level of knowledge of educational technology into the curriculum with newly gained insight as it is presented. Furthermore, educators with prior classroom experience may have a basic to moderate level of understanding of educational technologies; yet, may be inexperienced on how to effectively use educational technology as supplement to coursework (Mishra, Koehler, & Kereluik, 2009).

2.3.3 Motivational Barrier

Striving to expand the knowledge base of educational technology can serve as a motivational barrier for educators. “In other words, the development pattern of the teachers’ views defines a continuum, at one end of which lies the external influences on the teacher, and at the other end the teacher’s internal behaviors; that is, their self-regulated, reflective behaviors” (Levin & Wadmany, 2008, p. 243). A desire to learn how to effectively incorporate educational technology into preset curriculum can pertain to either or both.

Educators should strive to have each of their learners engage in an active learning environment. “In effect, student-centered learning environments emphasize constructing personal meaning by relating new knowledge to existing conceptions and understandings; technology promotes access to resources and tools that facilitate construction” (Hannafin & Land, 1997, p. 170). Despite an increase in educator motivation from seeing learners excel, there is still the issue of continuing the same level of motivation to go beyond the typical daily requirements that are placed on educators. Effectively integrating technology within curriculum requires additional time and knowledge (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012). Educators need specific training on how to achieve this through compelling and efficient methods. Consistent training sessions allow educators to gain and expand their knowledge on different applications or software.

Different learning preferences and needs can be addressed by using educational technology. Visual, auditory, and textual learners can have their needs met through the many elements offered by these applications (Solvie & Sungur, 2012). “At the same time that emerging technologies are impacting online learning opportunities, millions of new learners are demanding instructional formats that meet their needs” (Bonk, 2004, p. 3). These new learners are being expected to learn more at a younger age than the previous generations before them were required to learn (Solvie & Sungur, 2012). Knowing the relevance of the technology, learning through simulations, value, and learner impact encourages educators to undertake learning to incorporate educational technology (Knowles, Holton, III, & Swanson, 2012).

2.3.4 Need for Additional Professional Development Opportunities

Expanding opportunities for educators to learn through professional development can motivate and aid in reducing the hesitation to integrate educational technology. Learning with peers allows educators to ask questions, clarify points of confusion, and gain ideas from one another (Howard, McGee, & Schwartz, 2000). Individualized learning may be optimal for some learners; however, others require more of a group learning environment. “When we use collaboration to enable people to learn together, we make learners more active and self-reliant” (Alonso, López, Manrique, & Viñes, 2005, p. 234).

One instructional method used by some educators to establish collaboration is problem-based learning. This style of learning focuses on the importance of having the problem-solving element in curriculum design. The background framing set forth in a story allows the learner to become personally involved in solving the problem or issue that is presented. The narrative of a story-based problem helps to build the background story. This can be achieved through different technology applications (Jonassen & Hernandez-Serrano, 2002).

A professional development activity is “more likely to be effective in improving teachers' knowledge and skills if it forms a coherent part of a wider set of opportunities for teacher learning and development” (Garet, Porter, Desimone, Birman, & Yoon, 2001, p. 927). Extensive professional development has also been discussed and short-term professional development was found by Howard, McGee, and Schwartz (2000) to show positive results. In this study, participants were required to live and train together for two weeks. An increase in collaboration and retention of new educational technology knowledge were found in study data results.

2.3.5 The Changing of Paradigms

As noted with problem-based learning, pedagogy is changing. As educational technologies change, educational paradigms and pedagogies necessarily do as well to account for best practices in the classroom. The new paradigm of the Information and Communication Age has brought about a new way of thinking about education (Singh, 2014). The workforce today expects more technology skills from learners upon graduation. Educators have been given the task of getting the learners ready for this expectation, while meeting the standards placed within their curriculum and instruction (Mitchell, 2007). The intention of the early technology integration push was to increase the learners' workforce readiness and expand learner knowledge and skills (Lowther, Inan, Strahl, & Ross, 2008). Not only must educators strive to teach new curriculum to the learners and meet required educational standards, they should also prepare learners for employment opportunities and demands post-graduation.

Technology advancements may have changed the way children and young adults learn. This directly affects the way an effective educator presents coursework materials to the learners. According to Merrill (2002):

> Many current instructional models suggest that the most effective learning products or environments are those that are problem-centered and involve the student in four distinct phases of learning: (a) activation of prior experience, (b)

> demonstration of skills, (c) application of skills, and (d) integration of these skills into real-world activities (p. 44).

It is important for educators going into the classroom for the first time to have the knowledge of how to successfully address each of these four phases while instructing with technology-enriched curriculum. “Students need to be engaged in meaningful content. When teachers provide experiences that stimulate the brain, they help students create building blocks for understanding. Students need meaningful input with varied instructional strategies for learning” (Mitchell, 2007). This requires a change in the educator’s pedagogy in order to meet the ever-changing paradigms in education.

2.3.6 Pedagogical Changes

An effective educator should be able to alter their own perceptions or beliefs on how classroom instruction should be given. A transformation of pedagogical views requires that each educator understand and have the willingness to modify their own pedagogical beliefs (Koschmann, 1996). The manner in which learners retain new information has and will continue to change or evolve. The pedagogical method and curriculum delivery mechanisms should be altered in order to expand and meet the scaffolding of knowledge that is desired of learners. “Educational technologies are unlikely to impact positively on student learning if such technologies are used to perpetuate traditional teaching practices (vd Westhuizen, 2012). Revisions of these teaching practices could further ensure that the learners needs are being met or exceeded.

The learner-focused instruction style is another area gaining attention. According to Pedersen and Liu (2003):

> We would like to offer three considerations for designers that we believe are pertinent to student-centered programs: (a) Provide scaffolds for students with special needs; (b) support factual knowledge acquisition; and (c) capitalize on the multimedia affordances of computer technology to create new learning experiences for students. (p. 73)

The Ohio State University at Mansfield's Education Master's program focuses on effectively creating technology-enriched curriculum. An example of this is, as a final project, learners present the lessons and explain how they should be considered as effective instruction along with all technology-based elements. This is a requirement that must be fulfilled before graduation from the program (Teal Bucci, Copenhaver, Johnson, Lehman, & O'Brien, 2003).

Attempts to resolve the various educator barriers for technology integration into education have been done with good intentions, but many of these barriers still exist today. It is important to achieve a full understanding of current educators and their needs in order to gain a better perspective of the situation in today's classrooms. Whether or not, each barrier discussed in this literature review is real or simply perceived they are important to educators. Finding a resolution to each barrier would not only benefit educators but the learners as well. This is why it is important to revisit this topic with educators and understand their perceptions of these barriers to integrating emerging educational technology in today's classrooms. Further research is needed in order to develop a firm consensus on barriers to increasing education technology budgets and educator motivation.

2.4 Learner Barriers

Learners are still generally the same as they have been for generations; yet, they are also remarkably different from their predecessors. “Today’s students – K through college – represent the first generations to spend their entire lives surrounded by and using computers, videogames, digital music players, video cams, cell phones, and all other toys and toys of the digital age” (Prensky, 2001, p. 1). However, methods needed to engage today’s learners have changed from their previous counterparts (Milman, 2009). Educators are tasked with designing learning activities and instructing learners using multiple methods that will result in engagement.

It is important to recognize that applying and using technology in a classroom should not focus on technological innovations, but rather desired pedagogical outcomes (Angeli & Valanides, 2009; Enochsson & Rizza, 2009; International Society of Technology in Education [ISTE], 2008; OECD, 2010). “Consistency between theoretical conceptions of learning and teaching practice has shown to support effective applications of technologies to increase achievement” (Sherman, 2005, p. 11). The learner-focused instructional style and its promotion in the classroom generally derives from best educational technology practices (Becker, 1994; Bigatel, 2004; Coppola, 2004). Learning and retention of new information gained from learner-focused curriculum provides an opportunity for an active learning environment and new experiences for the learners (Hickey, Moore, & Pellergrino, 2001; Jonassen, 1996).

2.4.1 Learner Demotivation

In some studies, learners using technology in the classroom have been found to spend more time on task with assignments or lessons, which has been correlated with increased achievement (Barnett & Whitford, 2016; Ruthven, Hennessy, & Brindley, 2004; Warren, Dondlinger, & Barab, 2008). The increase in motivation and engagement often leads to more active learners. Research evidence has also noted that in certain formats or environments that are technology-enriched, there are affordances that offer support and create learning that is intrinsically motivating for the learner (Gee, 2003; Malone & Lepper, 1987; Reynolds & Caperton, 2011). Increased skills, including higher order thinking, problem-solving, and analysis of data, have been correlated with the use of classroom technology (Kozma, 2003; Lei & Zhao, 2007; Jonassen, 1996). An increase in motivation has also been found to decrease learner classroom behavior issues and result in higher achievement rates (Tiene & Luft, 2001: Morgan, Farkas, Hillemeier, & Maczuga, 2009). A correlation of an increase in learner self-regulation capabilities and overall learner achievement have also been identified (Ruthven, Hennessy, & Deaney, 2005).

Despite these educational technology integration benefits, learner barriers for the integration of technology in education still exist. In order to gain a clear perspective on all types of barriers, these should be reviewed as well. Learner barriers may include; motivation, skill, digital divide (Wood, Mueller, Willoughby, Specht, & DeYoung, 2005) or a learner's socioeconomic status (Muijs, Harris, Chapman, Stoll, & Russ, 2009; Mistry, Benner, Tan, & Kim, 2009). Decisive answers on ways to resolve barriers and implement these resolutions have not resulted in the desired outcomes that were intended by the researchers (Polly, Mims, Shepherd, & Inan, 2010; Kim, Kim, Lee, Spector, & DeMeester, 2013). Further research on learner barriers should uncover benefits and possible resolutions to technology integration in K-12 classrooms.

Some educators have found that there is a lack of motivation among learners to use technology in a meaningfully manner. Learners often want technology to simply provide them a quick or easy answer, instead of conducting further research themselves (Wood, et. al., 2005). However, Grabe and Grabe (2007) found that the use of technologies in the classroom can increase learners' skills, motivation, and knowledge. Learner success with educational technology can be seen through their positive attitudes and willingness to use such technology for educational purposes (Albrini, 2006).

2.4.2 Learner Motivation

Integrated learning systems allow educators to distribute individualize learning programs for their learners (Peck, & Dorricott, 1994). Increases in learner achievement and motivation have been correlated with higher educator motivation to incorporate more technology into the curriculum (Angers & Machtmes, 2005). This includes the use of learning management systems (LMS) that allow the learners to submit coursework, complete assessments, and communicate with their instructor and one another. In addition, learners can also receive and provide feedback through these systems.

This type of technology has proven to increase the learner's academic success in the class (Zimmerman & Tsikalas, 2005). Using discourse options (discussion boards, email, etc.) within a LMS has shown to have a positive impact on these learners when compared with learners who did not have online discourse opportunities (Elicker, O'Malley, & Williams, 2008). Immediate or timely feedback on assignments is important for learners to gain a full understanding of their current coursework before moving on to new concepts (Gallien & Oomen-Early, 2008; Green, 2015). Research studies have found that learners who have received and provided in-depth feedback through an LMS have noted having a higher self-efficacy (Wang & Wu, 2008).

2.4.3 Learner Technology Skills

Technology has changed the ways that today's learners receive, review, and retain new curriculum. Educator-driven instruction provides opportunities for learners to use technology for to learn through discovery and inquiry using different media outlets (Kirschner, Sweller, & Clark, 2006). Learners who regularly use technology have been noted to have twice as many brain signals as those that do not regularly use technology (Small & Vorgan, 2008). Further, technology has changed learners brain wave patterns and the number of firings between synapses of the brain (Sonwalker, 2001). "Emerging media foster psychological immersion through the use of the computer to provide access to distant experts for learners, offering learner's multiuser virtual environment (MUVE) interfaces and mobile wireless technologies" (Rawe, 2013, p. 58).

Learners' skills with social media can help to further the learning experience outside of the classroom (Rawe, 2013). It should be noted that this type of learning also increases instructor effort and guidance yet produces an active learning experience for the learners (Oliver, 2009). Despite the extra involvement required from the educator, this type of media-based learning can promote increased social competence and psychological health for learners (Johnson, 2007).

2.4.4 Digital Divide: Educator versus Learners

Learners view technology as an important part of life and as an essential tool for functioning on a normal day regardless of schoolwork (Pedro, 2006). However, learners may have access to newer computers and faster Internet speeds at home when compared with those available at school (Aikens & Barbarin, 2008). Older or slower computers, needed software or applications, or prolonged time waiting on Internet searches can lead to frustration for the learners (Wood et. al, 2005). Increased instructor assistance or technological glitches can further disturb the learning process when using technology, if the learner lacks training (Li, 2007).

How educational technologies are integrated into the curriculum plays an important part in how learners respond to them. Current educational technologies are envisioned as a tool to aid learners with understanding how the subject matter being taught directly relates to their previous knowledge of the material, initiating questions, and developing learning strategies for problem solving. These technologies also enable the learners to discover new ideas or concepts and provide opportunities for discourse amongst their peers and themselves (ISTE, 2008; Jonassen & Reeves, 1996; Salomon, Perkins, & Globerson, 1991).

2.5 The Educator's Role

Educators have an important role in how educational technology is incorporated in the classroom and its influences on how their learners are instructed or learn (Darling-Hammond, 2010; Weglinksi, 2000). Despite research showing that the use of technology in education can increase a learner's retention of new curriculum, there is still hesitation or resistance from the public, parents, and educators. "Our new, digital technology is dictating not only our kids' future, but also the new paradigm for educating them. Our educators need to begin understanding this, and moving with its tide" (Prensky, 2007, p. 3). Technology should not be viewed as a detriment to learning.

Educators should be attempting to reach learners through a medium that they understand and are motivated to be engaged with. This medium involves using various forms and formats of technology. "Having grown up immersed in technology, the students of today are digital natives, but many of their teachers are often playing catch-up because they are digital immigrants" (Hammonds, Matherson, Wilson, & Wright, 2013, p. 1).

2.6 Conclusions and Implications for Further Research

Higher learner achievement scores have been correlated with increases in learner motivation (Hoskins & Van Hooff, 2005); other studies have shown this may be part of a novelty effect (Annetta, Minogue, Holmes & Cheng, 2009; Kulik & Kulik, 1991). However, if there is a chance that technology can directly or indirectly improve a learner's retention and understanding of important new information, then schools and educators have the obligation to the learners to focus on increasing their achievement levels by any means necessary (McClenney, 2008). Each time a learner slips through our educational system without receiving a high-quality education it is detrimental to the learner (Florida Council of 100, 2009) "Our nation owes its citizens the benefit of a marketable education, so we may continue to be productive members of society" (Rawe, 2013, p. 61).

Educators should provide educational material and coursework in a manner that is fitting with how learners live and actively learn today. In the 21st century, this means integrating technology in an effective and engaging manner to create active learners for life. Upon graduation, these learners will face a society and workforce where technology is important. Their success in the workforce will depend on their technology skills. The foundation of these skills should begin as early as possible in K-12 learning environments.

It is important to conduct additional research on how to eliminate or further reduce barriers to the integration of educational technologies for educators and learners. State and Federal standards of technology integration in curriculum will not become less stringent. Requirements on educators are going to continue to grow. Researchers, educators, and educational experts need to work as a cohesive team in order to find methods of eliminating these barriers.

The ultimate goal should be effective learner education and preparedness for the workforce after graduation. Each person in education plays an important part in learners reaching this desired level of success. Finding resolutions to education barriers should be important for each key player. Each learner in K-12 deserves the best education possible and it should be the mission of everyone in the educational system to deliver on these needs. Varying barriers to the integration of technology, changes within the field of academia, and a shift in the academic focus for pre-service educators within U.S. universities leads to a significant level of ambiguity in the field. These factors necessitate the study of course offerings and requirements to establish a foundation for current trends associated with pre-service educator degree programs.

CHAPTER 3

METHODOLOGY

Educational technology course offerings and requirements within pre-service educator programs have changed over the past couple of decades. This research study established a baseline that will serve as a platform for future research studies. To better understand these changes, historical and current approaches in university pre-service teaching programs, educational technology course requirements, and faculty K-12 experience were analyzed. This research study employed a non-positivistic qualitative multi-strategy approach incorporating survey methods and content analysis to increase the depth and range of the data gathered.

3.1 Strategy for Research Study

In an effort to examine, analyze, and document the approaches used by universities to instruct pre-service educators on the use of educational technology, a two-phase approach was employed to conduct this research study. An initial survey was distributed to K-12 educators through multiple electronic channels. Based on the survey data collected, a sample of U.S. universities was identified for data mining purposes. These data mining efforts focused on specific technology courses and program details including university statistics and undergraduate education major course requirements from the U.S. universities identified through the examination of the results from the survey instrument completed by the participants. The multi-strategy research method was utilized to gather the necessary data from university websites, faculty member profiles, LinkedIn profiles, and other publicly available online resources were used in the collection of information. Data collected through the multi-strategy and survey methods were analyzed and summarized including university statistics, undergraduate education major program course requirements, and faculty member positions and K-12 experience. This provided a clear and concise explanation of the collected data and their relationship to the research topics of inquiry.

3.2 Primary Topic of Inquiry

What are the course offerings and program requirements associated with technology integration skills for undergraduate pre-service educators at U.S. universities?

3.3 Secondary Topics of Inquiry

1. How many universities no longer offer stand-alone educational technology courses?
2. Do content area programs include technology integration in lieu of, or in addition to, a required course?
3. How many universities require educational technology courses for undergraduate education majors?
4. What is the position distribution and K-12 experience of the faculty members in the undergraduate pre-service educator program at each university?

3.4 Study Design

The U.S. universities examined for this research study were identified from the data collected through the completed survey instrument submitted by the participants. Multi-strategy methods were employed to gather data for each university and its undergraduate education program faculty members. Undergraduate educator program websites and other electronic formats that are available for public use were examined and data mined for information relevant to the topics of inquiry.

3.4.1 Survey

A Qualtrics online electronic survey was used as the instrument for the study and it was set to not collect participant IP addresses, names, or other information. The survey instrument (located in Appendix A) consisted of 36 items: one informed consent, six demographics, four Boolean (yes/no), three open-ended, and 22 Likert-type questions. All Likert-type questions were adapted from the International Society for Technology in Education (ISTE) 2017 Standards for Educators.

Survey participants were solicited through a social media request in a Facebook post created by the researcher. K-12 educators interested in contributing to an educational technology study were requested to contact the researcher directly through electronic mail. It was assumed in good faith by the researcher that each of the respondents was in fact an educator. The researcher sent the educational technology survey link to each respondent.

For this research study, all participants were assigned pseudonyms using a random name selector application to ensure confidentiality. These pseudonyms are referenced in later sections for consistency in reporting participants’ responses on the Educational Technology Course survey. The universities attended by the survey participants for their undergraduate pre-service educator programs were also given pseudonyms as a secondary means of maintaining confidentiality.

3.4.2 Multi-Strategy Analysis

This study incorporated the multi-strategy method for data analysis (Robson & McCartan, 2016). University websites and other electronic sources as well as other publicly available websites were used to collect data to address each topic of inquiry. Upon the completion of the data collection process, all data were consolidated in electronic spreadsheets and organized by participant, university, and undergraduate teacher education program faculty.

Survey responses, both qualitative and quantitative, were stored in an electronic spreadsheet organized by participant. Participant data were analyzed using non-positivistic statistical analysis. These data were then charted, and descriptive analysis was employed to explain the findings in greater detail. Qualitative data were coded into three categories: positive, negative, and undecided. Data resulting from this coding process was presented in tabular form and then graphed to aid in comprehension.

The first coding category represented responses that were generally positive regarding educational technology use. Responses in this category supported the use of technology in education. Feedback reflected a belief that the participants academic experiences in the undergraduate teacher education programs supported their knowledge in the use of technology in education.

The second category used in the coding process reflected generally negative views of technology. This category represented responses that were not in support of the use of technology or the belief that the undergraduate teacher education program attended by each participant supported their use of technology in education. Data resulting from this coding process were then transferred into a chart format and graphed for visual comprehension.

The final category utilized during the coding process was labeled “undecided”. In this group, participant responses reflected neither agreement or disagreement with support of the use of technology in education. Responses in this category reflected ambivalence in participant belief in the support they received through the undergraduate degree program they attended. Survey participants’ undergraduate degree programs were further analyzed individually as the final step in this process.

University data were consolidated into a single workbook consisting of multiple worksheets. The workbook included one worksheet for each university and a summary worksheet. Data collected for each university included demographic statistical values, details regarding undergraduate degree program offerings/requirements, TPACK inclusion within content courses, and documenting any changes these programs may have had regarding stand-alone educational technology courses over time. Data related to faculty for these undergraduate pre-service educator programs at each university were also analyzed.

Faculty data were collected from university websites, faculty profile pages, and public access LinkedIn profiles. All instructional faculty for each university undergraduate teacher education program were identified through university websites. Data for each faculty member included faculty position ranking and prior K-12 experience. These data were then analyzed using a comparative calculation process, comparing each as a percentage to the whole.

3.5 Sources of Data and Data Collection Activities

Study data were collected from the completed online survey for each participant, publicly available university websites, university faculty profile pages, and each faculty member's LinkedIn profiles. University statistical data were also collected from each of the publicly available university websites that participants attended. Additional data were extracted from course descriptions, course catalogs, and any other publicly available relevant sources.

- Course catalog - The course catalog was utilized to confirm course offerings and requirements. Information found on this site may include details for current or prior courses.
- Course description - Course descriptions were used in the absence of an educational technology course offering. Information obtained from this source was used in the coding process to determine if an independent educational technology course had been merged into another course offering.
- LinkedIn - This website for professional connections was used to review the employment background for the university faculty member. This review was done to determine if each faculty member had prior K-12 experience.
- University websites - This source was used as the starting point for all research conducted at the individual university level. The site could include specific pre-service educator program offerings or general program information.

