Influential factors and faculty members’ practices in technology integration using ISTE standards for teacher preparation at Taibah University- Saudi Arabia

by

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B.S., Educational College of Girls, Jeddah, Saudi Arabia, 1987
M.S., Kansas State University, Manhattan, KS, 2012

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

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Abstract

Using technology effectively has been proven to enhance education. The status quo in Saudi Arabia reflects low-level usage of technology in K-12 classrooms. Preparing 21st Century teachers to integrate technology in their future classrooms for meaningful learning requires College of Education faculty to model using technology effectively.

This study investigated the technology integration practices of faculty members in the College of Education at Taibah University, particularly to what extent these practices are aligned with ISTE NETS-T standards and what factors predict these practices. Based on the literature, the factors examined include attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support.

The population of the study was the 257 faculty in the College of Education at Taibah University. The study used a web-based survey containing 66 closed-ended items to collect data, and 170 valid responses were obtained (66% response rate).

Descriptive and multiple linear regression analyses were conducted to analyze data. Findings from the first research question revealed that faculty members' technology integration practices were well-matched with ISTE NETS-T standards since the overall mean of these items was (M= 4.25, SD= .64). This indicates that faculty members had awareness of using technology effectively based on these standards to engage students in meaningful learning.

Results from the multiple linear regression analysis revealed that the overall model was significant as it explains 43% of the variability in faculty members' technology integration practices. Three significant factors statistically predicted faculty members' technology integration practices based on ISTE NETS standards. Faculty members' attitude toward

technology had a positive relationship with faculty members' technology integration practices [β=.35, p=.00]. Faculty technical skills had also a statistically significant positive relationship with faculty members' technology integration practices [β=.19, p=.00]. However, leadership support was found to have a statistically significant negative relationship with faculty members' technology integration practices in teaching based on ISTE NETS-T standards [β=-.23, p=.00]. These results, in addition to the means of the independent variables, showed that the highly rated technology integration factors, including technology attitudes and technical skills, predict their high technology integration practices based on ISTE NET-T standards. However, faculty members still need more support in several technology integration factors including professional development, technology access, workload, and leadership support.

The study recommends education faculty members to model the effective use of technology for pre-service teachers through providing them with opportunities to observe it in a variety of instructional models and practice the constructivist use of technology in lesson plan assignments and projects during the program, which helps in developing positive attitudes toward technology use among pre-service teachers. College of Education leaders are recommended to have a clear shared technology vision and offer the resources and support needed to make instructional technology integration successful. Recommendations for future studies are also discussed.

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Dedication

This humble effort is dedicated first

-To myself. I never expected to arrive at this moment of my life, but I did not give up, and always say I can do it.

-To the soul of my Dad, Sulaiman Bajabaa, and my lovely Mom – you taught me the spirit of giving in life and raised us to be our very best and to be beneficial to others.

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-To my kids, to do your best in whatever, whenever, and wherever. You will get it one day.

-To those people who are looking for a better educational future for today's kids.

Chapter 1 - INTRODUCTION

New Century: New Education

In the highly competitive knowledge-based global economy, there is increasing concern about the future of young people. A common agreement among business leaders, policymakers, parents, and educators is that schools are not preparing students adequately for post-secondary jobs or colleges (Casner-Lotto & Barrington, 2006). The 21st Century Readiness Act asserted that teachers should "develop, and support 21st century readiness initiatives that assist students in acquiring the skills necessary to think critically and solve problems, be an effective communicator, collaborate with others, and learn to create and innovate" (Govtrack, 2011, para.1). Therefore, education is being compelled by critical aspects in today's world to adopt 21st century learning to help students possess the knowledge and skills to succeed in a significantly connected and complex world in a highly competitive knowledge-based global economy.