3.6 Summary

This research study focused on universities pre-service education programs, program faculty, and survey participants perspectives in regard to program course requirements/offerings for educational technology. Secondary topics of inquiry including position distribution and K-12 experience for faculty, TPACK inclusion, and program changes were also examined. This chapter described the survey process, universities identified, and the analysis procedures utilized within the research. An inclusive depiction of the overall research was exhibited. In the next chapter survey results, data analysis, and study findings are presented.

CHAPTER 4

FINDINGS

This chapter presents the findings and analysis of qualitative data from two sources: a Likert-type survey instrument and university data collected from public access websites. First, an overview of demographic findings is reviewed. Following this, the website data analysis and survey findings are presented. This chapter concludes with a comprehensive comparative analysis of the survey responses and university data.

4.1 Demographics Outcomes

The Likert-type survey was distributed through direct and indirect channels, including electronic mail and social media. There were 21 participants that responded to the survey and of those, one was disqualified due to an incomplete survey. The remaining 20 (95.3%) participants' survey responses were analyzed for this research study. Based on the geographical distribution obtained, the majority 12 (60%) completed their degrees at universities in the south central United States. The remaining participants received their education degrees from universities located throughout the United States. Locations for these 8 (40%) were nearly evenly distributed with two (10%) from the southeastern United States, three (15%) from the northeastern United States, two (10%) from the northwestern United States, and one (5%) from the southwestern United States. The distribution of participants and the universities should reduce the probability of over-saturation and bias from any geographic area within the United States. Table 1 shows the participants and basic educational and workplace demographic information.

Table 1

Participant Degrees

Name	Highest Degree Obtained	Year Earned	Public/Private	Grade/Subject Taught
Sydney	Master's	1993	Public	9-12 / ELA
Mike	Master's	2012	Public	8th / Science
Clay	Bachelor's	2012	Public	K / All
Peggy	Master's	2015	Public	3rd / All
Theresa	Master's	2016	Public	2nd / ESL
Brooke	Master's	2015	Public	1st / ESL
Joel	Bachelor's	2010	Public	K / All ESL
Rochelle	Bachelor's	2001	Public	2nd / Reading
Brandy	Master's	1996	Public	9-12 / Technology
Miquel	PhD	1985	Public	4th / All
Maggie	PhD	2006	Public	3rd / All
Edna	Bachelor's	2008	Public	9-12 / Business Ed
Kristopher	PhD	2010	Public	9-12 / Government
Judy	Bachelor's	2008	Private	8-12 / Computer Technology
Gretchen	Master's	2007	Public	7-8 / English
Caleb	PhD	2005	Private	9-12 / Speech Language
Juanita	Master's	1982	Public	9-12 / English
Latoya	Master's	2001	Public	2-4 / Math, English, Reading
Stella	Bachelor's	2009	Public	4 / Math, Science
Erik	Bachelor's	2003	Public	4 / Spelling

The 20 participants obtained their teaching degrees between 1982-2016, earned from public and private universities located throughout the United States. Participants had at minimum a Bachelor’s in Education with the majority earning a masters or Ph.D. Grade levels currently being taught range from kindergarten through grade 12. There were 11 (55%) elementary, two (10%) middle school, and seven (35%) high school educators who participated in this research study. To capture participants, the researcher posted a request on social media asking educators interested in completing an educational technology survey to please send an email directly to the researcher. Once an email was received, the researcher sent the educational technology survey link to the participants to complete. It was assumed by the research that each person that responded was an educator as they had stated.

4.2 Educational Technology Course Survey

The survey instrument consisted of 36 questions and is located in Appendix A. Of those, there was one informed consent, six demographics, four Boolean (yes/no), three open-ended, and 22 Likert-type questions. All Likert-type questions were adapted from the International Society for Technology in Education (ISTE) 2017 Standards for Educators. Regarding questions involving course offerings, there were ten (50%) teaching programs that offered stand-alone educational technology courses. Teaching programs attended by the other ten participants offered only elective educational technology courses. Twelve (12) (60%) responses related to teaching programs requiring a stand-alone educational technology course. Participants responded to a Likert-type scale, shown in Figure 1, with a range of seven possible answers (*strongly agree* to *strongly disagree*) allowing them to rate if courses in their degree program prepared them for different situations and responsibilities that an educator in the classroom may encounter.

During the analysis process, data related to course offerings and program requirements were categorized into two thematic groupings; *positive* and *negative* perceptual responses related to educational technologies. These categories were then compared to responses regarding whether the participant believed their degree prepared them for the use of educational technology in the classroom. Of the 60 responses, 27 (45%) were categorized as viewing their preparation as not adequate to ready them for technology integration and 33 (55%) viewed their preparation as positive.

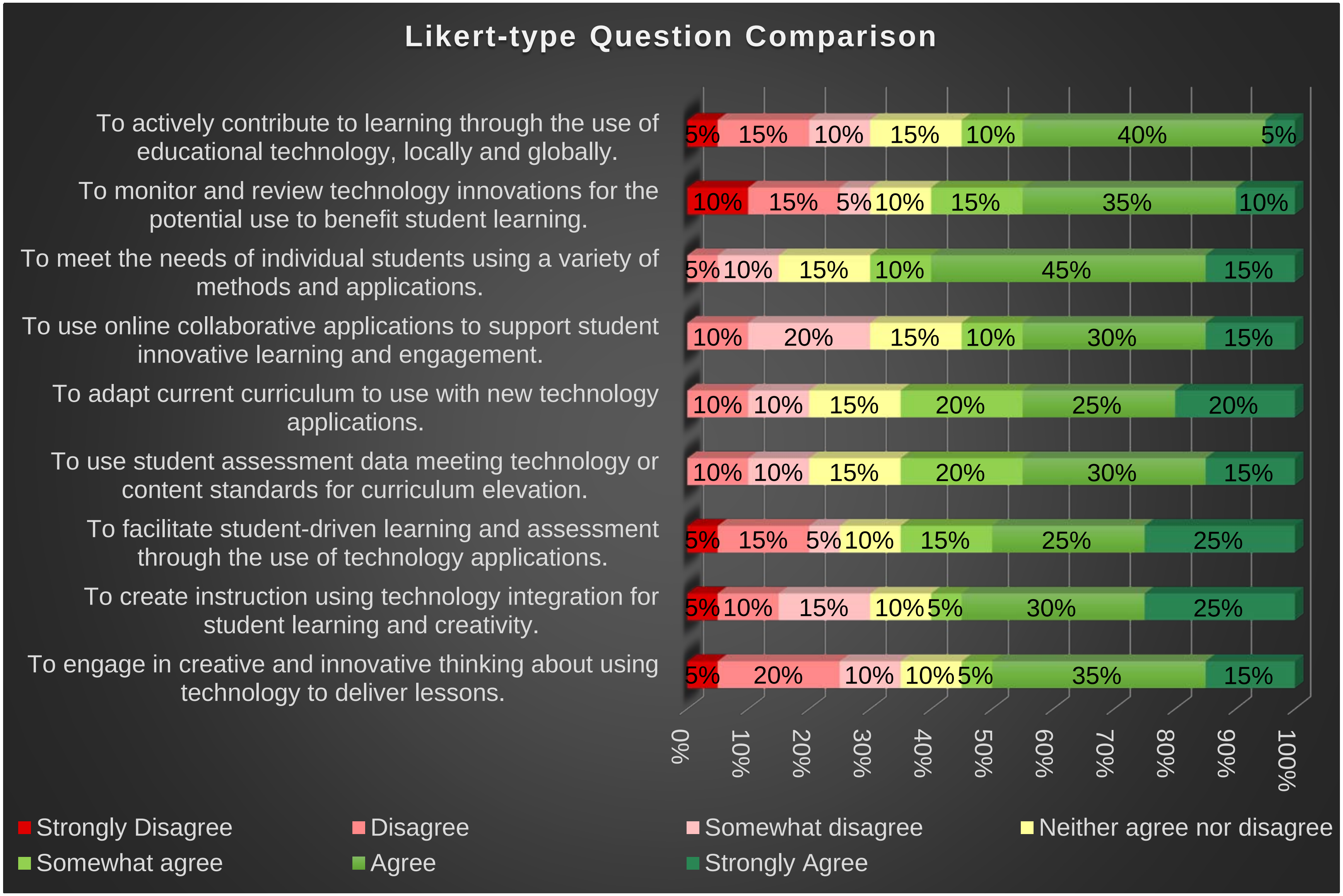

Figure 1. Likert-type Question Comparison – Educator survey responses.

Due to the inverse responses from the participants it should be noted by comparison, responses related to degree preparation resulted in 11 (55%) negative and nine (45%) positive. From this outcome, participants felt confident in their own use of educational technology today, but they did not believe that their degree program prepared them for the use in their future classrooms. On the job experience and/or professional development training could explain the participants' confident views of their abilities to use educational technology.

One participant was an outlier among the participants and answered negatively to all questions related to the quality and preparation value of the course offerings and degree program requirements. The participant indicated that neither required nor elective educational technology course(s) were available during their degree program. By comparison, three participants answered affirmatively to all questions regarding course offerings and program requirements, indicating their universities required or offered educational technology course(s) during their degree program as a means of preparing future educators to integrate instructional technology in different curricula and lessons. However, related to the degree preparation, they answered negatively in terms of the value they received from the courses and program requirements, indicating they perceived that the course instructors did not focus on the importance of educational technology either in lectures, curriculum, or both. However, they answered affirmatively to the question regarding the degree preparation. This indicated that they perceived that their undergraduate pre-service educator degree program prepared them to effectively use educational technology in their future classroom. However, there was no stand-alone course and TPACK as a technology integration tool was not used in the course.

These findings reveal a conflict in participants' perception of their preparedness in relation to the use educational technology and the formal education that they received.

4.2.1 Preparation to Create Technology-Inclusive Instruction

The first question, noted in Figure 2, asked the participants if their educator degree programs had prepared them to create instruction using technology integration for student learning and creativity.

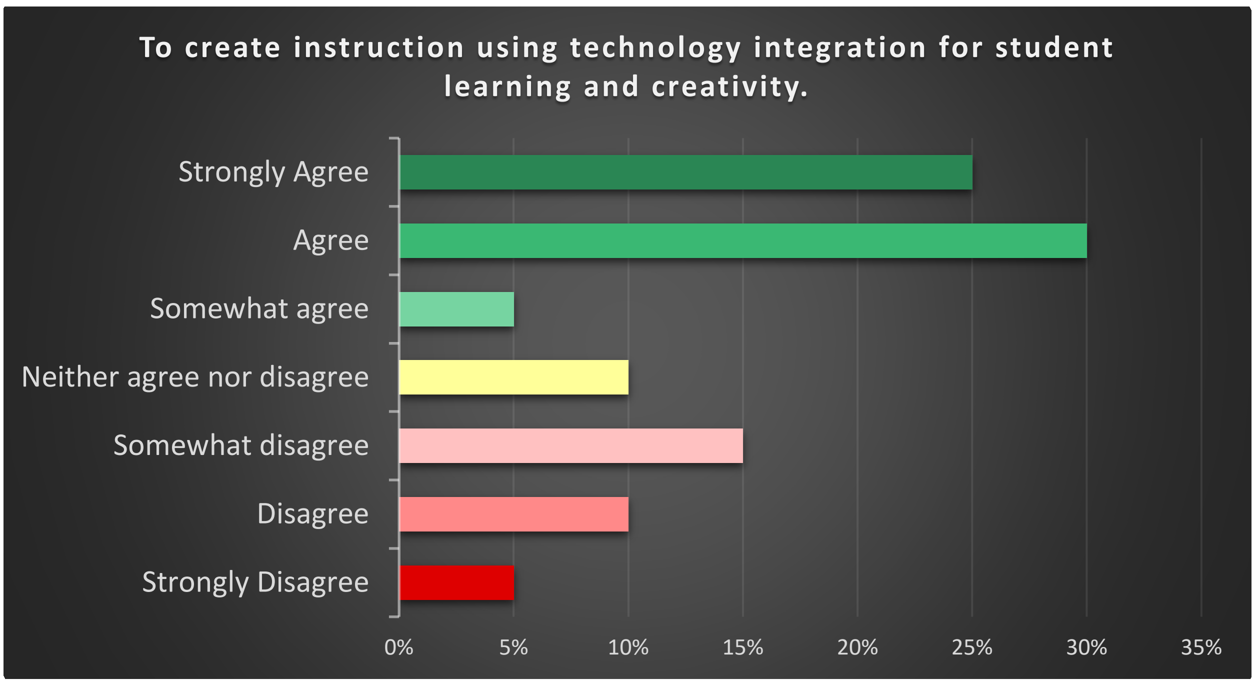

Figure 2. Individual educator survey responses – Create technology integrated instruction.

Slightly more than half (12) of the participants perceived that coursework positively prepared them to effectively integrate educational technology into instruction for learners in their classroom and use these technology elements in a creative manner as a result of their pre-service educator degree program. However, six (30%) participants replied that their degree plan coursework did not, while the remainder (2) stated that they neither agreed or disagreed. Therefore, most participants believed that their educator degree program sufficiently prepared them to create instruction incorporating educational technology to enhance the learning environment creatively.

4.2.2 Preparation for Use of Learner Assessment Results

The next question focused on the educators' perception of whether their degree programs prepared them for meeting or exceeding technology or content standards for curriculum evaluation and the results are presented in Figure 3.

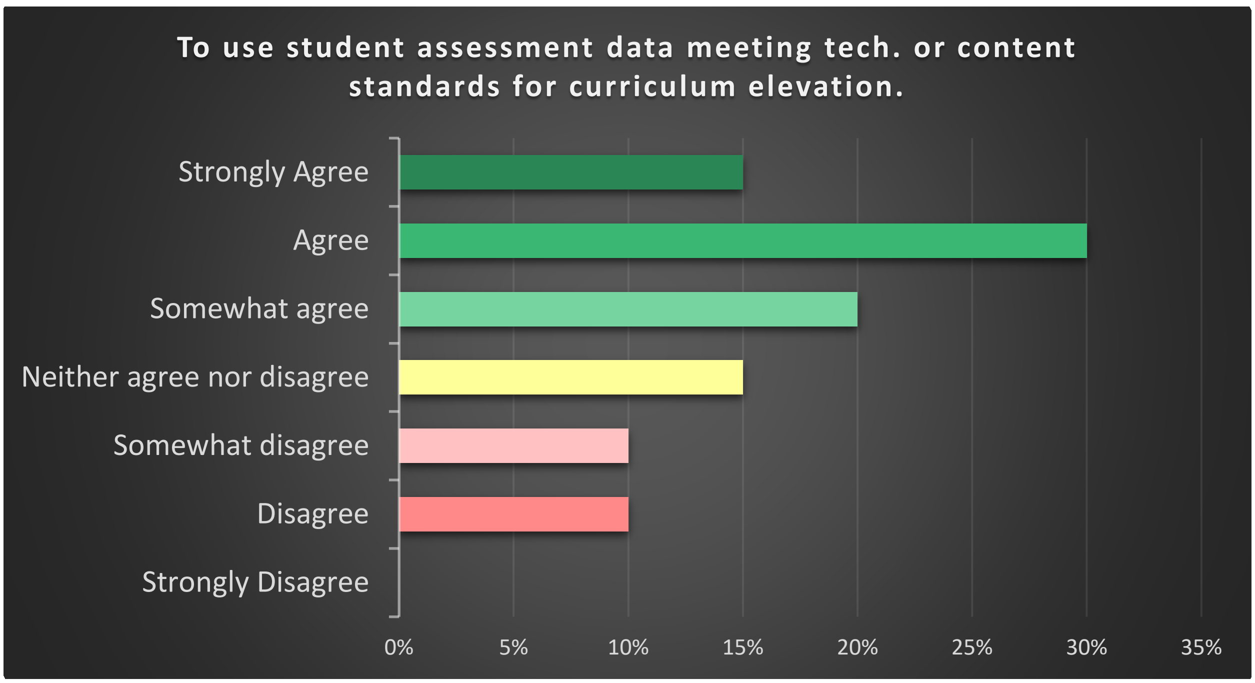

Figure 3. Likert-type educator survey question – Use of learner assessment data to meet standards evaluation.

This indicated that 13 (65%) participants were confident that coursework during their pre-service educator degree program prepared them to use assessment data of the learners to meet technology or content standards for evaluation of the classroom's curriculum. However, four (20%) participants replied that their pre-service education degree's coursework did not prepare them and the remaining three (15%) claimed that they neither agreed or disagreed.

4.2.3 Preparation for Creative and Innovative Use of Technology in Teaching

Participants were also asked whether their degree programs prepared them to engage in creative and innovative thinking when using technology to deliver lessons and the results are presented in Figure 4.

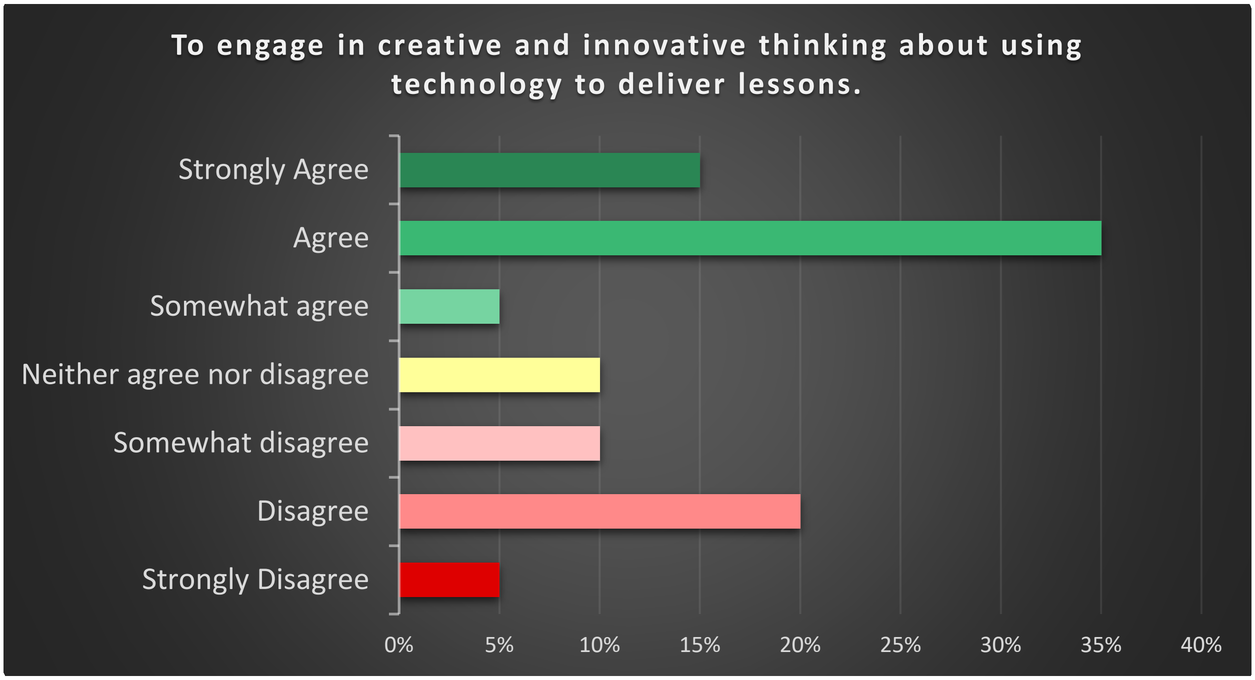

Figure 4. Likert-type educator survey question – Creative and innovative thinking concerning technology.

This indicated that 11 (55%) participants positively perceived that coursework during their pre-service educator degree program prepared them to use creative and innovative thinking regarding the use of technology for lesson delivery. However, seven (35%) participants replied that their degree plan coursework did not prepare them for such innovative lesson delivery development.

4.2.4 Preparation to Facilitate Learner-focused Curriculum and Assessment with Technology

Participants answered if their degree programs prepared them to facilitate student-driven learning and assessment using technology applications in the classroom (Figure 5).

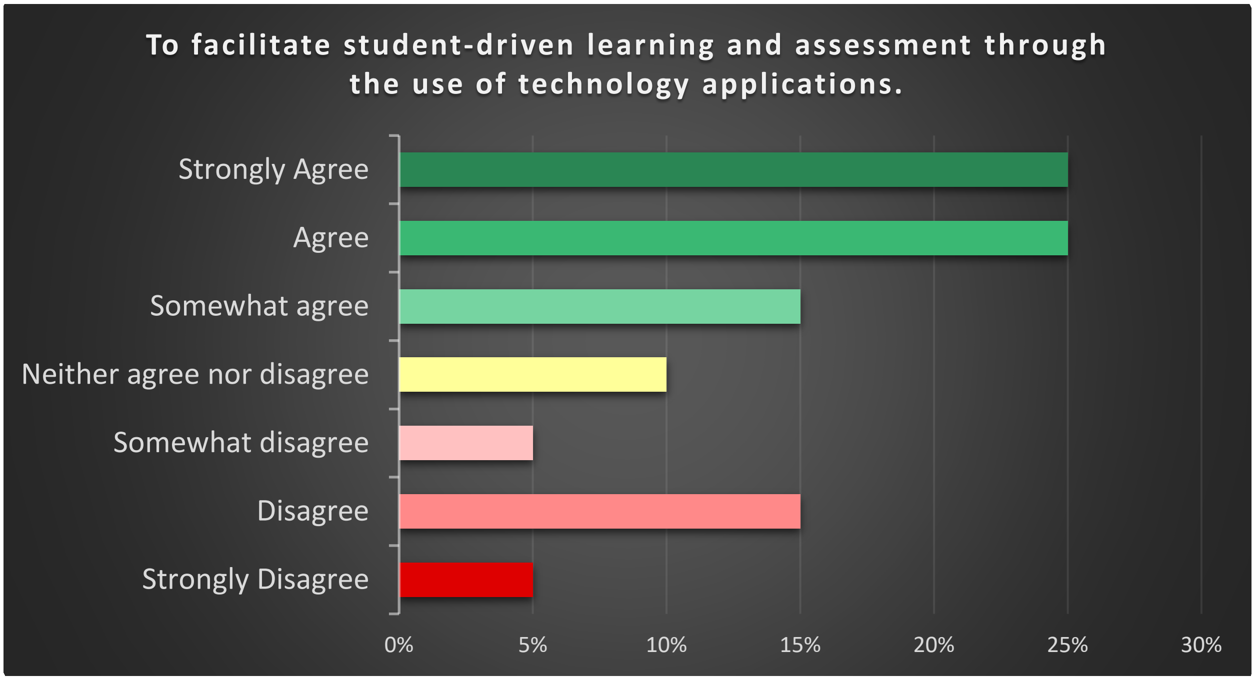

Figure 5. Likert-type educator survey question – Facilitation of technology to promote learner-focused curriculum.