Based on social context changes, the world of work is redefined as "access to information and the ability to use information effectively that enables individuals to seize life's opportunities [and] solve important problems within a globally competitive economy" (Leu, Kinzer, Coiro, & Cammack, 2004, p. 1575). Social context changes stimulate the changes to Information Communication Technology (ICT) and literacy and force the effective use of internet as a key element of the literacy curriculum. With network and digital technology capabilities, people have greater access to information, which requires workers to have the skills to use information effectively in a competitive workplace context in order to be productive and responsive to customer's needs.

The world in which today's children live is significantly different from that of 20 years ago. Living in a technology and media enriched environment allows easy and rapid access to a huge amount of information. Today's students are tech-savvy. They generally use technology, with all of its promises and pitfalls, to connect with different people (e.g., peers, friends, family, and experts) in their community and around the globe. While today's students use and access technology often for entertainment purposes, they are not fully digitally literate (Metiri Group & North Central Regional Education Laboratory (NCREL), 2003). Schools must prepare students to be digitally literate and use technology effectively, especially when engaging in online, collaborative, research-driven environments, through "researching, analyzing, synthesizing, critiquing, evaluating and creating new knowledge. In order to prepare for tomorrow's success, they need to be able to use technology to develop critical thinking, problem solving, and other 21st century skills" (21st century schools, 2008, para. 3).

Saudi Arabian Case

Spread of Technology in Saudi Arabian Society

It is not surprising that technology is widespread throughout Saudi society. Saudis are voracious internet and other social media users. One quarter of the Saudis is active in using social media (Zarovsky, 2013). For example, 40 % of the Middle East tweets come from Saudi Arabia (The State of Social Media in Saudi Arabia, Vol, 3., 2015) When it comes to You Tube, 96% of the internet users in Saudi Arabia (SA) watch You Tube videos while seven millions Saudi internet users have uploaded videos at least once (The State of Social Media in Saudi Arabia, Vol, 3., 2015). Such uses have made Saudis more connected to the outside world than ever before. Internet services in SA reached 26.8% in 2009, with an increase of 3750% since 2000; the 7.7 million internet users represent the largest internet user population in the Arab world by the end of 2009 (Simsim, 2011). This huge growth rate in internet services in SA was ten times more than the world's growth rate in the same period of time. The question is how the internet is used by the Saudi society. Simsim (2009) examined the diffusion of internet services within the Saudi society and the differences in internet usage across different factors in addition to identifying usage patterns in terms of time and purposes. The study indicated that among the 706 valid participants, 84% of them use the internet on a regular basis. Also, 92.5% of Saudi youth (between 19-25 years old) use the internet, which is more than the older Saudis (over 45 years old) who use the internet 69.8%. More importantly, the study indicated that young users are on the internet for chatting as a modern way of communication, which differs from older users, who use the internet for entertainment-related activities most of the time. Interestingly, the study indicated that Saudi business workers use the internet for e-commerce and similar activities, which were found to be an attractive alternative because of its simplicity and high efficiency (Simsim, 2011). These results showed that, regardless of the booming internet usage in SA, educational uses were almost absent.

While the potential of educational technology to enhance learning opportunities, support learning practices, increase student engagement, and improve their thinking skills and achievements have been widely proven (Jonassen & Reeves, 1996; Jonassen, Howland, Marra, & Crismond, 2008; Liu, 2012; Prensky, 2010; Unnisa, 2014), the effective use of technology in Saudi education has not been noted, regardless of the wide spread of technology uses in the society. Studies showed that technology uses in K-12 education in the country are still at a low level (Al-Qurashi, 2008; A. Kamal, 2012) .

Al-Qurashi (2008) examined the instructional uses of computer and internet in teaching seventh graders mathematics in Al-Taif intermediate schools. Results found that teachers used computer and internet in classroom management tasks and office applications, while participants rarely used technology to support meaningful learning (Al-Qurashi, 2008). A. Kamal (2012), who examined the use of technology in 30 Tatweer schools (n= 710) in SA, found that "more uses in the lower cognitive level tasks than in technology use to support high-order thinking skills" (p. 221). Most of the participants' responses related to technology uses were "Never" or "Sometimes" (A. Kamal, 2012). These studies emphasize that low level uses of technology in Saudi schools are more dominant than high level uses that would support meaningful learning with technology. This raises the question why K-12 teachers who are surrounded by technology in their life are not using it in their teaching. Therefore, it is important to investigate how teachers are prepared to use technology effectively during their teacher preparation programs.

The Need for Qualified Teachers and Colleges of Education

With the continuous declaration from the Saudi government leaders for the country to take critical steps toward a more diversified, knowledge-based economy, education reform has become a must (Murphy, 2011). Several reform initiatives have been done with insignificant improvement (Al-Abdulkareem, 2009). Based on the Global Competitiveness Report 2014–2015, SA education ranked 57th (Schwab, 2014). According to the report, "Saudi Arabia faces important challenges going forward. For example, health and education do not meet the standards of other countries at similar income levels (50th)" (Schwab, 2014, p. 36). This result was disappointing for both the country leaders and the public.

In agreement with the previous results, the Center for Universal Education at the Brookings Institution published a report in 2014 titled "*Arab youth: Do they suffer from a lack of educational foundations that would guarantee them a productive life?"* that examined the status of education in 13 Arab countries. Based on 2011-2012 data, the report indicated that after spending four years in primary school, half of Saudi boys did not succeed in acquiring basic requirements in education, while one-third of the girls were not able to acquire the basic requirements in education (Steer, Ghanem, Jalbout, Parker, & Smith, 2014). The report recommended that urgent actions should be taken to improve education to help students gain foundational skills to enable them to progress in school and be ready for the future workforce through closing the gap of teachers' quantity and quality: "Filling this teacher gap with qualified graduates as well as retraining in-service teachers is a shared priority among countries in the region" (Steer et al., 2014, p. 19).

There is no doubt qualified teachers play a key factor in the success of educational reform initiatives. Saudi Arabia has continued a conversation among society at different levels including stakeholders, academics, and the public that questions the preparation and quality of teachers. Aljabri (2015), the Dean of College of Education at Taibah University (TU), emphasized that the low scores of Saudi students in TIMSS in 2003, 2007, and 2011, was the outcome of teachers' low quality (Aljabri, 2015).

In SA, joining the teaching profession is easy, since it only requires getting a bachelor's degree without any consideration of the teacher's GPA as a student nor of the quality of the institute the teacher attended (Aljabri, 2015). In recent years, a Teacher Competency Test (TCT) was added as another requirement for hiring teachers; unfortunately, it is not a distinguishing criterion, since the cut off point for passing the exam is as low as 50% (Aljabri, 2015). In the same manner, Dr. Ahamad Aleissa, recently appointed as the Secretary of Saudi Education Ministry, indicated that education reform should start with teachers. The teacher is an effective and vital element in the success of the educational process or failure, and unless the teacher is at the level of quality to be able to create a difference in more effective ways in student's mentality, behavior, and manners, the paths of reform in all other developing issues, such as curriculum and school environment, will continue to be inadequate and ineffective (Aleissa, 2009).

Having a qualified group of educators, begins in colleges of education, which necessitates reviewing the teacher preparation programs in the country and their effectiveness in preparing teachers for new education demands. To achieve this goal, Aleissa (2009) suggested several solutions including creating new and clear policies to choose teacher candidates from the top of educated cohorts and "improving teacher preparation programs and colleges of education to keep pace with the scientific and professional development in the developed countries" (p. 114).

When compared with other colleges like engineering, computer science, and science, colleges of education receive less attention from the Saudi universities in terms of quality of professional development programs and opportunities for partnership with international universities and accreditation institutions (Aleissa, 2009; Aleissa, 2011). In supporting what Aleissa emphasized, Al-Ghamdi (2012), examined the status of professional development of faculty members in Saudi colleges of education in light of the National Council for Accreditation of Teacher Education (NCATE) standards. Participants were 20 experts of education, quality assurance, education planning, and administration, and accreditation who represent different Saudi colleges of education. Results of the study showed that low professional development efforts took place to prepare the college of education's faculty members, especially in the academic accreditation area, and there were no significant efforts taken toward accrediting their programs or even starting initial steps. Participants rated the need for professional development areas based on NCATE standards as "high" with an average of 2.69 out of 3 (Al-Ghamdi, 2012). This result, in addition to the opinion of both stakeholders and the public, emphasize the need for improving teacher preparation programs and examining how college of education faculty members are competent with skills and knowledge in different areas including educational technology integration as a characteristic of today's learning in order to prepare the 21st century teachers.