Responses to this question show 13 (65%) participants perceived that pre-service educator coursework positively prepared them to successfully facilitate learner-focused curriculum and assessment using technology applications. The majority responded that they could confidently use educational technology applications to assess learning, which is a major focus of many public schools. While these participants accounted for a larger portion of all participants, one would reasonably expect a greater positive response due to the nature of the education programs as preparatory spaces for future expected practice. However, five (25%) participants replied that their degree plan coursework did not prepare them and two (10%) participants stated that they neither agreed or disagreed, which is still not a positive endorsement of their programs. A substantial number of those surveyed to felt that they entered the teaching profession unprepared to use technology to support an active learning environment, given that educator preparation programs are intended to offer such skills and public schools need trained educators walking through their doors to teach on the first day of school.

4.2.5 Preparation to Infuse Educational Technology into Current Curriculum

Participants were asked, shown in Figure 6, if their degree program prepared them to adapt current curriculum to use with new technology applications.

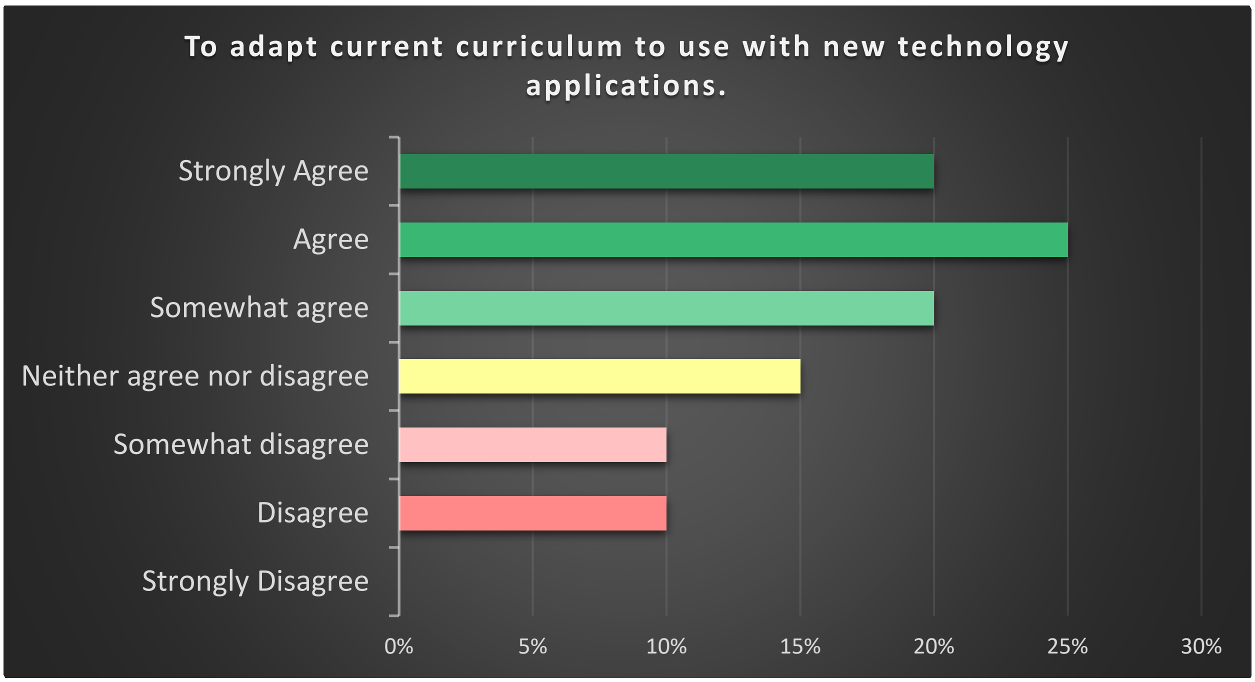

Figure 6. Likert-type educator survey question – Adapting curriculum with the integration of technology.

It was found that 13 participants (65%) indicated positive perceptions of the coursework, noting that it allowed them to successfully adapt current curriculum to use technology application elements. However, four (20%) participants replied that their degree plan coursework did not prepare them and remaining three (15%) neither agreed or disagreed. This could negatively impact school outcomes if they fail to meet state technology standards or disengage learners.

4.2.6 Preparation to Evaluate Technology Innovations for Learner Benefit

For this question, participants responded with their perceptions regarding whether their degree program prepared them to monitor and review technology innovations used to benefit learners and the results are shown in Figure 7.

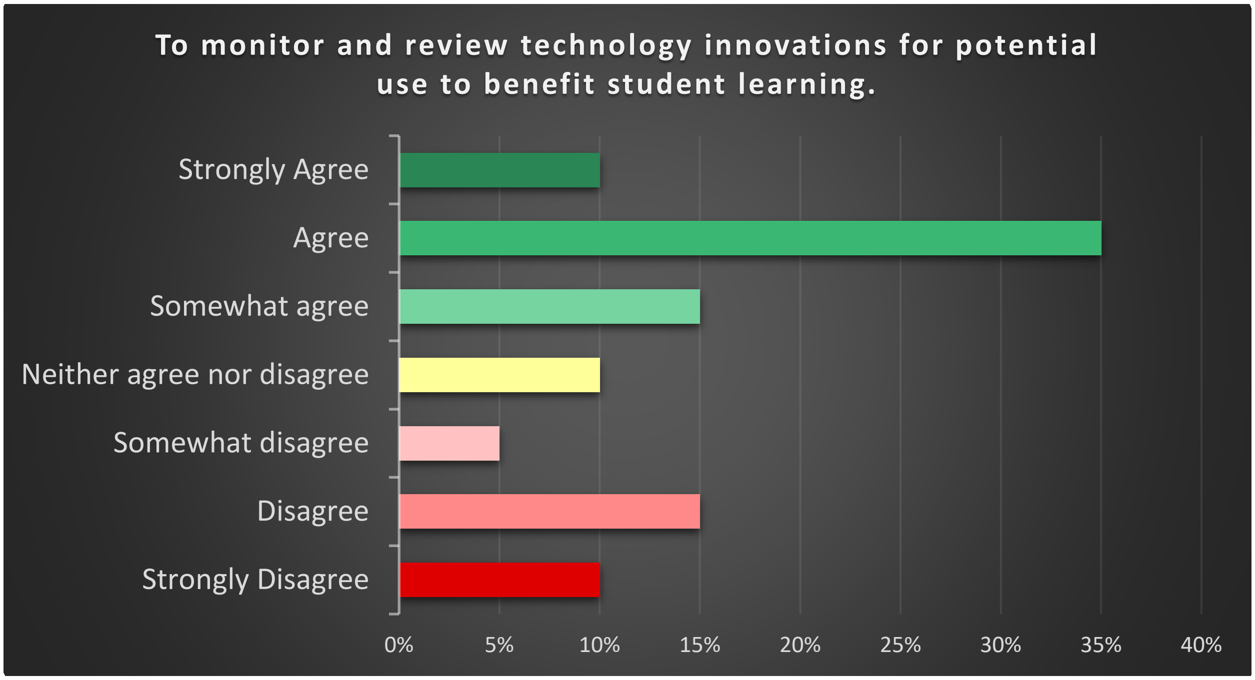

Figure 7. Likert-type educator survey question –Monitor technology innovations for learners' benefits.

Participant responses were primarily positive, with 12 (60%) participants positively perceiving that pre-service coursework prepared them to monitor and review innovations in technology for plausible benefits for each learner. However, five (25%) participants replied that their degree plan coursework did not prepare them to successfully stay current and fund new technologies; which is unfortunate, as such skills are commonly expected of educators in today's K-12 schools. This could put them at a disadvantage when they are reviewed for retention by administrative evaluators or peers.

4.2.7 Preparation to Support Individual Learners' Needs Through a Variety of Technologies

Participants responded to whether they felt their undergraduate universities prepared them to meet the needs of individual students using a variety of methods and applications, as shown in Figure 8.

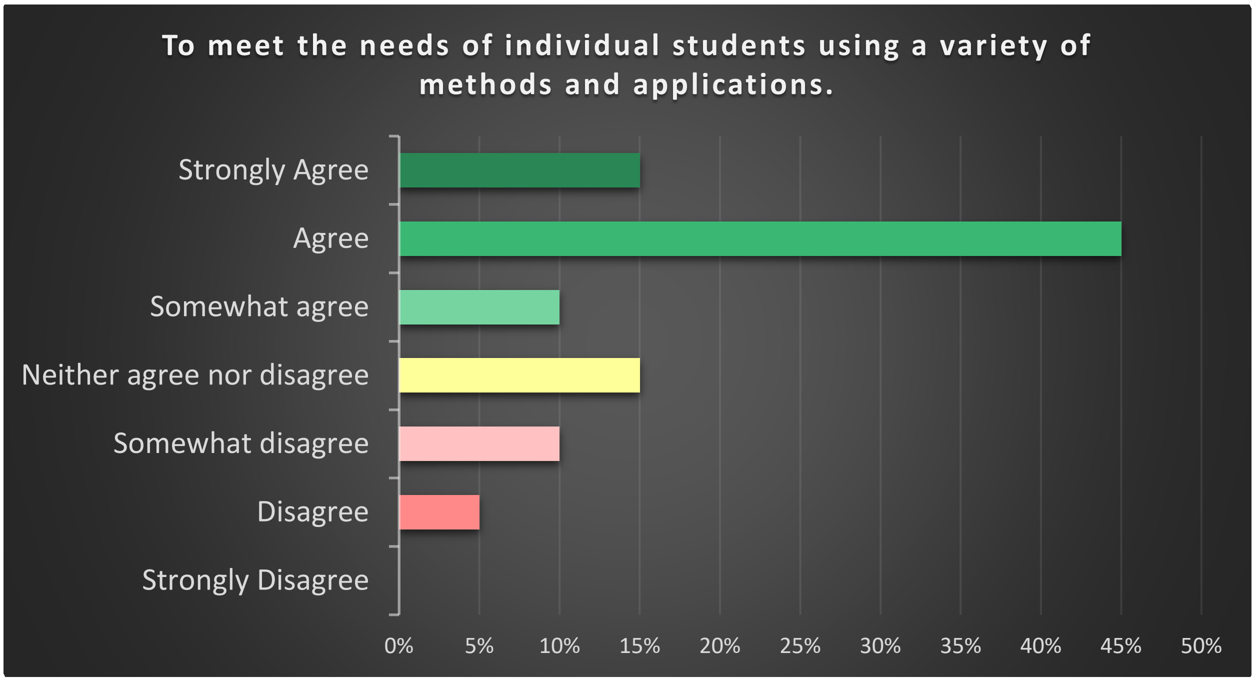

Figure 8. Likert-type educator survey question –Meet the needs of each learner using a variety of methods.

This question revealed that a large majority (15) of participants constituting 75% of the group positively perceived that coursework prepared them to successfully meet the needs of individual learners using a variety of methods and applications. The feedback showed most participants felt their program aided their ability to adapt their methods and applications on an individual basis. Only three (15%) participants that did not feel that their program was helpful and three (15%) neither agreed or disagreed, which is unfortunately still a substantial number from the sample. However, considering that 75% of the participants responded positively, it is likely that educator programs consist of courses that illustrate to their pre-service educators the importance of using varying methods and applications to meet the needs of each learner in their classrooms. This may be problematic for programs where the stand-alone course(s) are eliminated in favor of teaching technology skills through content methods courses, especially if the instructor lacks high technology integration knowledge and skills themselves.

4.2.8 Preparation to Use Collaborative Technologies

Figure 9 presents how participants viewed whether their degree programs readied them to effectively use online collaborative applications to support learners through innovative learning and engagement.

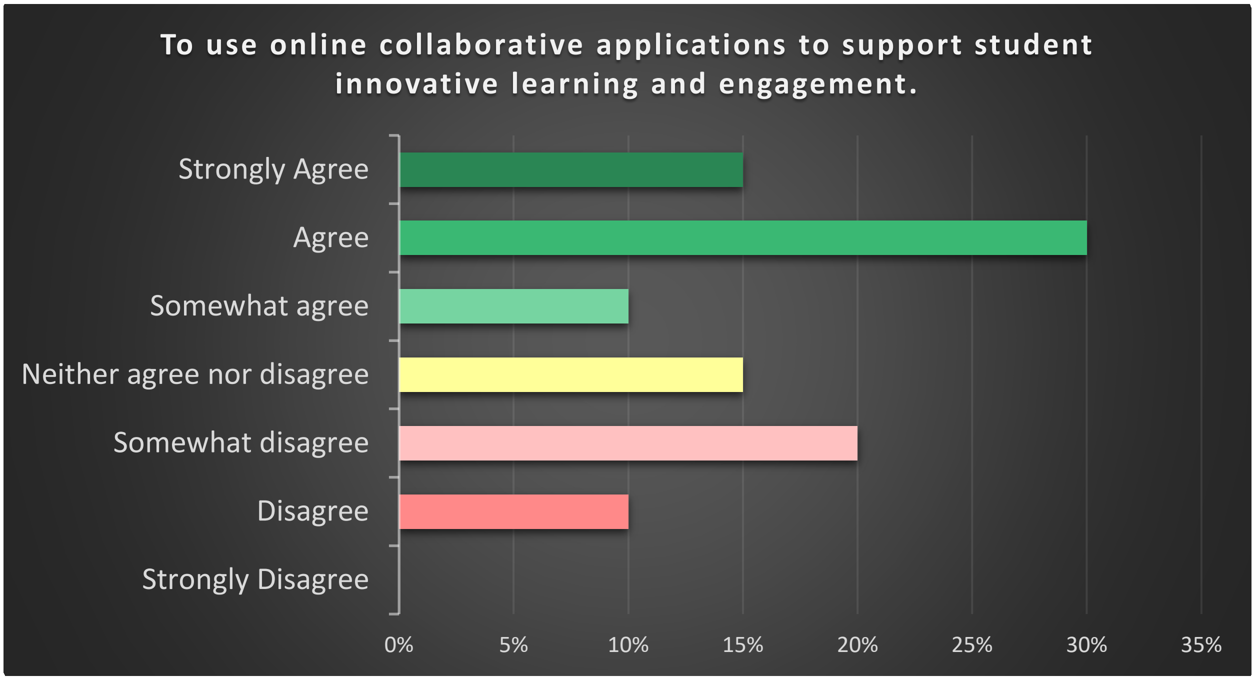

Figure 9. Likert-type educator survey question –Use online collaboration to support learners.

This indicated that 11 (55%) participants positively perceived that coursework during their pre-service educator degree program prepared them to effectively use online methodologies. The responses demonstrated that three (15%) Strongly Agreed, six (30%) Agreed, two (10%) Somewhat Agreed, four (20%) Somewhat Disagreed, two (10%) Disagreed, while the remainder were undecided. While most participants responded positively, the number of negative and undecided responses indicate there is still a significant gap that needs to be addressed so that educators are prepared to utilize online resources effectively in K-12 classrooms.

4.2.9 Preparation to Contribute to Learning through of Educational Technology

Participants responses to the question on whether their degree programs prepared them to actively contribute to learning using educational technology, both locally and globally are shown in Figure 10.

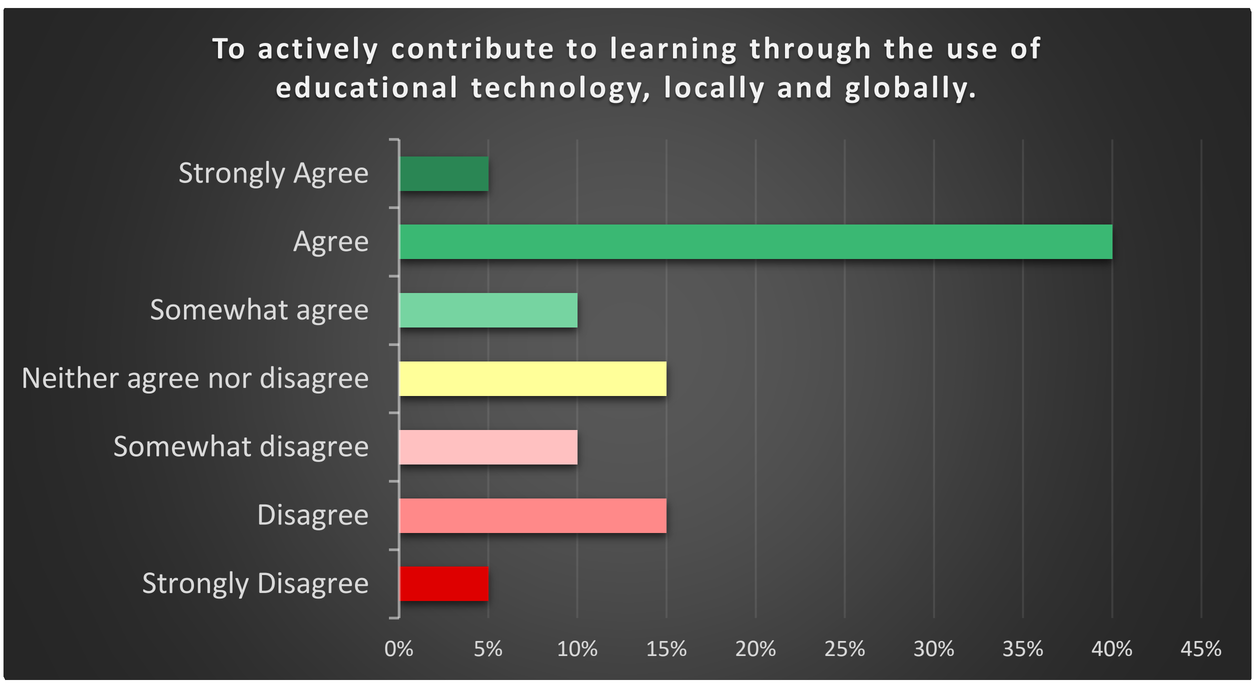

Figure 10. Likert-type educator survey question – Actively contribute to local and global learning with technology.

Feedback showed that 11 (55%) participants positively perceived that their pre-service coursework prepared them to be active contributors to local and global learning with the use of educational technology. However, six (35%) participants replied that their degree plan did not prepare them to work in both local and global environments using educational technology. The remaining three (15%) stated that they neither agreed or disagreed. Almost half (45%) of the participants did not report confidence with their ability to contribute to local and global learning communities using educational technology, which is an expectation from many schools if they are to help those within their classrooms be global 21st Century learners prepared for future work.

These programs are expected to train future educators to teach content, supported by educational technology, and while this is not a large sample, it indicates that many educators have completed these pre-service programs unprepared to do so. Future research with a larger sample should help determine if these findings are commonplace or peculiar to this sample, but it is necessary to further examine this concern. This educational technology preparation deficit is also important to note, considering the increased expectation that learners complete K-12 and higher education programs with advanced technology skills. To expand on these answers in conjunction with the Likert-type scale questions reported in this section, participants were presented with the opportunity to provide additional open dialog in a comment box that was provided. Their responses follow in the next section.

4.3 Participants' Survey Responses

Survey participants were asked to comment regarding any specific feedback, opinions, or other information they wanted to share regarding the use of educational technology in the classroom and their training in pre-service settings. The analysis of the participant responses resulted in a series of themes. In the following sections, these leitmotifs are explored through the participant responses and their demographic information to help better contextualize the Likert-scale responses. The universities and the participants mentioned here are pseudonyms to protect both participants and the schools.

4.3.1 Theme 1: Learning Technologies are Central to Learners in the Future

Several participants attested to the importance of educational technology to their learners as well as the learners' futures. For example, Maggie received her education degree in 2006 from the University of Pallid at a time when educational technology courses and topics were widely included in pre-service educator programs in the U.S., supported by the National Science Foundations "Preparing Teachers to Teach Tomorrow" (PT3) grants to support teaching about technology integration. Maggie primarily answered positively on the survey questions, commenting that, "I believe it's critical to promoting 21st century skills. Educational technology should be integrated purposely beginning as early as Kindergarten to promote higher order thinking."

Also making statements supportive of this theme was Theresa. She strongly agreed that she was prepared to teach with technology in the classroom on the survey and asserted that Northern Hawk University demonstrated the importance of educational technology. Further they taught her to integrate it into the curriculum by modeling its use through her coursework. Theresa said she had experience that this is the case, noting that "Technology has help (sic) me to reach every student learning objective."