Faculty as Role Models in Integrating Technology in Pre-Service Teacher Education

Technology Integration for Meaningful Learning

Technology advancement has impacted education positively (Dede, 2014a; Jonassen & Reeves, 1996; Jonassen et al., 2008; Jonassen, 2000; Liu, 2012; Prensky, 2010; Unnisa, 2014; Wright, Wilson, Gordon, & Stallworth, 2002). Dede (2014a), in the report of The Role of Digital Technologies in Deeper Learning, argued that for achieving deeper learning several elements should be addressed including richer content, powerful pedagogy (e.g., project-based and problem-based learning), valid assessment, and effective use of technology (Dede, 2014a). In his emphasis of the importance of technology, he asserted that "digital technology will be indispensable to the effort to scale up deeper learning in the nation's high schools" (Dede, 2014b, p. 1). More specifically, technology should be used to assist 21st century learning for today's students in order to prepare them for the knowledge-based workforce and to be responsible citizens. This requires using technology at a level higher than merely as a tool for productivity and administrative purposes to reach the constructivist learning and teaching level (e.g., enables students to construct deep and connected knowledge and create meaningful learning in real situations). Integrating technology in classrooms meaningfully by engaging students in active constructive, intentional, authentic, and cooperative learning helps students to derive more meaning (Jonassen et al., 2008). This process of learning is not easy.

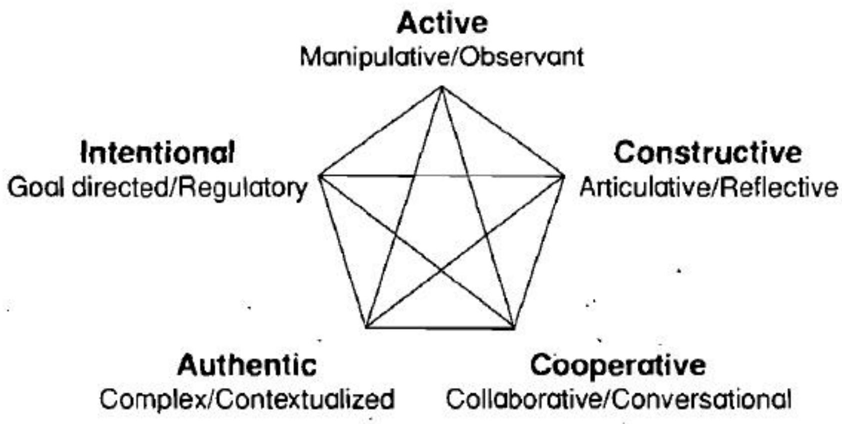

Figure 1.1. Characteristics of meaningful learning
Adapted from (Jonassen et al., 2008, p. 3)

For today's digital native learners, learning with technology makes learning more engaging, gives them more responsibility about their learning, and enhances a learner-centered approach where 21st century skills are more easily gained (Cox, 2014; Vockley, 2007). Therefore, for students to learn with technology, teachers, who play a key role in classroom practices, must increase their knowledge and skills, apply new methods of learning, and adopt more constructivist teaching roles (Jonassen et al., 2008).

In-Service Teachers and Technology Integration

Technology availability and having teachers who have technology technical skills don't guarantee deep knowledge construction with meaningful technology integration (Jonassen et al., 2008; Prensky, 2010). Successful technology integration is a pedagogical process that requires in-service teachers who understand its impact on students' outcomes and possess knowledge and skills for applying technology effectively as "inappropriate training styles that lack pedagogical aspects are likely to be unsuccessful, so that high levels of ICT use by teachers are not achieved" (Al Mulhim, 2014, p. 488). The literature in both the United States and Saudi Arabia support the idea that technology use in K-12 classrooms reflect low level usage that is mostly limited to administrative and productive purposes, or in the best cases, demonstrating knowledge (Al-Qurashi, 2008; Ertmer & Ottenbreit-Leftwich, 2010; A. Kamal, 2012; U.S. Congress, 1995; Wright et al., 2002; Zhao, Pugh, Sheldon, & Byers, 2002).

Effective technology integration in classrooms is positively correlated with in-service teachers' technology competences (Afshari, Bakar, Luan, Samah, & Fooi, 2009; Becker, 2000; Buabeng-Andoh, 2012; Osika, Johnson, & Butea, 2009), yet, much of the research related to technology integration in K-12 classrooms indicates that in-service teachers feel unprepared to use technology effectively to support teaching and learning activities in their classrooms (Al Mulhim, 2014; Al-Madani & Allaafiajiy, 2014; Alshehri, 2012; Ertmer & Ottenbreit-Leftwich, 2010; A. Kamal, 2012; U.S. Congress, 1995; Wright et al., 2002). In early 2015, the Public Education Evaluation Commission in SA conducted a nationwide online survey aimed to investigate the public opinion including teachers, students, parents, and others. Participants included 8500 teachers (Public Education Evaluation Commission in Saudi Arabia, 2015). When asked about the total number of in-service training hours they received during the academic year, one third of the participated teachers indicated 1-5 hours only, though the maximum training hours was 20 hours or more, which was indicated by 10.3% of the teachers. These results indicate that it would be efficient to prepare the novice teachers before they started their teaching through improved teacher preparation programs.

Pre-service Teacher Preparation Programs

Today's digital natives, pre-service teachers who have grown up in a technology-filled society (e.g., mobile devices, social media, and computers) (Lei, 2009) are assumed to be fluent in technology and do not need to be trained to use technology in their future classrooms (Prensky, 2001; Tapscott, 2008). However, research showed that regardless of the strong positive attitudes toward technology and technological skills they have, today's pre-service teachers are still far away from implementing technology effectively to create meaningful learning due to their lack of technology related pedagogical skills (C. Jones & Czerniewicz, 2010; Lei, 2009; Oblinger & Oblinger, 2005; Richardson, 2011). Brush et al. (2008) studied technology uses, and the participating pre-service teachers (n= 176) indicated that they were prepared with low level technology skills (Brush, Glazewski, & Hew, 2008). In similar manner, Lei (2009) found that pre-service teachers still need to be prepared to use technology in their classrooms for high level usage (e.g., knowledge construction, sharing, and communication). These results emphasize the important role of teacher preparation programs in preparing novice teachers with the skills they need to create meaningful learning with technology.

Faculty Members as Technology Integration Role Models

Pre-service teacher preparation programs are seen as the responsible bodies for preparing technology proficient future teachers, especially because they are the ones who make the decisions related to what and how these technologies will be used. Teacher preparation programs have applied a variety of strategies and models to prepare teachers to use technology in 21st century classrooms. However, research found that these efforts are inappropriately preparing pre-service teachers to integrate technology (Alghanem, 2005; Almaraee, 2003; Chai, Koh, & Tsai, 2010; Ertmer & Ottenbreit-Leftwich, 2010; Sadaf, Newby, & Ertmer, 2012; The CEO Forum on Education and Technology, 1999; Wright et al., 2002).

To address this issue, the United States Department of Education established the Preparing Tomorrow's Teachers to Use Technology (PT3) program as the first and primary initiative to ensure that pre-service teachers are well prepared to integrate technology in their future classrooms (Howland & Wedman, 2004; Mims, Polly, Shepherd, & Inan, 2006; Tondeur et al., 2012). A main goal of PT3 is to expose pre-service teachers to deep technology experiences not only in their technology courses but throughout the whole curriculum, especially methods courses (Mims et al., 2006). As a result of collected efforts, various studies of PT3 projects showed that preparing pre-service teachers to effectively integrate technology is a complex issue that requires faculty members themselves to develop knowledge related to the connection of technology with pedagogy (Polly et al., 2010).