Another graduate of Northern Hawk University, Clay, received his bachelor's in education in 2012. He responded positively on all nine survey questions. He noted that, "Integrating technology in the classroom has been engaging and fun for students. Students are constantly challenged to use all types of apps and share them with the teacher, students, and parents." However, when asked what educational technology elements were used in the content-focused courses for pre-service educators at Northern Hawk, Clay responded "Presentation tools including document cameras and digital projectors, Microsoft Office, and Google Docs." These educational technology tools that he listed are typical classroom technology. This participant's experience could indicate that *learner-focused* educational applications were not demonstrated and emphasized within his coursework.

Another participant, Edna, was slightly less positive. However, she had an overall viewpoint that her preparation served as a support for her teaching. She graduated in 2000 from Northern Hawk University, around the time that educational technology integration was just becoming part of pre-service educator preparation curriculum at universities. Edna primarily answered that she either Agrees or Somewhat Agrees that her undergraduate educator degree coursework prepared her to effectively use educational technology in the classroom. She had much to say about her experience with technology in the classroom since graduating, which was influenced by her being knowledgeable about technology use for teaching as she stated,

> I recently completed my 9th year in the classroom. During that time, I have used a variety of ed. tech tools, from Gaggle (teaching email etiquette) to Google Classroom. Because I tend to be an early adopter, I have by default, become a "go to" person for staff members on our campus regarding tech in the classroom.

Beyond her use of the tools and support for others, she noted that

> A few observations I've made over that past few years: there is a disconnect regarding the basic level of understanding of technology between administrators and teachers. There are many basic skills that are assumed as common knowledge by new or tech-savvy individuals yet are foreign to many of our veteran teachers. This is creating a wide array of classroom approaches, and frustration for students needing consistency in delivery styles.

The problem of different delivery styles and approaches that Edna continues to find requires a different way of applying them in the schools, “So, new and fun apps are all the craze, and anyone can implement them; however, I think more focus should be placed on developing a systematic approach, particularly at the secondary level.” It could be interpreted that Edna’s comment implies an underlying frustration between expectations of the school administration’s requirements of the educators and the educators’ current skills with educational technologies.

Contrasting with the first set of participants that were mainly positive about their pre-service educator technology preparation experiences was Sidney. This educator received her Bachelor’s in Education from Montane University in 1983. She did not have a strong opinion regarding her degree program and its preparation for the use of educational technologies, which would have predated the heavy focus on using educational technology that began by the late 1990s, meaning her lack of opinion may be due to the date in which she received her bachelor’s in education.

> As a graduate in 1983, technology was not readily available. I am lucky that our school district continually offers education and support for technology.

Further contrasting with the mostly positive responses was Mike. He answered in a more balanced manner. He graduated with his education degree from Montane University in 2012. Mike’s responses indicated that an existing barrier may be inferred to indicate that he perceived that his pre-service coursework did not model adequately integrating educational technology. This may be partly due to his school context that he noted, “Our demographics allow for a one on one campus system, but the age of our building/wireless infrastructure does not support this system.” This is a major educational barrier, as discussed in Chapter 2, because Mike’s situation is similar to those of other schools with poor facilities and equipment made available to some educators. It is important that this is further explored to determine if the problem comes primarily a local building financial issue, strategic resource allocation problem state, district, or other level, or lack of administrative support for the use of technology resources, restricting them from reaching classrooms. The barrier can be seen to affect both the educator and the learner, and it is important to understand where the systemic bottleneck occurs that keeps the resources from reaching these stakeholders. Building and technical constraints can directly affect the learning experience and limit the educator to a less technology focused curriculum to scaffold for learners and improve the acquisition or construction of new knowledge.

4.3.2 Theme 2: Common Learning Technologies Identified by Participants

The educators in this study were asked to list the educational technology elements by either the instructors or themselves during their content-focused pre-service education coursework. The researcher sought to discover which educational technologies were most strongly promoted by the instructors to support learners. Of the 20 participants, 15 responded that they learned how to use digital presentation tools, productivity tools (e.g. Microsoft Office, Google Docs), and digital cameras. No participants discussed the use of online educational websites or applications as a supplemental aid for learning and engagement, which means that their training was focused primarily on learning hardware and basic software, rather being supported in their exploration of the vast array of educational technology resources available on the Internet that could be integrated into lessons.

Another challenge was the conflicting answers given by the participants. Some agreed that they had high self-efficacy and knowledge of with the use of educational technology, but had difficulty showing how this was the case. This gap may be contributed to the Dunning-Kruger Effect. According to Schlosser, Dunning, Johnson, and Kruger (2013) the Dunning-Kruger Effect exists when a level of expertise must be present to effectively rate one's own performance in domains such as social skills and intellectual abilities. Just as when a person who is unable to attain a desired level or skill they would not serve as an adequate authority in determining when the desired level or skill has been acquired. Likewise, someone exhibiting the Dunning-Kruger Effect would not be able to ascertain how inadequate their own skills or performances are in relation to their peers. Furthermore, due to their self-recognized level of flawed expertise on the topic or skill, one is incapable of perceiving the missing elements within themselves. In the context of this study, participant's overestimation of their level of competence achieved resulting from what they were taught during their education program conflicts with the actual educational technology competency of each participant.

These educators' responses indicated that they highly value their abilities in teaching, creating new curriculum, and integrating curriculum with educational technology applications. Participants' responses were based upon their individual university's pre-service programs. However, a substantial number of the participants said that their undergraduate education program did not prepare them to effectively use and integrate educational technology into curriculum and they had to learn the skills on their own or after they were already in the classroom.

4.4 Universities Pre-service Educator Programs and Learning Technologies Courses

The survey and open-ended qualitative responses stem from these educator participants' experiences during their university programs, but these do not specify the curricular gaps in the programs. Therefore, it was important to examine the current state of pre-service education curriculum regarding educating pre-service educators to use learning technologies. The public websites for the college or school of education, located within each university that these participants attended for their undergraduate degrees, were reviewed to provide a sample of programs to understand the current state of pre-service educator program approaches. The findings are divided into three main areas used to examine this topic of inquiry.

1. Program description
    a. Total student body population
    b. Number of students enrolled in the undergraduate pre-service educator program
2. Educational technologies curriculum and course description
    a. Presence of a stand-alone educational technology course currently or whether there was one offered in the past
    b. Presence of a stand-alone educational technology course presently being offered
    c. Whether the educational technology course was required or offered as an elective

3. Whether program instructors in the program were expected to incorporate TPACK into content focused courses rather than offer a stand-alone educational technology course

Each university is listed in Table 2. There were 15 public and private universities analyzed, because multiple participants responded with the same universities for their undergraduate educator degrees. All identifying university information has been removed to further ensure the confidentiality of the participants and the universities.

Table 2

Educational Technology Course Survey Responses

Educators' Universities - College of Education Data	University Data Collection Questions						
	Size of student body	Number of students enrolled in the undergrad ed. Program	Stand-alone ed. tech course ever offered in the program?	Stand-alone ed. tech course currently offered for program?	Required	Elective	Use of TPACK in content courses?
Northern Hawk Univ.	38,081	1,322	Y	N	N	N	N
Santa Marta Univ.	8,798	429	N	N	N	N	Y
Grand Comoro Univ.	773	NF*	Y	Y	Y	N	Y
Sunda Univ.	3,424	529	Y	Y	Y	N	Y
Micrathene Univ.	1,121	NF*	Y	Y	Y	N	Y
Usambara Univ.	11,463	2,296	Y	Y	N	Y	Y
Surnia Univ.	29,307	508	Y	Y	N	Y	Y
Andaman Univ.	22,317	2405	Y	Y	Y	N	Y
Pallid Univ.	37,022	685	Y	Y	Y	N	Y
Nicobar Univ.	11,950	1,103	Y	Y	N	Y	Y
North Tawn Univ.	36,088	2,152	Y	Y	Y	N	Y
Rio Napo Univ.	51,232	5,753	Y	Y	Y	N	Y
Albertine Univ.	24,729	3,564	N	N	N	N	Y
Hume Univ.	28,238	497	Y	Y	Y	N	Y
Montane Univ.	31,209	3,223	Y	Y**	N	Y	Y

*Not Found
**Course is offered, but only at the secondary level

Overall, the student body size for the schools ranged from 773 to 51,232. One university has a student body size of 773 and publicly acknowledged its desire to maintain a small, close-knit campus. This information was retrieved from the Institutional Review Board or the Fact Book for each university. These numbers are from 2016 or 2017 data and represent the most current information publicly available for the universities. The number of students enrolled reflected in Table 1 were acquired from the public information available from the Institutional Review webpage or the most current Fact Book listed by each university. This information could not be located for two (2) universities despite multiple searches of their websites. For the remaining schools, the size of the undergraduate pre-service educator programs ranged from 429 to 5,753.

To determine whether each university has offered a stand-alone educational technology course, degree plans for this specific degree where analyzed for the previous 15 years using the individual university websites. When analyzing the previous 15 years of degree plans it was found that two (13%) universities' degree plans did not show a stand-alone educational course as either a required or elective option. However, 13 (87%) included a stand-alone educational technology course, either listed as a requirement or an optional elective on the degree plan.

Current degree plans were evaluated for each of these universities. Three (20%) universities do not currently offer a stand-alone educational technology course, either required for a teaching degree or available as an elective option. Twelve (80%) institutions currently offer a stand-alone educational technology course. One of the universities that currently offers a stand-alone educational technology course only has it available to pre-service educators who focus their degrees on secondary education.

An examination of current degree plans for the universities indicated that seven (47%) do not have a stand-alone educational technology course requirement. Eight (53%) require that an educational technology course be completed to meet the degree plan requirements for their pre-service educators. Additionally, four (27%) have an educational technology course offering for pre-service education majors in the K-12 pre-service degree program. However, 11 (73%) currently offer no elective course for educational technology. The courses listed on each degree plan were researched to locate the most current course descriptions. Using these descriptions, 14 (93%) program sites noted that they use elements of TPACK in the required content courses for their pre-service degree plans.

This is an important consideration, because our field widely considers TPACK to be an important addition to the subject-specific courses that pre-service educators must complete to fulfill degree plan requirements. An example of this would be a pre-service educator who is getting their education degree to teach high school science, because the focus of this content area requires that multiple college science courses be completed. Framing the course this way allows the pre-service educator to see TPACK in use in multiple science courses and with possibly numerous instructors. By contrast, a pre-service educator obtaining a general focus degree to allow them to teach in a K-6 environment would have fewer content-based courses than the science educator described above. Thus, the future K-6 educator would have less in-classroom hands-on experience for each subject that they will be teaching when compared to the science educator.

Typically, K-6 educators teach each subject as specified by their state's standard for the grade level. Learners in these K-6 classrooms generally do not go between classrooms to learn subjects from other educators. The learners have one educator who must teach the curriculum for all subjects. These K-6 degreed educators typically take a few courses in each subject matter and do not get the benefit of seeing multiple university instructors use TPACK on a regular basis for the individual subjects. A stand-alone educational technology course should allow these pre-service educators to work in a hands-on technology environment using technology elements that could benefit the multiple subject matters that they will be teaching in their K-6 classrooms. Having university instructors with K-12 classroom experience teach these core subject matter and educational technology courses would be another benefit to the pre-service educators. Experienced K-12 educators should also be aware of how to effectively integrate educational technology into the K-12 learning environments to engage learners and encourage the scaffolding of new information.

4.5 University College of Education Faculty Members

The second examination of each university's education focused on their websites to determine the demographic makeup of the faculty teaching educational technology and pre-service educator preparation courses. If "Teacher Preparation" was not a listed division of the university's College of Education, then faculty members of Curriculum and Instruction were included in the next part of the study. Faculty members were classified by their description on the website and grouped as professor, assistant professor, associate professor, and other. The other group was composed of adjuncts, lecturers, or when a title was not indicated. Across all selected schools, there were 616 faculty members, Figure 11, listed between the 15 universities that were indicated in the survey responses.

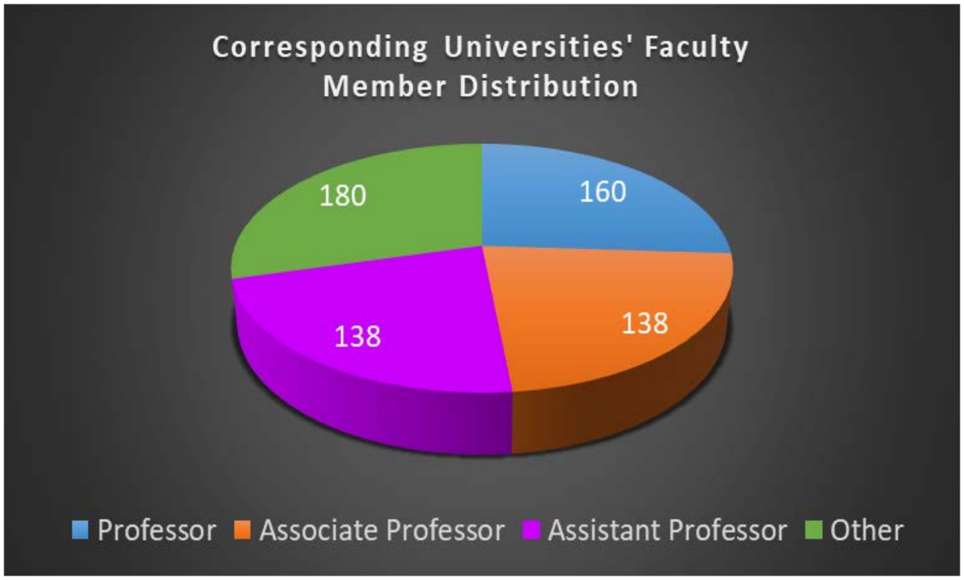

Figure 11. Corresponding universities' faculty member distribution.

These 616 faculty members consisted of 160 (26%) professors, 138 (22.4%) associate professors, 138 (22.4%) assistant professors, and 180 (29.2%) others. Those categorized as other were aggregated from the lower faculty positions comprised of adjuncts and lecturers. Those without titles on the university's website, LinkedIn, and without curriculum vitas (CVs) to confirm actual position title were placed in the Other group as well. Each grouping was further analyzed, and Figure 12 depicts whether faculty members had prior experience with teaching in a K-12 classroom environment.

In a further effort to identify and classify faculty members with this experience their faculty profiles, curriculum vitae (CV), and LinkedIn profiles were investigated. Upon the examination, three categories emerged; Yes, for those with K-12 experience, No, for no K-12 experience, Unknown for no information, limited information, or no CV on file. Of the 160 professors, it was found that around 61 (38%) had prior K-12 classroom teaching experience, about 36 (23%) had no prior experience, and the remaining 63 (39%) could not be determined.

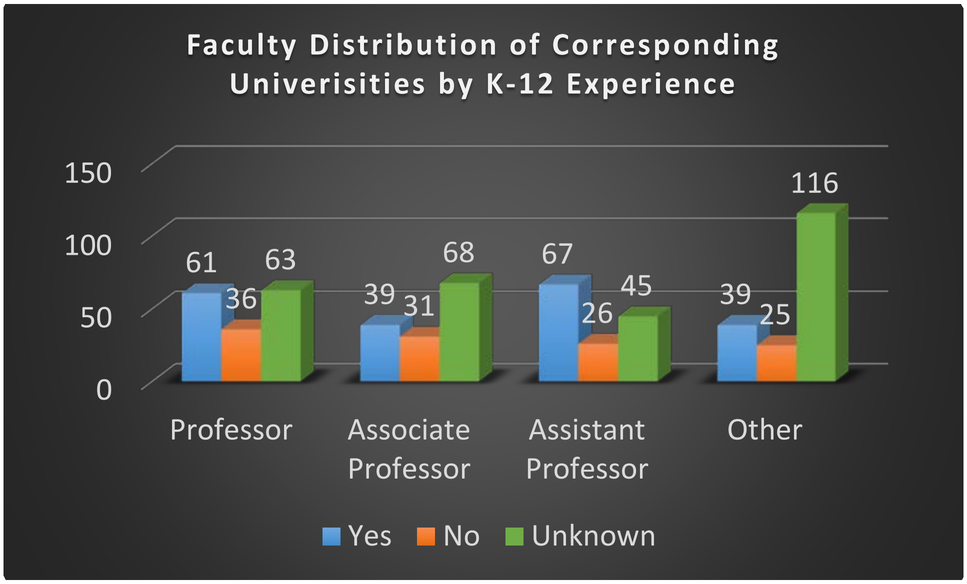

Figure 12. Faculty Distribution of corresponding Universities.

In the associate professor grouping of 138 (22.4%), it was found that 39 (28.2%) had prior K-12 classroom teaching experience, and 31 (22.5%) had no prior experience, while there was insufficient information to determine the status of the other 68 (49.3%). The 138 (22.4%) assistant professors' online profiles and CVS for these universities researched to determine that 67 (48%) had prior K-12, and 26 (19%) had no prior K-12 classroom experience, and the remaining 45 (33%) could not be determined.

Analysis of the 180 profiles and CVs for official instructional faculty members in Other found that a smaller percentage of instructors 22% (39) had prior K-12 classroom teaching experience, 25 (14%) had no prior experience, and 116 (64%) could not be determined. With the large quantity of unknown K-12 experience among faculty members it is difficult to determine the actual amount of faculty with this key experience that are instructing pre-service educators in how to use educational technology to support teaching and learning. There were 206 (33%) faculty members of all levels with K-12 experience amongst all reviewed universities, which is not a particularly high number and should be further explored in future research.

4.6 Summary

This chapter synthesized the data collection of a comprehensive research study examining educator survey responses that focused on prior training for the use of educational technology in curriculum of K-12 learners. Initially, 21 educators took the survey through an online web link. However, only 20 out of the 21 completed the entire survey instrument. The remaining responses from the removed participant were disqualified for the research study analysis. The remaining 20 participants had received their Bachelor's in Education degree between 1982-2016.

Responses for nine of the 36 questions were further analyzed to determine if commonalities amongst the educators' replies could be shown. Overall, most participants responded with about the technology-based classroom skills despite having obtained their education from 1982-2016. The commentary provided by the participants found that they understood the importance of technology integration into the curriculum for the benefit of learners. However, additional participant commentary stated that many of the educators' current skills were learned through professional development workshops or were acquired through hands-on learning within their own classroom. The conflicting feedback may have direct correlation to the Dunning-Kruger Effect, in which a participant has high regards for their own cognitive ability or performance skills, without evidence from practice that would be deemed to be high by an outside evaluator.

In the survey, each participant stated the name of the university in which they obtained their undergraduate education degree. Each university website was analyzed to determine the overall student body population, number of students in the undergraduate education program, stand-alone educational technology ever offered, stand-alone educational technology course currently offered, if the course was required or an elective, and whether the use of TPACK in was taught in the content. The university's Institutional Review department's publicly posted data or the Fact Book were examined to collect the overall student body size and the number of education program undergraduate learners.

Degree plans for the last 15 years were analyzed to determine if a stand-alone educational technology course had been available in the past. The most current degree plan available was reviewed to verify if a stand-alone educational technology course is being offered currently and to determine if this course did exist whether it was required or available as an elective. Courses listed on the current degree plan were further examined to review the course descriptions to determine if TPACK was incorporated in the pre-service educator content-focused courses.

Each universities' College of Education's Teacher Preparation or Curriculum and Instruction departments were examined to determine the number of faculty members with prior K-12 classroom experience. The Teacher Preparation department was the primary focus. However, it the university website did not list this as a viable option then the Curriculum and Instruction department was reviewed for this examination. Each university was given a pseudonym to keep their identities confidential. A total of 616 faculty members from the 15 universities were found. The university's website, faculty profiles, CVs, and LinkedIn profiles were analyzed to correctly place each of the 616 faculty members into three primary groupings; Professor, Associate Professor, Assistant Professor, and Other. The grouping for Other consisted of faculty members whose titles could not be determined, including Adjuncts, and Lecturers. Each of these groupings were further divided into sub-groupings; K-12 experience, No K-12 experience, or experience unknown. This information was necessary to determine the number of instructors with K-12 experience using their own knowledge of classroom curriculum to further scaffold the pre-service educators with the benefits and affordances of the use of educational technology with learners.

One generation of educators must become the first to explore, acknowledge, and effectively integrate educational technology into curriculum. Newly degreed educators should obtain these skills from highly experienced faculty within their undergraduate education program. The findings within this research study show that while some universities have educational technology courses available, many do not. These pre-service educators are graduating with an education degree and not the much-needed educational technology skills that today's learners and society require. This leaves the new educator behind those educators whose education programs emphasize educational technology enriched curriculum. Thus, the learners in these classrooms could be lacking the technology skills that will be needed in the workforce upon graduation. The cycle of technology inferior learners must end, and this should start with the education that the educators are receiving from their universities.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

5.1 Discussion of Results

The purpose of this study was to explore, evaluate, and document the presence of educational technology courses and other approaches used in pre-service education programs to demonstrate how to integrate modern learning technologies into curriculum effectively and emphasize their importance. The main goal was to describe the prevailing trends in these pre-service programs relative to how universities prepare future educators to use educational technology and technology enriched curriculum in the classroom. This exploratory, non-positivistic qualitative study sought to establish a baseline of how and whether technology integration skills are taught in undergraduate pre-service educator programs today. My hope is that it can act as a foundation for future research into possible impacts and educational gaps that stem from no longer offering stand-alone technology courses in an increasing number of pre-service education programs.

A multi-faceted approach was used to provide a comprehensive view of the factors that will have an important role in educational technology immersion in K-12 classroom curriculum. To identify the universities included in this study, a random group of K-12 educators was recruited through a social media posting by the researcher. A survey was distributed via email to those that agreed to participate. Upon survey closure, data collection and analysis began on information collected from the survey participants' answers. Trends emerged regarding the universities attended, the faculty members' highest degrees held, and their K-12 experience. This led to further expansion of the study to include an analysis of all faculty in the teacher education programs at the universities indicated by the survey responses.

The undergraduate educator programs noted by the participants came from a significant number of universities throughout the United States. The size of the universities identified for data collection ranged in size from small and rural to large and urban. To increase the accuracy of the depiction of each school, data were collected from multiple sources. These included public university websites, degree programs, university catalogs, and findings that varied across each institution.

Historically, some programs did not offer and have never offered stand-alone educational technology courses. While most universities continue to offer these stand-alone courses as they have done in the past, one significant finding was that a small majority of the universities studied here do not require a stand-alone educational technology course. This indicates that the many universities' undergraduate education programs have a low perceived value for a stand-alone technology course's ability to support future teachers' technology needs. Given that most districts required that new educators come to their first year of teaching with a reasonable level of educational technology literacy and skills this is problematic. Since the purpose of an education degree is to certify that new educators have this knowledge and possible a base level of familiarity with technology integration into content areas. Failing to include such a course then places the burden of training new educators in this knowledge and skill set on districts, which increases their training costs.

While some of these universities offer stand-alone courses, most have incorporated TPACK into their content area-related courses curriculum. These findings demonstrate the importance that universities have placed on the inclusion of technology in their undergraduate education programs. During the analysis a trend emerged that made it apparent that the universities utilized faculty members with varying rank and K-12 experience to teach their education degree program courses.

The survey results revealed unanticipated outcomes such as participant education, perception of educational technology, and unrecognized skill gaps. The educator surveys yielded universities for analysis and exposed some questionable aspects related to how the participants responded. For example, a large number of respondents stated that the course offerings of the program they attended met their current educational technology needs. Educators stated that they were instructed on integrating Microsoft Office, Google Documents, and digital cameras as the educational technologies that they became fluent in from their undergraduate educator programs. In addition, a clear majority of these K-12 educators asserted possession of above average educational technology skills and knowledge. However, some reported degrees that were earned 20 or more years ago and others did not identify any educational technology elements offered in their program. None of the participants provided feedback concerning the use of educational applications or software within their curriculum despite indicating that they are confident in their abilities to do so. The deviation between the educational technology knowledge acquired during their education degree program and their self-reports of high perceptions of their skills could be caused by the Dunning-Kruger effect.

Another trend that emerged from the survey lead to a focus on whether those faculty members teaching the educational technology courses had experience, certification, or other experience within K-12 classrooms previously. This experience should enable them to provide learners with a realistic sense of what they would face in classrooms relative to technology expectations. The data therefore focused on the faculty rank and past K-12 experience of the faculty members for the universities reported in the survey responses.

Data were collected for all permanent faculty in these programs, totaling 616 instructors. Multiple data sources were examined including faculty member webpages, CVs, and LinkedIn profiles. Findings from the analysis indicated a fairly even distribution between professors, associate professors, assistant professors, and others. Those without specific identifying information regarding their rank and/or position were categorized as other. Some of these universities employ a higher percentage of professors and associate professors than any other category. still other universities employ mostly assistant professors.

Beyond faculty rank information, data were also collected on faculty historical K-12 experience. Findings from the collected data revealed a significant portion of faculty do not disclose their K-12 experience. This may reflect that they do not perceive having experience in a K-12 classroom environment as important. The Assistant Professor rank was the only group where a majority had their K-12 experience disclosed. This may be due to their limited amount of time teaching at the university level.

There are numerous factors that may be contributing to perceptions involving K-12 classroom experience and university instructors, such as rapid advancements in technology, curriculum development, and instructional designers to name a few. In order to determine the specific values being placed on K-12 experience, further research would be required. Based on the findings from this study, there appears to be less focus placed on K-12 experience at this current time. The change in K-12 experience valuation could have several impacts and consequences.

The devaluation of K-12 experience for university instructors would open many opportunities for those interested in careers changes and other opportunities. The requirement of K-12 experience has been a barrier for some persons desiring a university level instructor position. This is one positive impact the perception change related to K-12 experience could bring to the field of education technology.

This change in perception will also generate greater value for educational technologists and instructional designers knowledgeable on educational technology concepts and incorporation. These blended disciplines will be necessary to maintain a successful channel between academia and K-12 educators. The reduction in value placed on K-12 experience for university instructors, reflects a greater dependence upon the instructor’s ability to communicate and stay aware of current trends in K-12. However, not all impacts will be positive.

There will be some consequences due to the loss of, or lack of, K-12 experience for university instructors teaching instructional design, educational technology, or pre-service educator focused educational technology courses. One such consequence will be a lower level of understanding regarding the application of technology at the K-12 level. While input from K-12 educators will benefit the process, the loss of hands-on experience, and understanding will be a detriment to K-12 learners, university learners, and even future educators.

In an effort to ensure academia, pre-service education programs, educational technology programs, and education as a whole continues to thrive, is for universities to realize the value that comes from K-12 experience, however not use that as a basis to deny potential instructors into the field. K-12 experience carries value, however all experience outside of the university carries value. Universities should continue to promote pre-service educator programs through the use and incorporation of educational technology. Instructional designers should be developing additional courses with TPACK and universities should require stand-alone educational technology courses.

By doing all of this, universities will continue to graduate talent that contributes to society at multiple generation levels. Learners, instructors, instructional designers, pre-service educators, and others alike will all benefit from this proposed process. In addition, programs around the globe will have access to a large population of potential instructors they have not had in the past.

5.2 Limitations of Findings

The findings provide a more comprehensive look into the field of educational technology and whether those charged with incorporating it are being taught by experienced instructors during the coursework in their undergraduate pre-service educator degree programs. There were two research methods used in this study. Survey questions allowed the participants to address their personal perceptions of their undergraduate education program in regard to educational technology and explain their answers in comment boxes. The multi-strategy research approach in correlation with the use of survey questions allowed for a more in-depth analysis of the research questions and their lasting effect on the field of education. Despite using multiple research methods, several limitations of the study were identified.

The first limitation was the number of participants. A smaller sample size may make it difficult to identify trends within the data. The sample size used in this research study was sufficient in establishing a baseline for future studies. A larger sample would help to substantiate the findings of this research study. However, the sample size as a whole is generally not as relevant in a qualitative or multi-strategy research study (Marshall, Cardon, Podder, & Fontenot, 2013).

Next, the number of universities examined was another limitation. While the number of universities was adequate for this preliminary study, a larger pool of universities would allow future researchers to obtain a more extensive look at how the universities are addressing the importance of preparing new educators to use educational technology in K-12 classrooms. This is addressed in the following sections.

Another limitation discovered was the availability of detailed records of course offerings for pre-service educators at different universities. Online records and data available for public access are limited to the years and data that each university decided to disclose. Obtaining access to historical data beyond the records currently available would allow for a more holistic view of how each university has previously addressed educational technology courses. This can be done by contacting the universities in future studies to ask for their primary data sets.

The last limitation was the availability of each teacher education faculty member's curriculum vitae (CV) and/or employment history. Several universities did not provide faculty CV’s on faculty members profile pages. Access to this information will allow that future researchers to be able to determine if each faculty member had prior K-12 experience.

It is my desire that future researchers would be able to reduce the limitations found in this study. By doing so, a more comprehensive and expansive research examination on this important topic should provide results that universities would use to address any possible concerns within their own undergraduate educator degree programs. Public and private universities, both in the United States and worldwide, could make any necessary changes needed to benefit their pre-service educator students. This may require that school districts ask for these stand-alone educational technology courses be included in undergraduate pre-service education programs. Another option is for state policies that would mandate either inclusion of specific content area integration activities or stand-alone courses as a part of pre-service educator degree plans.

5.3 Recommendations for Practice

This study was conducted with an exploratory intention to create an initial depiction of the current state of learning technologies preparation for new educators. Therefore, explicit solutions to problems were not sought. However, the findings lend to multiple areas that would be enhanced through increased specificity of technology preparation in pre-service programs for K-12 educators. Several recommendations were developed that could be utilized to fill any educational gaps for pre-service educators and to communicate to districts that stand-alone courses focused on instructional technology integration are not a requirement in the academic programs for many of the new educators they are hiring. The intent of this research study was not to produce solutions to specific problems but sought to identify recommendations that could contribute to the field of undergraduate pre-service education programs.

The following recommendations were drawn from the findings of this study. In an event that these recommendations were applied, they would not only benefit future pre-service educators, but also these educators' future classrooms of learners. The following are specific recommendations for improving undergraduate pre-service educator preparation programs relative to educational technology training.

5.3.1 Recommendation 1: Learner-focused Technology Preparation

The first recommendation is that each undergraduate pre-service educator program include at least one required stand-alone educational technology course. By requiring a stand-alone educational technology course be completed, it would ensure that graduates have formally acquired a foundation for effectively integrating these technology elements into curriculum. Therefore, this should help to ensure the future learners of these educators' technology enriched learning experiences.

5.3.2 Recommendation 2: Require a Stand-alone Educational Technology Course

Another recommendation for stand-alone courses is that they specifically include learner-focused technology elements. This recommendation is not intended to eliminate any technologies being currently addressed. However, it should reduce the course time spent on those tasks and incorporate more learner-centered educational technology to enhance the learning opportunities available. Courses that utilize TPACK as a tool for supporting individual content areas would also meet this recommendation.

5.3.3 Recommendation 3: Require Education Specific Technology Instruction

This recommendation would have the pre-service education programs teach about different websites and applications that K-12 learners would use to enhance the learning experience. These should be learner-focused such as the websites Baamboozle, Listenwise, ArtsEdge, and Spreaker. The inclusion of currently existing used technical including Microsoft Office, Google Documents, and digital cameras should not be eliminated from the curriculum. An introduction to learning application course could be designed and developed to address this specific recommendation.

5.4 Recommendations for Future Research

This research study focused on a specific segment of the field of the higher education: undergraduate pre-service educator preparation programs and their inclusion of instructional technology training elements. Past research has been conducted on individual portions of this topic. However, at this time no other study could be located that incorporated the holistic approach found within this research study. This lends to multiple opportunities for future studies.

A potential study would focus on the technology elements actually incorporated by the educators in K-12 classrooms. The outcomes of such a study should clarify what K-12 educators define as educational technology. Findings from this study could help to identify any gaps in the integration of educational technology or educator understanding of what educational technology is and the resulting benefits that could be achieved.

Another potential study should make an in-depth, qualitative examination of K-12 educators' opinions regarding the importance and actual practices that educators use relative to the integration of educational technology into their curriculum. By focusing on an educators' personal opinions researchers could identify acceptance and value of educational technology. Such findings could potentially be used to determine if the existence of acceptance and valuation is dependent on the length of tenure and the age of the educator within a K-12 classroom. Results from this study could be used to better pinpoint those educators that may need educational technology focused professional development and provide it.

Further research on this subject should focus on university perceptions regarding the value of K-12 experience for instructors. As noted within this study, the actual evaluation of K-12 experience appears to be questionable. Additional research on this topic could benefit not only the field of educational technology, but also the course offerings, instructional designs, and programs for those interested in being a university instructor.

A last, likely research study should focus on learners' perception of the educational technology elements currently being used in the classroom. Also, learners should be given the opportunity to recommend specific technologies such as virtual reality, 3D printing, augmented reality, and gaming that they are interested in learning to use. This research study could result in more engaging curriculum delivery to scaffold the learning opportunities for today's learners.

Future research studies should contribute to the overall knowledge of the integration and acceptance of educational technology in K-12 classrooms. Findings from these studies could be used at both K-12 and university levels. Conducting any of these potential research studies should contribute to the holistic approach of this topic.

5.5 Summary

This research study sought to examine, evaluate, and document whether undergraduate pre-service education programs in the United States are teaching educational technology use and curriculum integration in individual courses or content areas according to their own materials. The multi-strategy research content analysis and survey methods used allowed the researcher to gain a comprehensive understanding in the practices of teaching educational technology elements to pre-service educators in both public and private U.S. universities.

A fundamental objective for an educator is to help prepare each learner within their classroom walls to be successful in their endeavors. Today's learners will require a firm understanding of technology literacy and skills in almost every aspect of their lives. Technology applications and uses can be found in one's personal life. As well, each graduate will need to be technology savvy for most fields in business. It is important for learners that the acquisition of learning technology skills begins in K-12 classrooms and for their instructors to be literate in technology integration and best practices for using technologies to teach and learn. One method to address this need is having K-12 educators that can effectively teach these skills by preparing them during their undergraduate programs.

For learners to successfully enter the workforce with an adequate understanding of technology, the skills should be organically integrated into the curriculum. "By choosing and creating compelling, relevant, up-to-date, and interactive content as the core of teaching materials, educators are providing students with a base understanding and awareness of skills that will better prepare them for a future career" (Today's Classrooms, 2018, para. 3). Today's learners need an education that provides them with the skills needed to compete in an evolving and increasingly technology-driven workforce upon graduation.

The impact of education can have widespread effects. "The United States has been losing ground in an aggressively competitive global economy future" (Preparing Today's, 2018, para. 3). The future world that current learners will experience will be dramatically different from the world that our ancestors lived in. It has already changed more than any of those elders could have possibly envisioned. Smart houses that can be operate by a cellphone, surgeries being performed by robots, artificial intelligence that can communicate with people, and are only a few of the latest innovations to change the world. Using the same curriculum and teaching methods of prior generations is not sufficient to meet the needs of today's learners. Decisions regarding the implementation of technology-focused curriculum are more important than ever in reducing the skill gap and in turn opening a path to greater economic, social, and financial opportunities. Ensuring that courses contain adequate instructional technology training for future educators can help prepare everyone in the workforce for a better future.

APPENDIX A

EDUCATIONAL TECHNOLOGY SURVEY INSTRUMENT

Block 1

University of North Texas Institutional Review Board Informed Consent Notice

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

Title of Study: Current Trends in the Availability and Requirement of Learning Technology
Courses for Pre-service Educators at Public U.S. Universities

Student Investigator: Tessa West, University of North Texas (UNT) Department of Learning Technologies. **Supervising Investigator**: Dr. Scott Warren

Purpose of the Study: You are being asked to participate in a research study which involves: determining the existing baseline for educational technology courses or offerings in undergraduate teacher education programs at U.S. public universities.

Study Procedures: You will be asked to complete an online survey concerning any technology courses or requirements for your university's undergraduate teacher education program. This survey will take approximately 15-20 minutes to complete.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: This study is not expected to be of any direct benefit to you, but we hope to learn more about current trends in educational course offerings or requirements. This information may allow for future research studies on this topic.

Compensation for Participants: None

Procedures for Maintaining Confidentiality of Research Records: Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet. The security and confidentiality of information collected from your email survey cannot be guaranteed. Confidentiality will be kept to the extent permitted by the technology being used. Information collected via email can be interrupted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. Your email address will be discarded once your participation is discontinued.

Questions about the Study: If you have any questions about the study, you may contact Tessa West at TessaWest@my.unt.edu or Dr. Scott Warren at Scott.Warren@unt.edu.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-4643 with any questions regarding the rights of research subjects.

Research Participants' Rights:
Your participation in the survey confirms that you have read all of the above and that you agree to all of the following:

- Tessa West has explained the study to you and you have had an opportunity to contact him/her with any questions about the study. You have been informed of the possible benefits and the potential risks of the study.

- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.

- You understand why the study is being conducted and how it will be performed.

- You understand your rights as a research participant and you voluntarily consent to participate in this study.

- You understand you may print a copy of this form for your records.

Agree	Disagree
O	O

Survey Questions

School District or University where you currently teach:

Subject(s) that you are currently teaching:

Grade level that you are currently teaching:

University that you received your teaching degree from:

The year that your teaching degree was received:

Highest degree earned:

My undergrad. teaching program offered one or more stand-alone ed. tech courses.

Yes ○ No ○

My undergraduate teaching program offered one or more **elective** ed. tech courses.

Yes ○ No ○

My undergraduate teaching program **required** one or more stand-alone ed. tech courses.

Yes ○ No ○

Which ed. tech elements were used in your content-specific courses for pre-service teachers?

- ☐ Presentation tools including document cameras and digital projectors
- ☐ Microsoft Office
- ☐ Google Docs
- ☐ Productivity software
- ☐ Online Applications
- ☐ Other ________
- ☐ None

My degree prepared me to use ed. tech in an effective and meaningful way for my students.

Yes ○ No ○

I am confident in my own educational technology skills.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

I feel confident using ed. tech to engage and motivate my students to become lifelong learners.

Strongly	Agree	Somewhat	Neither agree	Somewhat	Disagree	Strongly

agree	○	agree	nor disagree	Disagree	○	Disagree
○		○	○	○		○

Courses in my degree program prepared me:

To engage in creative and innovative thinking about using technology to deliver lessons.

Strongly agree	Agree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Disagree	Strongly Disagree
○	○	○	○	○	○	○

To promote student engagement with online tools to seek resolutions to real-word problems.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

To integrate blogs, wikis, journals, or other online applications as tools for student reflection.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

For the scaffolding of knowledge using online or face-to-face communication with others.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

Courses in my degree program prepared me:

To create instruction using technology integration for student learning and creativity.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

To facilitate student-driven learning and assessment through the use of technology applications.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
○	○	○	○	○	○	○

To utilize various technologies to accommodate the learning styles and abilities of students.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

To use student assessment data meeting tech. or content standards for curriculum elevation.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

Courses in my degree program prepared me:

To adapt current curriculum to use with new technology applications.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

To use online collaborative applications to support student innovative learning and engagement.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

To utilize multimedia technologies for communicating with students, parents, and peers.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

To facilitate the use of online resources for research and analysis.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
O	O	O	O	O	O	O

Courses in my degree program prepared me:

To teach about digital ethics such as copyright, intellectual property, and source documentation.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
	O				O	

To meet the needs of individual students using a variety of methods and applications.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

To convey the importance of online digital responsibility, respect, and etiquette.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

Use online communication with students and peers to promote global and cultural awareness.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

Courses in my degree program prepared me:

To be an active member of online communities focused on the use of technology in education.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

To be proactive in the use and dissemination of technology applications and benefits.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

To monitor and review technology innovations for potential use to benefit student learning.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

To actively contribute to learning through the use of educational technology, locally and globally.

Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree

○ ○ ○ ○ ○

Please leave a comment about using educational technology in the classroom:

How can ed. tech can be used in undergrad teaching programs to better prepare future educators:

Powered by Qualtrics

APPENDIX B

IRB REQUIREMENTS

IRB Email Script

Email Script for Research Study Conducted by Tessa West

Greetings,

My name is Tessa West, a PhD student at the University of North Texas in the Department of Learning Technologies. My faculty researcher, Dr. Scott Warren, Professor of Learning Technologies at the University of North Texas, and I are conducting a study on the course offerings and program requirements associated with educational technology courses for pre-service teachers at U.S. public universities. I am emailing to ask if you would like to take about 15 minutes to complete a survey for this research project.

Participation in this research study is completely voluntary. However, your participation is very valuable to us and may result in important findings that may advance our understanding of educational technology courses as they relate to pre-service undergraduate education majors. Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet.

Please use this link to participate in the survey.

If you have any questions about the research study, you may contact me at tessawest@my.unt.edu or Dr. Scott Warren at scott.warren@unt.edu.

Sincerely,

Tessa West
PhD Candidate
University of North Texas

Research Certificates

NIH Certificate

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Tessa West** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 09/03/2012

Certification Number: 977837

CITI #1: Responsible Conduct of Research (RCR)

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Tessa West (ID: 4887570)
- **Email:** tessawest@my.unt.edu
- **Institution Affiliation:** University of North Texas (Denton, TX) (ID: 1983)
- **Institution Unit:** Learning Technologies

- **Curriculum Group:** Responsible Conduct of Research (RCR)
- **Course Learner Group:** UNT RCR Basic Course
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 16382983
- **Report Date:** 06/15/2015
- **Current Score**:** 100

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Using Animal Subjects in Research (RCR-Basic) (ID:13301)	06/15/15	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID:13566)	06/15/15	5/5 (100%)
Plagiarism (RCR-Basic) (ID:15156)	06/15/15	5/5 (100%)
Authorship (RCR-Basic) (ID:16597)	06/15/15	5/5 (100%)
Collaborative Research (RCR-Basic) (ID:16598)	06/15/15	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID:16599)	06/15/15	5/5 (100%)
Data Management (RCR-Basic) (ID:16600)	06/15/15	5/5 (100%)
Financial Responsibility (RCR-Basic) (ID:16601)	06/15/15	5/5 (100%)
Mentoring (RCR-Basic) (ID:16602)	06/15/15	5/5 (100%)
Peer Review (RCR-Basic) (ID:16603)	06/15/15	5/5 (100%)
Research Misconduct (RCR-Basic) (ID:16604)	06/15/15	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Tessa West (ID: 4887570)
- **Email:** tessawest@my.unt.edu
- **Institution Affiliation:** University of North Texas (Denton, TX) (ID: 1983)
- **Institution Unit:** Learning Technologies

- **Curriculum Group:** Responsible Conduct of Research (RCR)
- **Course Learner Group:** UNT RCR Basic Course
- **Stage:** Stage 1 - Basic Course

- **Report ID:** 16382983
- **Completion Date:** 06/15/2015
- **Expiration Date:** 06/14/2019
- **Minimum Passing:** 80
- **Reported Score*:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Using Animal Subjects in Research (RCR-Basic) (ID:13301)	06/15/15	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID:13566)	06/15/15	5/5 (100%)
Plagiarism (RCR-Basic) (ID:15156)	06/15/15	5/5 (100%)
Authorship (RCR-Basic) (ID:16597)	06/15/15	5/5 (100%)
Collaborative Research (RCR-Basic) (ID:16598)	06/15/15	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID:16599)	06/15/15	5/5 (100%)
Data Management (RCR-Basic) (ID:16600)	06/15/15	5/5 (100%)
Financial Responsibility (RCR-Basic) (ID:16601)	06/15/15	5/5 (100%)
Mentoring (RCR-Basic) (ID:16602)	06/15/15	5/5 (100%)
Peer Review (RCR-Basic) (ID:16603)	06/15/15	5/5 (100%)
Research Misconduct (RCR-Basic) (ID:16604)	06/15/15	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
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Phone: 305-243-7970
Web: https://www.citiprogram.org

CITI #2 Social & Behavioral – Basic/Refresher

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK REQUIREMENTS REPORT*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Tessa West (ID: 4887570)
- **Email:** tessawest@my.unt.edu
- **Institution Affiliation:** University of North Texas (Denton, TX) (ID: 1983)
- **Institution Unit:** Learning Technologies

- **Curriculum Group:** Social & Behavioral Research - Basic/Refresher
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 16382982
- **Completion Date:** 06/15/2015
- **Expiration Date:** 06/14/2018
- **Minimum Passing:** 80
- **Reported Score*:** 99

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Belmont Report and CITI Course Introduction (ID:1127)	06/15/15	3/3 (100%)
Students in Research (ID:1321)	06/15/15	10/10 (100%)
History and Ethical Principles - SBE (ID:490)	06/15/15	5/5 (100%)
Defining Research with Human Subjects - SBE (ID:491)	06/15/15	5/5 (100%)
The Federal Regulations - SBE (ID:502)	06/15/15	5/5 (100%)
Assessing Risk - SBE (ID:503)	06/15/15	5/5 (100%)
Informed Consent - SBE (ID:504)	06/15/15	5/5 (100%)
Privacy and Confidentiality - SBE (ID:505)	06/15/15	5/5 (100%)
Research with Prisoners - SBE (ID:506)	06/15/15	5/5 (100%)
Research with Children - SBE (ID:507)	06/15/15	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID:508)	06/15/15	5/5 (100%)
International Research - SBE (ID:509)	06/15/15	5/5 (100%)
Internet-Based Research - SBE (ID:510)	06/15/15	5/5 (100%)
Research and HIPAA Privacy Protections (ID:14)	06/15/15	5/5 (100%)
Conflicts of Interest in Research Involving Human Subjects (ID:488)	06/15/15	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID:14928)	06/15/15	4/5 (80%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)
COURSEWORK TRANSCRIPT REPORT**

** NOTE: Scores on this Transcript Report reflect the most current quiz completions, including quizzes on optional (supplemental) elements of the course. See list below for details. See separate Requirements Report for the reported scores at the time all requirements for the course were met.

- **Name:** Tessa West (ID: 4887570)
- **Email:** tessawest@my.unt.edu
- **Institution Affiliation:** University of North Texas (Denton, TX) (ID: 1983)
- **Institution Unit:** Learning Technologies

- **Curriculum Group:** Social & Behavioral Research - Basic/Refresher
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - Basic Course
- **Description:** Choose this group to satisfy CITI training requirements for Investigators and staff involved primarily in Social/Behavioral Research with human subjects.

- **Report ID:** 16382982
- **Report Date:** 06/15/2015
- **Current Score**:** 99

REQUIRED, ELECTIVE, AND SUPPLEMENTAL MODULES	MOST RECENT	SCORE
Students in Research (ID:1321)	06/15/15	10/10 (100%)
History and Ethical Principles - SBE (ID:490)	06/15/15	5/5 (100%)
Defining Research with Human Subjects - SBE (ID:491)	06/15/15	5/5 (100%)
Belmont Report and CITI Course Introduction (ID:1127)	06/15/15	3/3 (100%)
The Federal Regulations - SBE (ID:502)	06/15/15	5/5 (100%)
Assessing Risk - SBE (ID:503)	06/15/15	5/5 (100%)
Informed Consent - SBE (ID:504)	06/15/15	5/5 (100%)
Privacy and Confidentiality - SBE (ID:505)	06/15/15	5/5 (100%)
Research with Prisoners - SBE (ID:506)	06/15/15	5/5 (100%)
Research with Children - SBE (ID:507)	06/15/15	5/5 (100%)
Research in Public Elementary and Secondary Schools - SBE (ID:508)	06/15/15	5/5 (100%)
International Research - SBE (ID:509)	06/15/15	5/5 (100%)
Internet-Based Research - SBE (ID:510)	06/15/15	5/5 (100%)
Research and HIPAA Privacy Protections (ID:14)	06/15/15	5/5 (100%)
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID:14928)	06/15/15	4/5 (80%)
Conflicts of Interest in Research Involving Human Subjects (ID:488)	06/15/15	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

CITI Program
Email: citisupport@miami.edu
Phone: 305-243-7970
Web: https://www.citiprogram.org

APPENDIX C

IRB APPROVAL

UNT®

Research and Economic Development
THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE

February 22, 2017

Dr. Scott Warren
Student Investigator: Tessa West
Department of Learning Technologies
University of North Texas

RE: Human Subjects Application No. 16-520

Dear Dr. Warren:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Current Trends in the Availability and Requirement of Learning Technology Courses for Pre-service Educators at Public U.S. Universities" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board (IRB).

Enclosed are the consent documents with stamped IRB approval. Since you are conducting an online study, **please copy the approved language and paste onto the first page of your online survey. You may also use the enclosed stamped document as the first page of your online survey.**

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact The Office of Research Integrity and Compliance at 940-565-4643 if you wish to make any such changes. Any changes to your procedures or forms after 3 years will require completion of a new IRB application.

We wish you success with your study.

Sincerely,

Chad Trulson, Ph.D.
Professor
Chair, Institutional Review Board

CT:jm

UNIVERSITY OF NORTH TEXAS®
1155 Union Circle #310979 Denton, Texas 76203-5017
940.369.4643 940.369.7486 fax www.research.unt.edu

University of North Texas Institutional Review Board

Informed Consent Notice

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

Title of Study: Current Trends in the Availability and Requirement of Learning Technology Courses for Pre-service Educators at Public U.S. Universities

Student Investigator: Tessa West, University of North Texas (UNT) Department of Learning Technologies. **Supervising Investigator:** Dr. Scott Warren

Purpose of the Study: You are being asked to participate in a research study which involves: determining the existing baseline for educational technology courses or offerings in undergraduate teacher education programs at U.S. public universities.

Study Procedures: You will be asked to complete an online survey concerning any technology courses or requirements for your university's undergraduate teacher education program. This survey will take approximately 15-20 minutes to complete.

Foreseeable Risks: No foreseeable risks are involved in this study.

Benefits to the Subjects or Others: This study is not expected to be of any direct benefit to you, but we hope to learn more about current trends in educational course offerings or requirements. This information may allow for future research studies on this topic.

Compensation for Participants: None

Procedures for Maintaining Confidentiality of Research Records: Confidentiality will be maintained to the degree possible given the technology and practices used by the online survey company. Your participation in this online survey involves risks to confidentiality similar to a person's everyday use of the internet. The security and confidentiality of information collected from your email survey cannot be guaranteed. Confidentiality will be kept to the extent permitted by the technology being used. Information collected via email can be interrupted, corrupted, lost, destroyed, arrive late or incomplete, or contain viruses. Your email address will be discarded once your participation is discontinued.

Questions about the Study: If you have any questions about the study, you may contact Tessa West at TessaWest@my.unt.edu or Dr. Scott Warren at Scott.Warren@unt.edu.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT

APPROVED BY THE UNT IRB
DATE: 2/22/17 JM

IRB can be contacted at (940) 565-4643 with any questions regarding the rights of research subjects.

Research Participants' Rights:

Your participation in the survey confirms that you have read all of the above and that you agree to all of the following:

- Tessa West has explained the study to you and you have had an opportunity to contact him/her with any questions about the study. You have been informed of the possible benefits and the potential risks of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You understand you may print a copy of this form for your records.

APPROVED BY THE UNT IRB
DATE: 2/22/17 GM

APPENDIX D

FACULTY DISTRIBUTION AND EXPERIENCE BY INDIVIDUAL UNIVERSITY

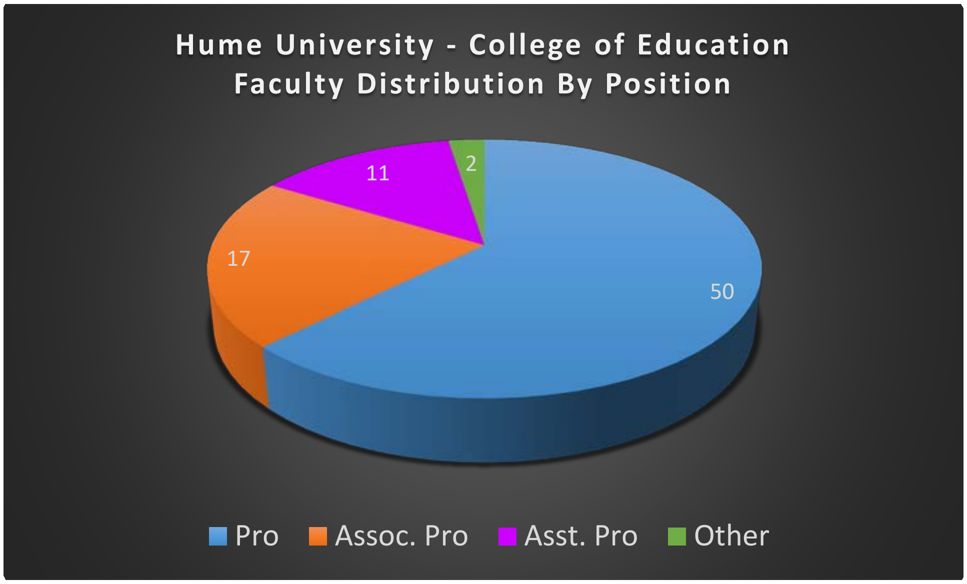

Figure D.1. Hume University – College of Education faculty distribution by position.

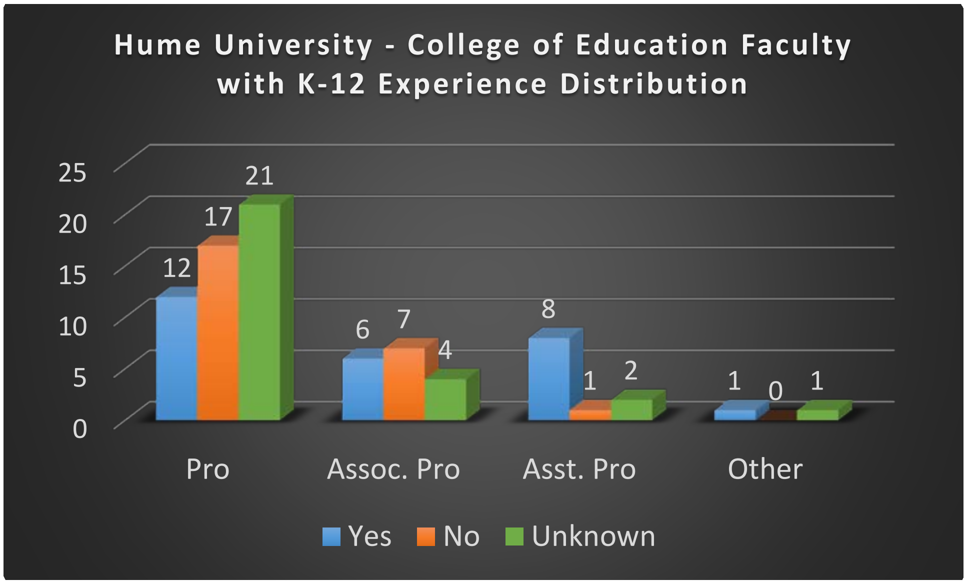

Figure D.2. Hume University – College of Education faculty with K-12 experience distribution.

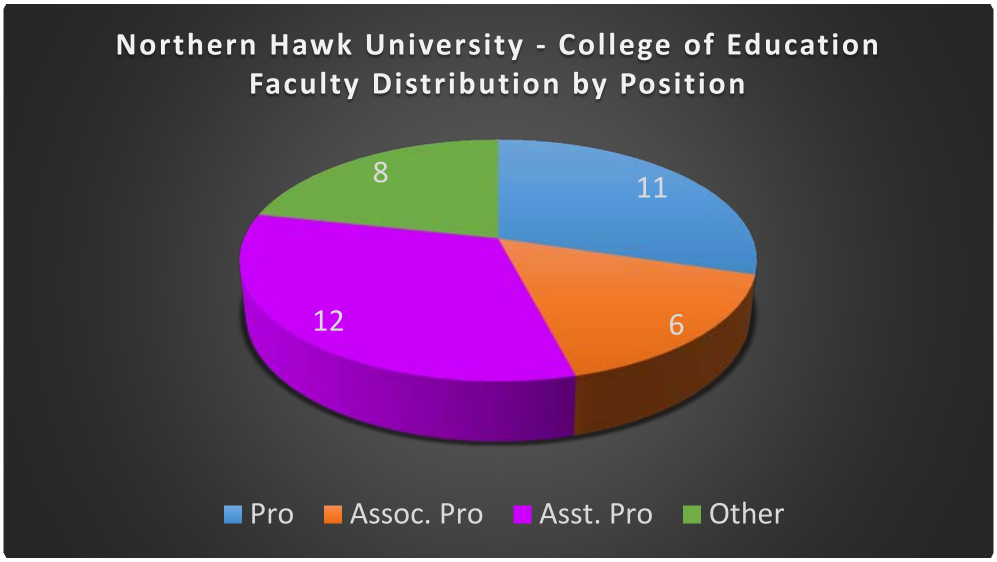

Figure D.3. Northern Hawk University - College of Education faculty distribution by position.

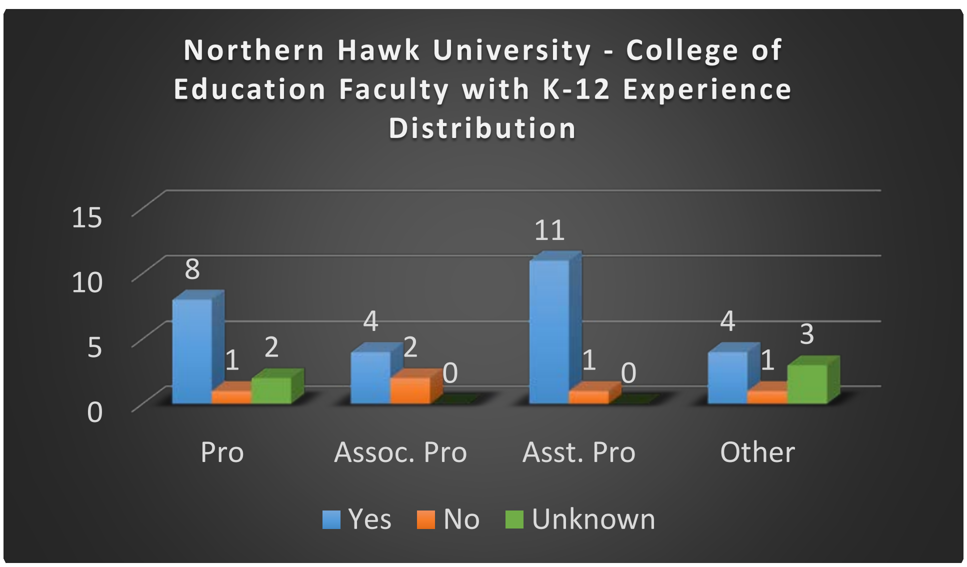

Figure D.4. Northern Hawk University – College of Education faculty with K-12 experience distribution.

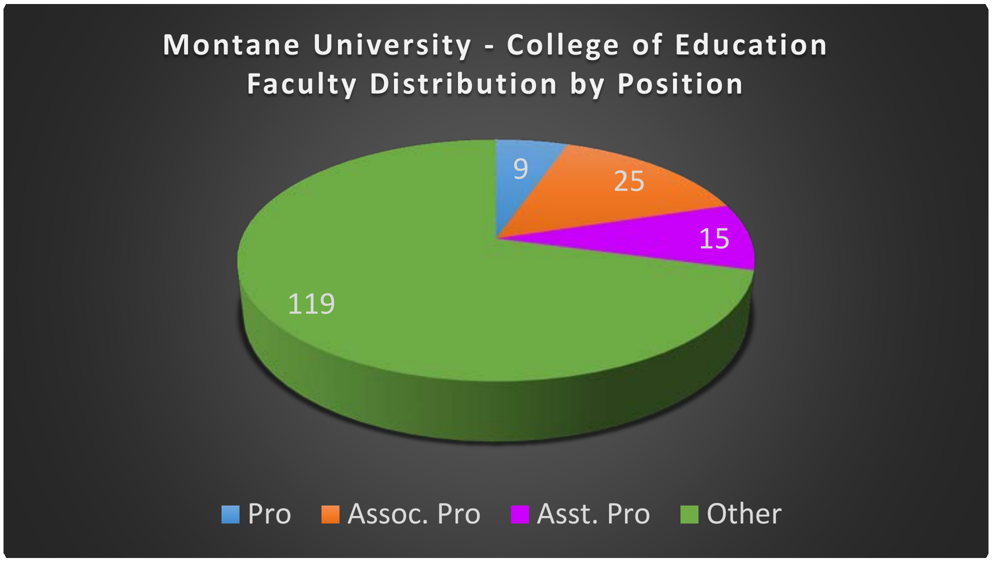

Figure D.5. Montane University - College of Education faculty distribution by position.

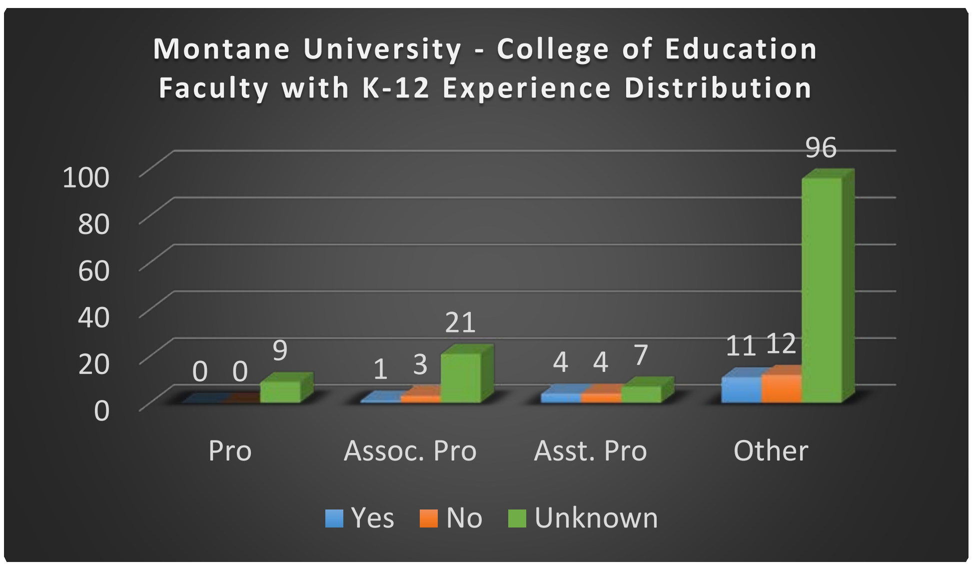

Figure D.6. Montane University – College of Education faculty with K-12 experience distribution.

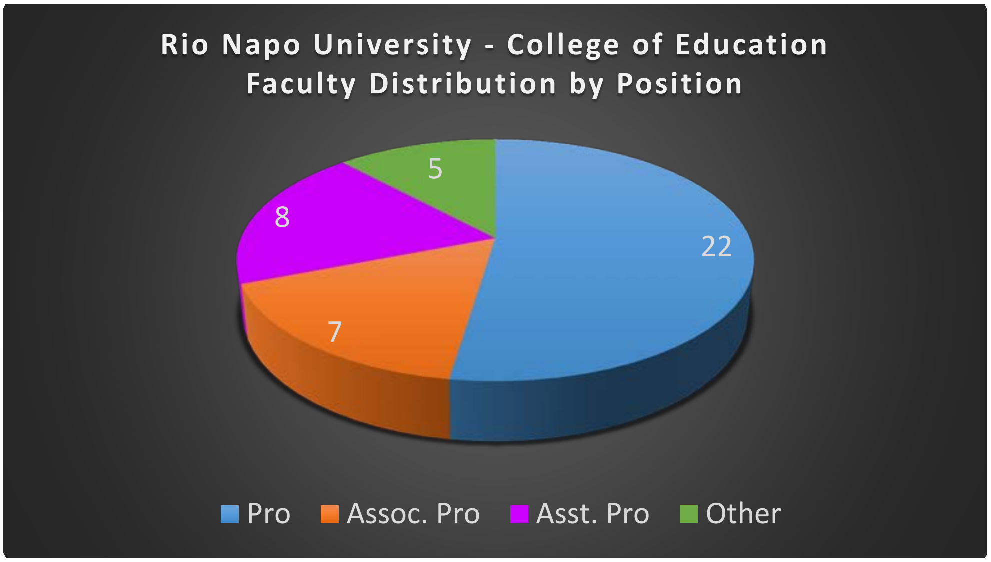

Figure D.7. University of Rio Napo - College of Education faculty distribution by position.

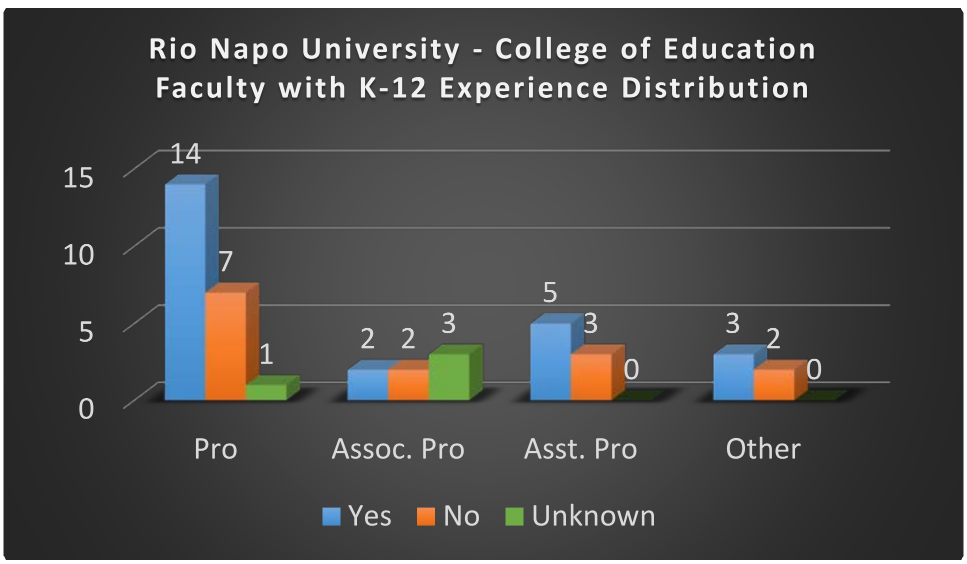

Figure D.8. University of Rio Napo – College of Education faculty with K-12 experience distribution.

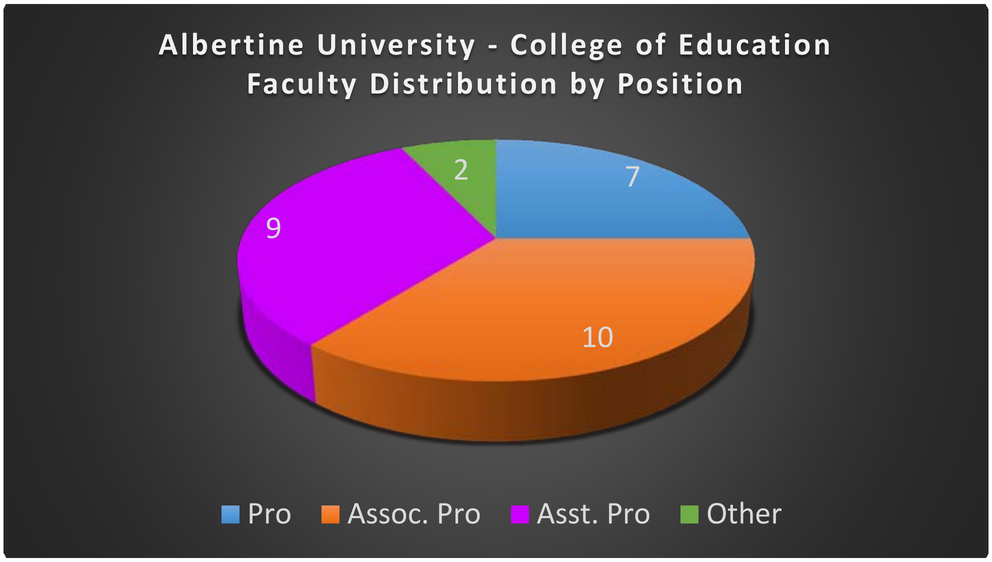

Figure D.9. Albertine University - College of Education faculty distribution by position.

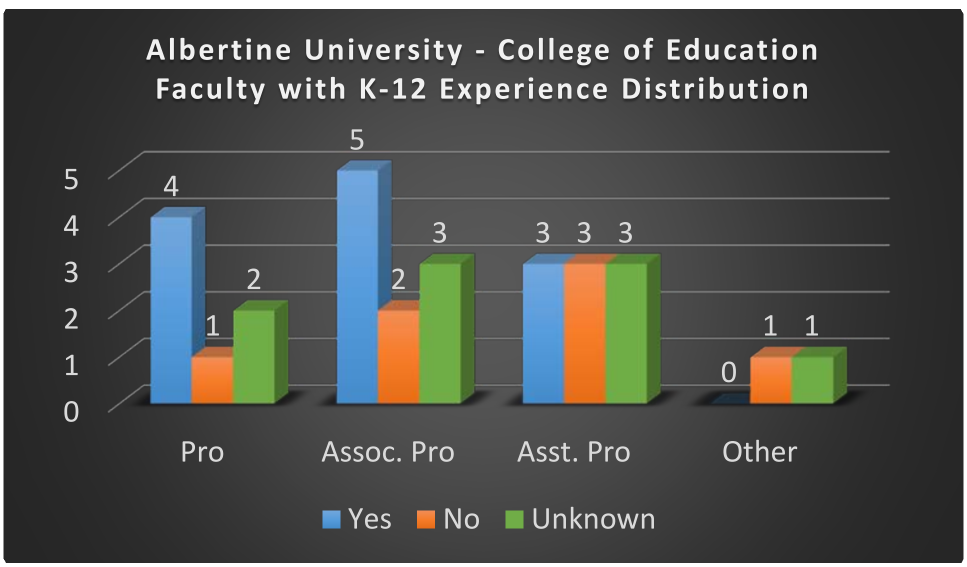

Figure D.10. Albertine University – College of Education faculty with K-12 experience distribution.

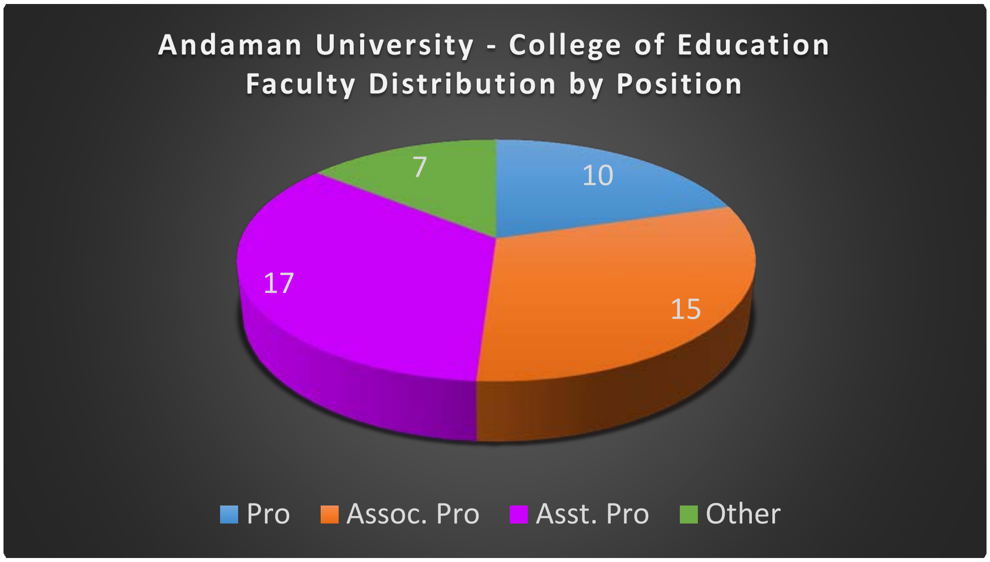

Figure D.11. University of Andaman - College of Education faculty distribution by position.

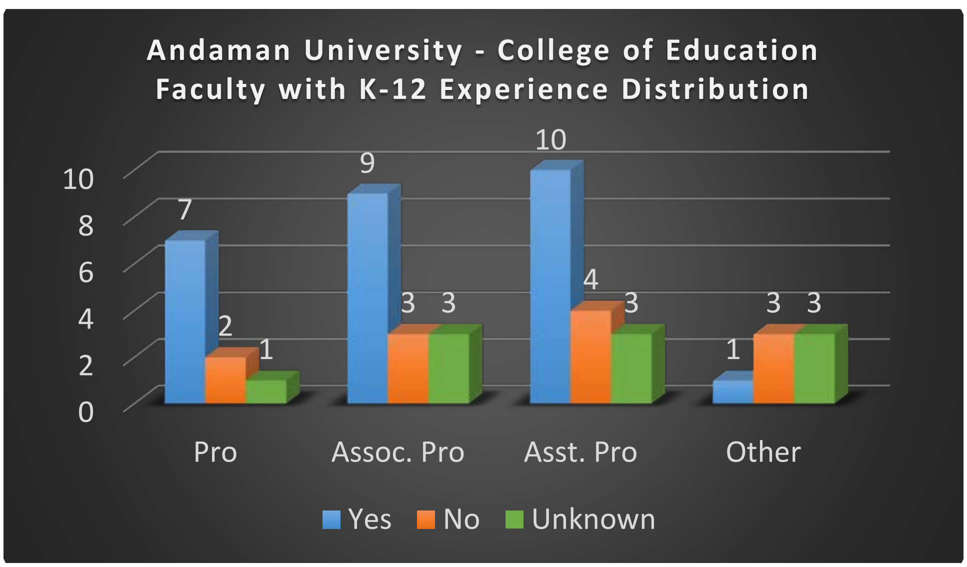

Figure D.12. University of Andaman – College of Education faculty with K-12 experience distribution.

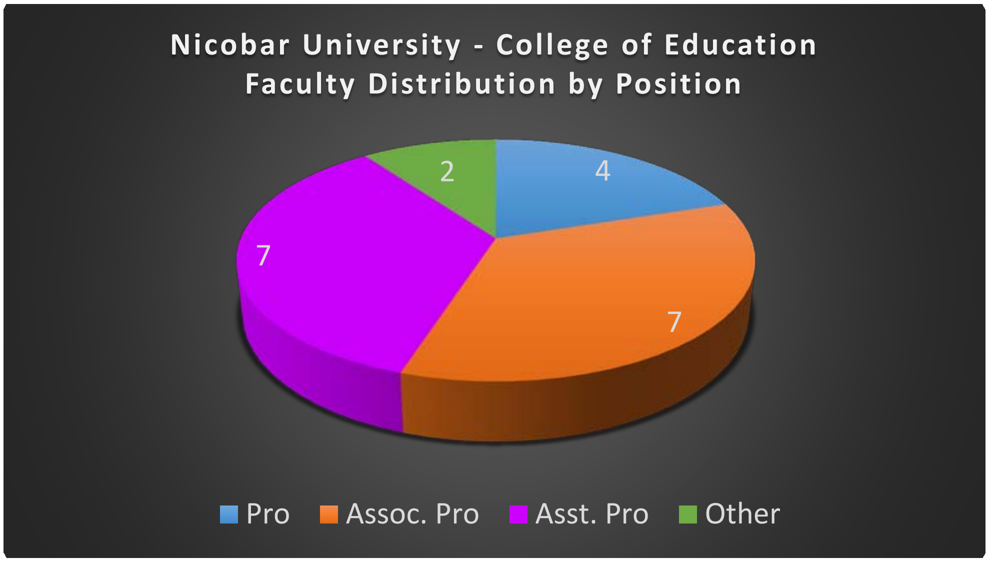

Figure D.13. Nicobar University - College of Education faculty distribution by position.

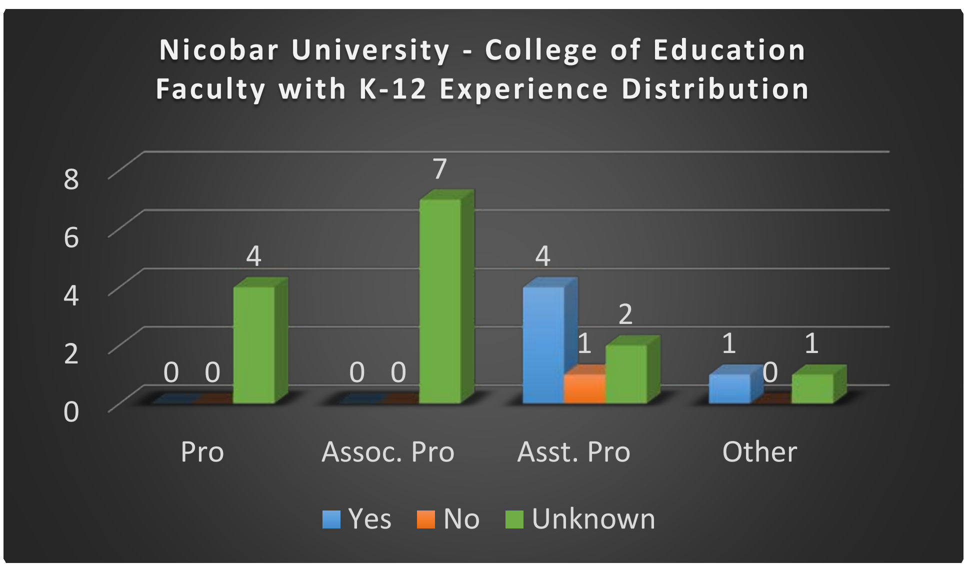

Figure D.14. Nicobar University – College of Education faculty with K-12 experience distribution.

University of Pallid

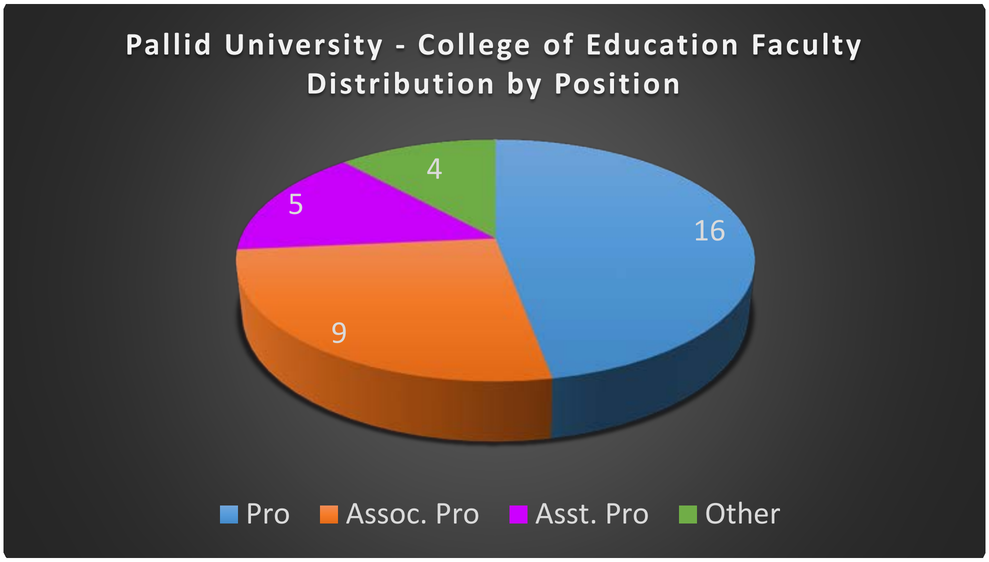

Figure D.15. University of Pallid - College of Education faculty distribution by position.

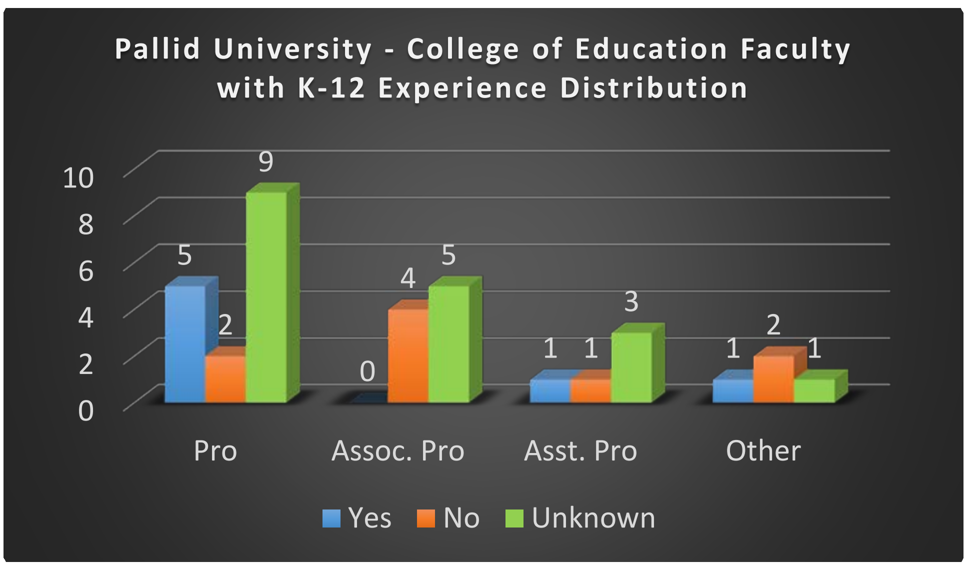

Figure D.16. University of Pallid – College of Education faculty with K-12 experience distribution.

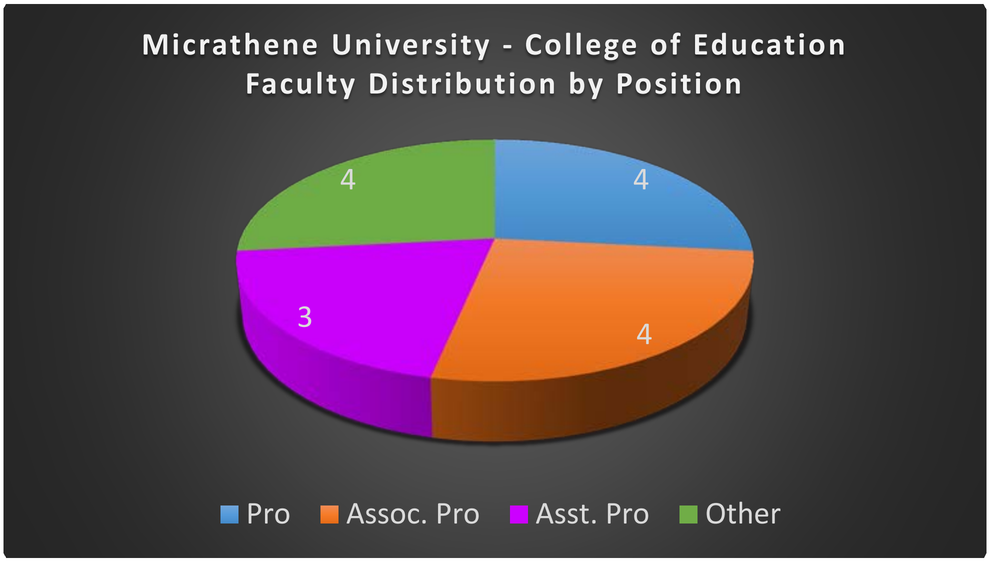

Figure D.17. University of Micrathene - College of Education faculty distribution by position.

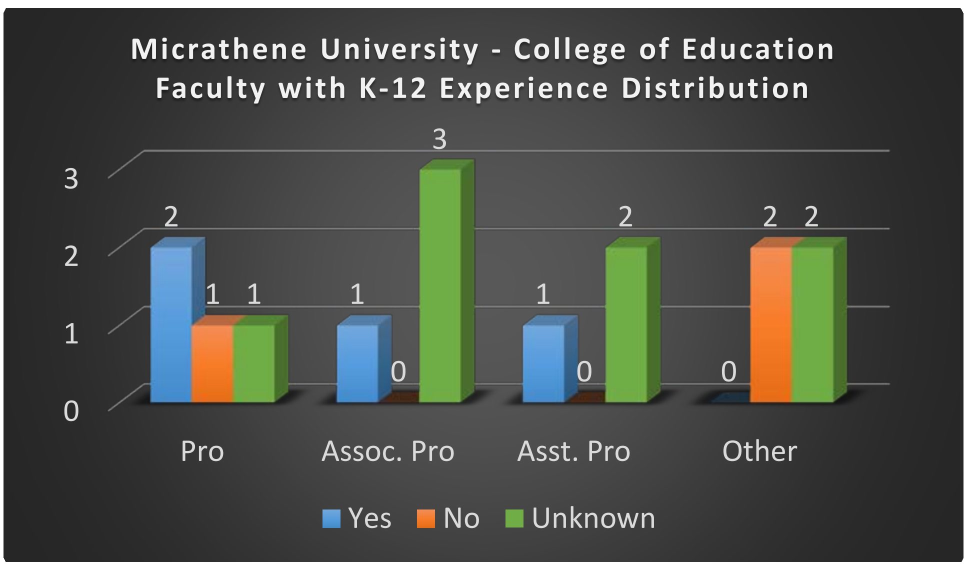

Figure D.18. University of Micrathene – College of Education faculty with K-12 experience distribution.

Usambara

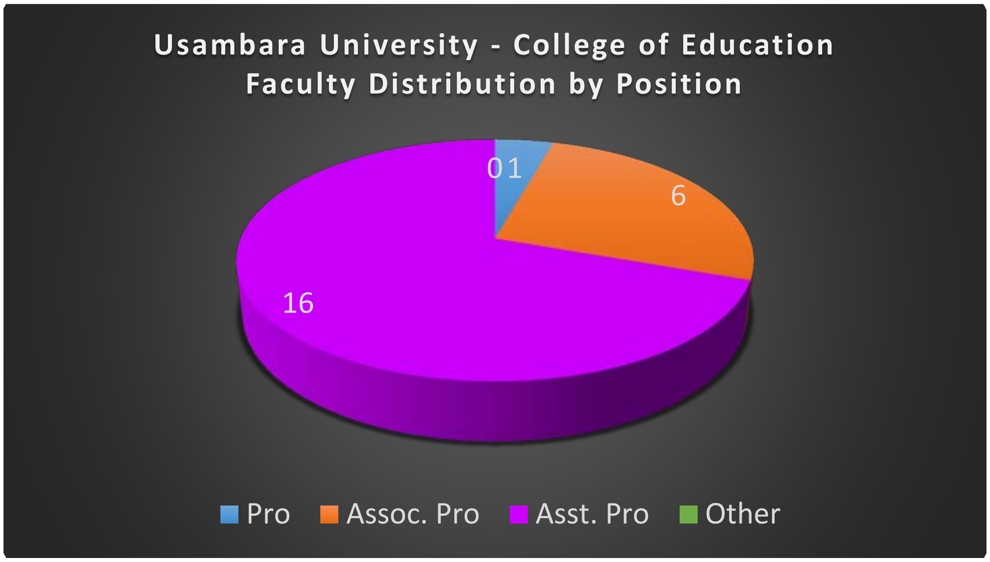

Figure D.19. University of Usambara - College of Education faculty distribution by position.

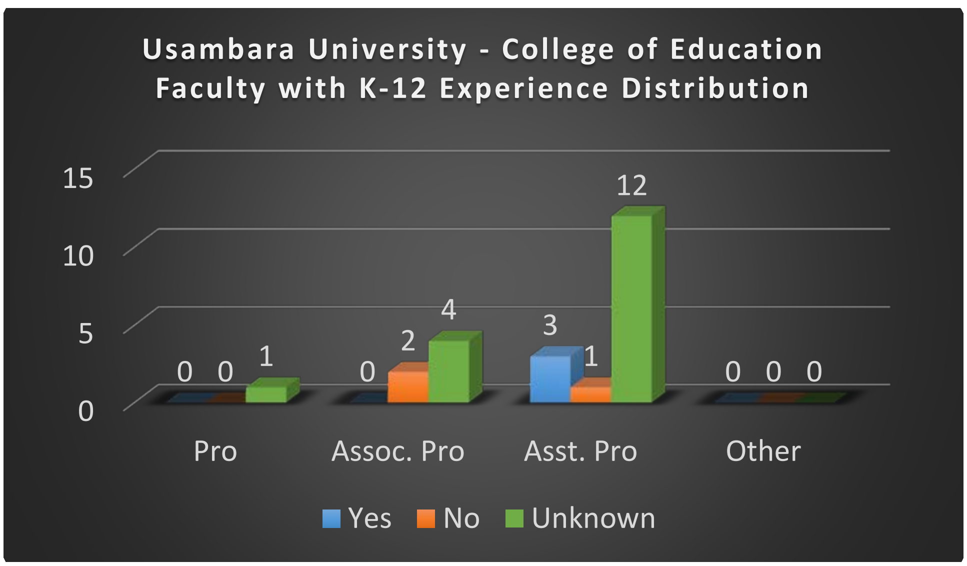

Figure D.20. University of Usambara – College of Education faculty with K-12 experience distribution.

North Tawn University

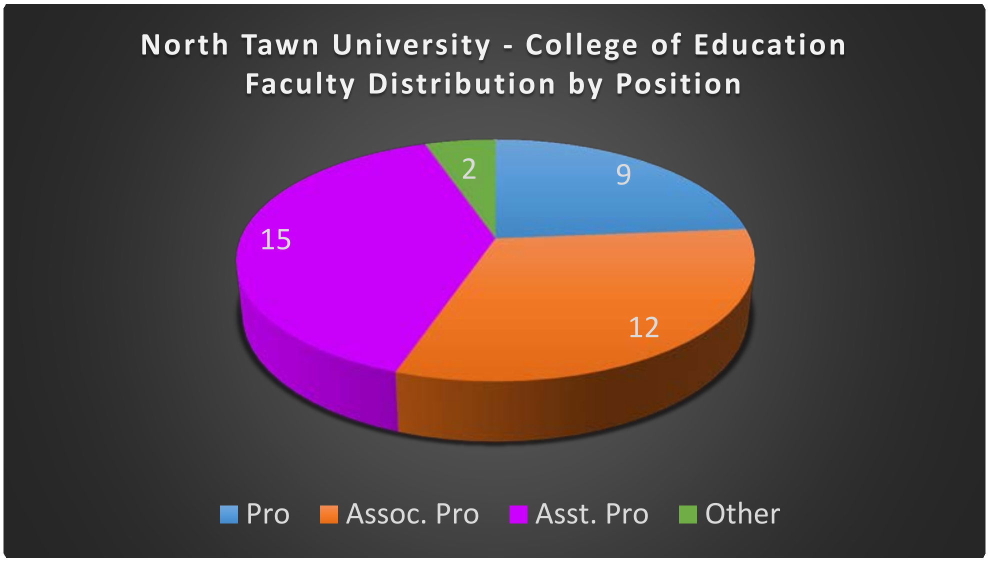

Figure D.21. North Tawn University - College of Education faculty distribution by position.

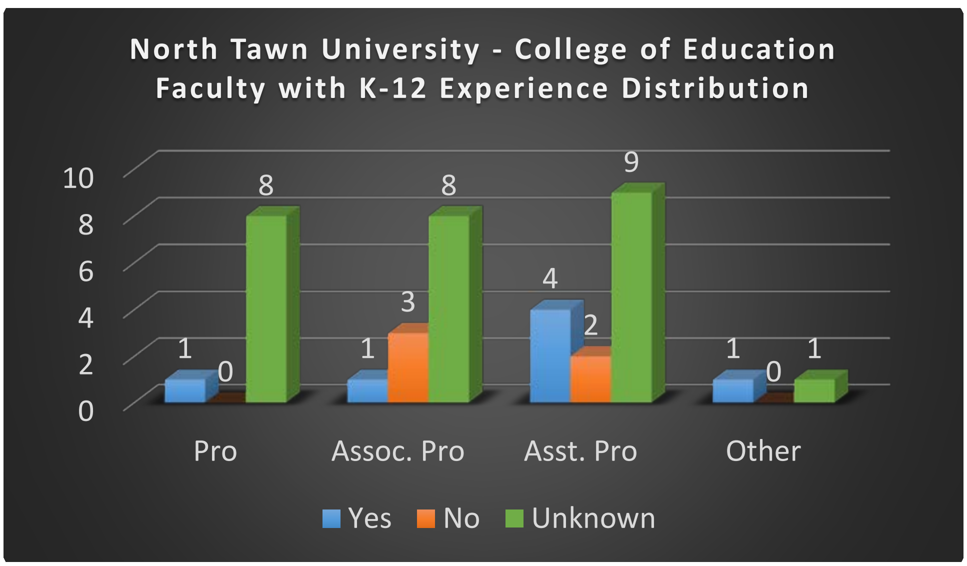

Figure D.22. North Tawn University – College of Education faculty with K-12 experience distribution.

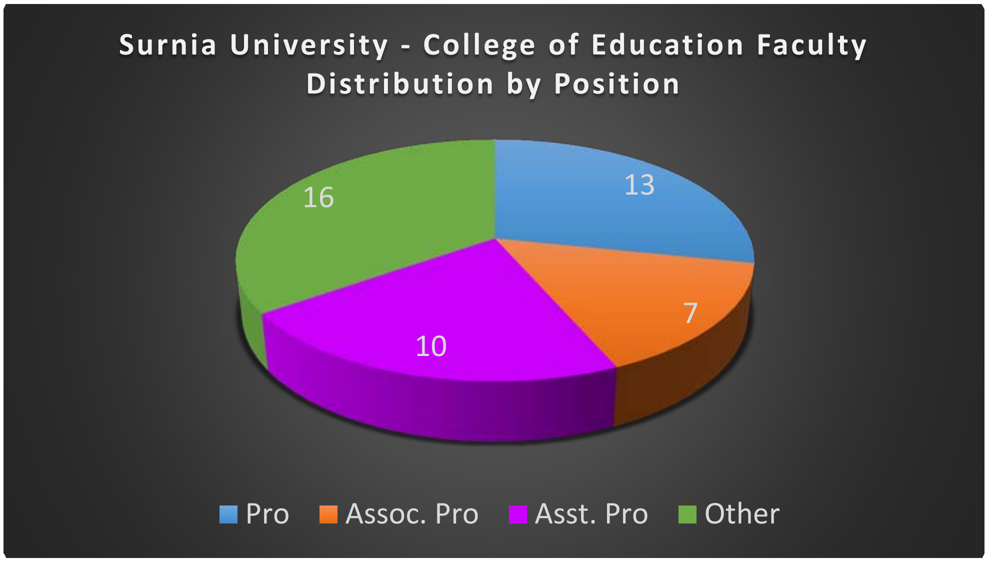

Figure D.23. Surnia University - College of Education faculty distribution by position.

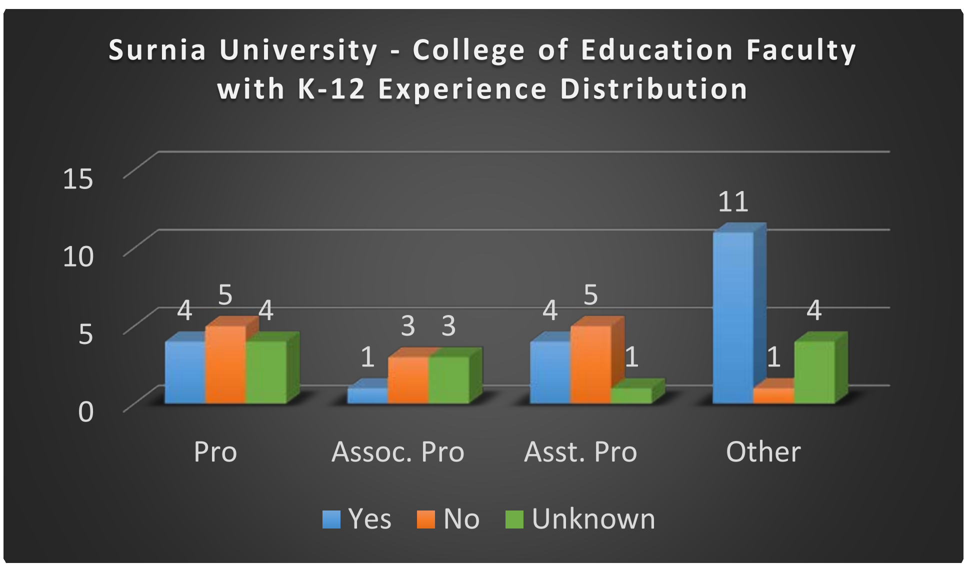

Figure D.24. Surnia University – College of Education faculty with K-12 experience distribution.

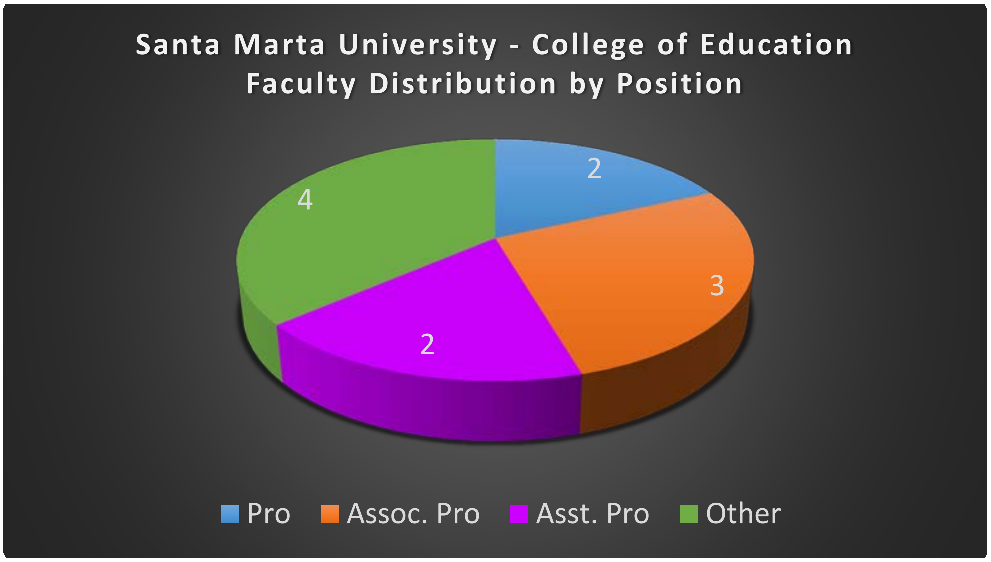

Figure D.25. University of Santa Marta - College of Education faculty distribution by position.

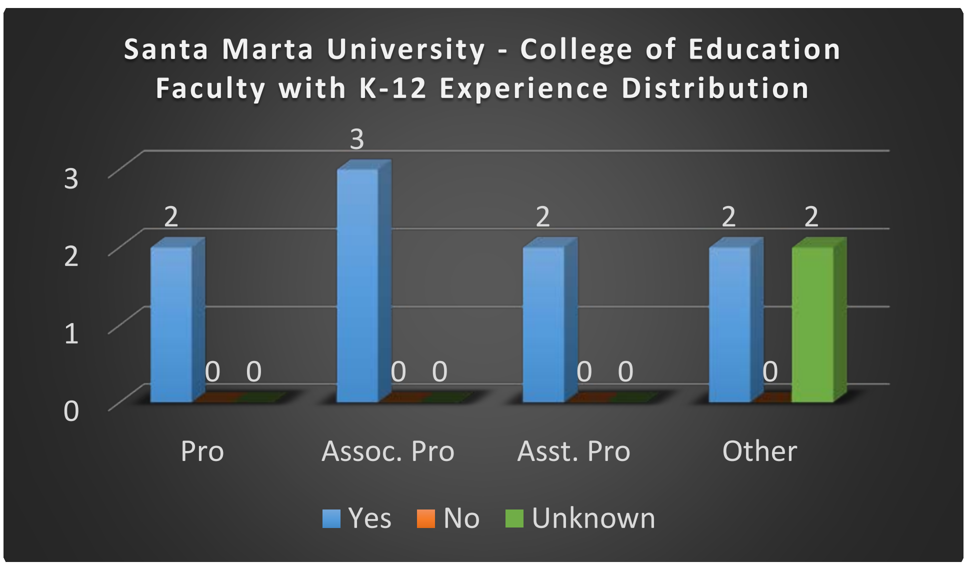

Figure D.26. University of Santa Marta – College of Education faculty with K-12 experience distribution.

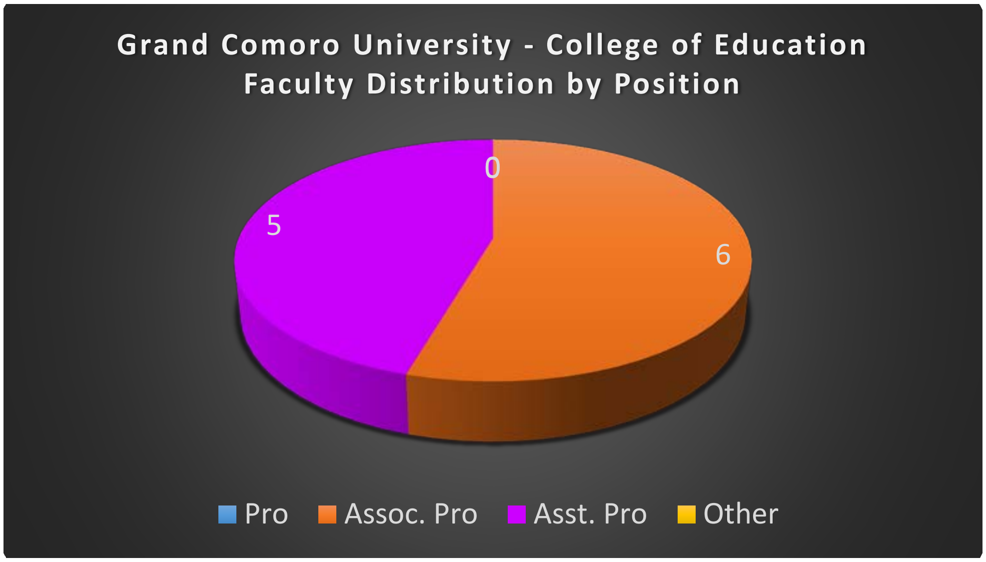

Figure D.27. University of Grand Comoro - College of Education faculty distribution by position.

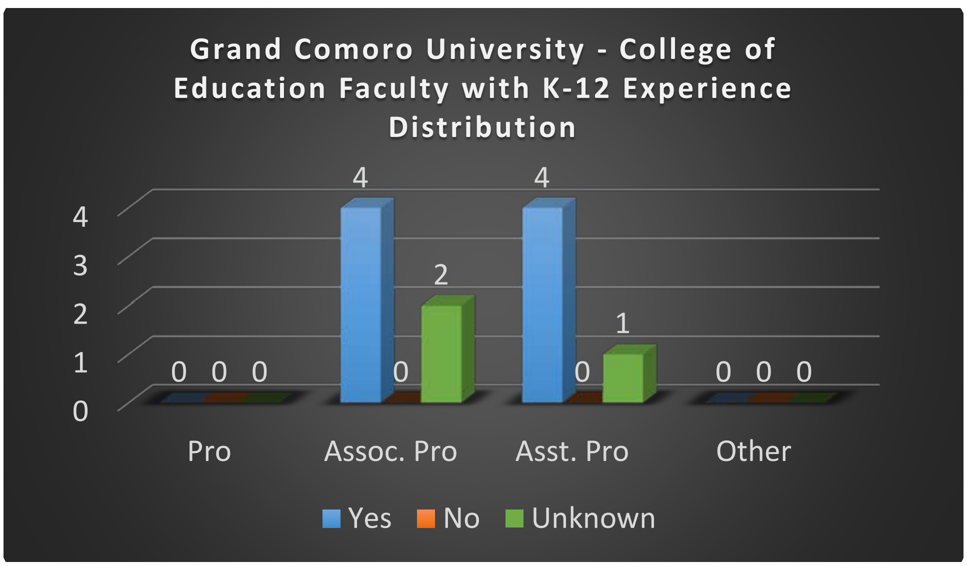

Figure D.28. University of Grand Comoro – College of Education faculty with K-12 experience distribution.

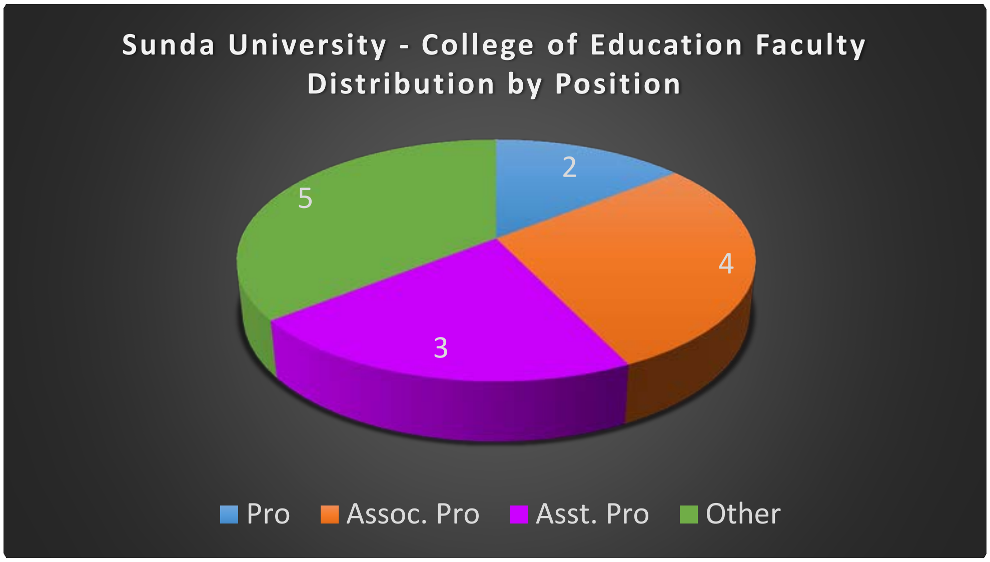

Figure D.29. Sunda University - College of Education faculty distribution by position.

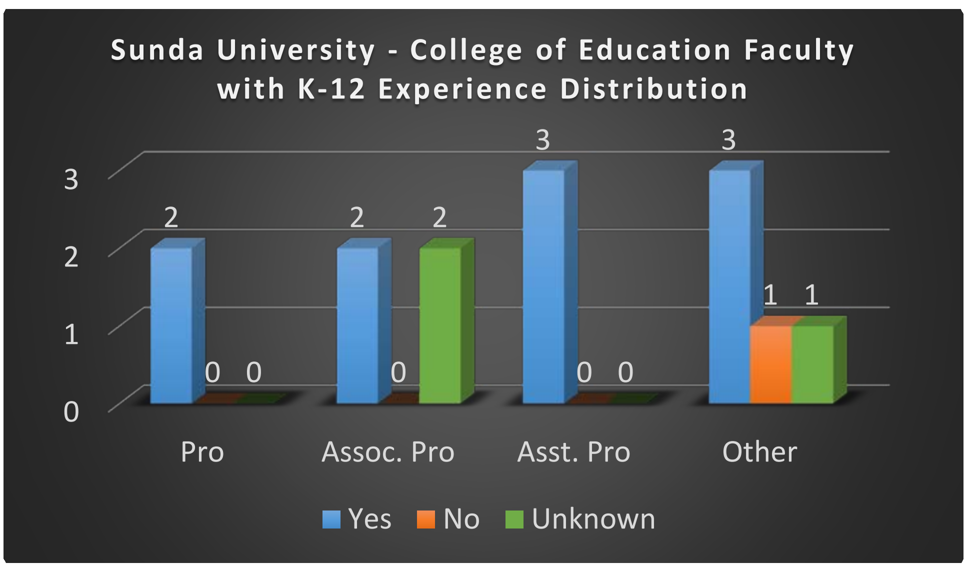

Figure D.30. Sunda University – College of Education faculty with K-12 experience distribution.

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