Both Kay (2006) and Tondeur et al. (2012) conducted separate studies to look at peer - reviewed articles focusing on strategies used in teacher preparation programs to prepare pre-service teachers to integrate technology. Kay's (2006) study found the most effective strategy was the integrated model, which requires teaching technology in all courses where students create authentic meaningful learning with technology (Kay, 2006). One important factor that makes the integrated strategy ineffective is faculties' lack of expertise. Therefore, another strategy found important and effective, as recommended by both NCATE and ISTE standards, is faculty modeling, especially when combined with the integrated strategy where demonstration of how technology can be used is given through all courses (Kay, 2006). Modeling was also found to be an important and effective strategy in preparing pre-service teachers to use technology in the Tondeur et al. (2012) review study. The term "role model" was mentioned in 13 of the 19 qualitative studies reviewed.

Based on the literature, faculty members play a key factor in preparing future teachers, which indicates that teacher preparation program instructors are role models for pre-service teachers to use technology effectively in their future classrooms (Drent & Meelissen, 2008; Ertmer & Ottenbreit-Leftwich, 2010; Grunwald Associates LLC, 2010; Russell, Bebell, O'Dwyer, & O'Connor, 2003; The CEO Forum on Education and Technology, 1999; Wright et al., 2002). Studler and Wetzel (1999) stated that "If college of education faculty do not model the integration of technology, then teachers will be less inclined to include technology in their own classrooms" (p. 63).

To reach this end, teacher preparation programs should take serious actions to make sure that faculty members are role models who possess appropriate competences to integrate technology effectively based on trusted widely accepted standards like the International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers (NETS-T). Moreover, addressing other factors that affect faculty members for being models in integrating technology effectively is equally important, too.

International Society for Technology in Education (ISTE) Standards

Serving the education profession with a framework for creating meaningful learning with technology, the International Society for Technology in Education (ISTE) was established as a nonprofit organization focusing on PK-12 and teacher education programs (ISTE, 2016; ISTE Advocacy, 2009). Rather than limiting technology uses in education to productivity and administrative purposes, ISTE standards emphasize effective use of technology to improve student learning in more constructivist ways (Anderson & Maninger, 2007; Graham, Tripp, & Wentworth, 2009).

The National Educational Technology Standards for teachers (NETS-T) 2008 and its performance indicators guide teachers to design technology-supported learning activities that reflect constructivism theory to help students gaining skills and knowledge matching the nature of 21st century learning (ISTE, 2016; Willis, 2012b). Teachers play a key factor in integrating technology effectively as "Teachers that meet ISTE standards are innovative thinkers who engage students with real-world issues and who encourage students to think outside the box by finding authentic, creative ways to solve problems using digital tools" (Kennedy, 2010, p. 23). As preparing teachers starts at the teacher preparation programs, the National Council for Accreditation of Teacher Education (NCATE) requires teacher preparation institutions to prepare their students to be capable to use technology to facilitate K-12 learning and help all students learn (Murley, Jukes, & Stobaugh, 2013). NCATE adopted ISTE NETS-T standards, among several other technology standards, as its framework to accredit teacher preparation institutions in preparing teacher candidates for integrating technology effectively in their future teaching (ISTE Advocacy, 2009).

Studies found in the literature examined how teacher preparation programs prepared pre-service teachers to integrate technology in their future classrooms based on ISTE NETS-T 2008 standards (Alnujaidi, 2008; Easter, 2012; Koch, 2009; Lewis, 2013; Wetzel & Williams, 2004). These studies stressed the importance of considering ISTE NETS-T standards in preparing teacher candidates to integrate technology and to examine how technology competent they will be in their future teaching. While faculty members play a key role in this preparation, none of these studies investigated how faculty used technology in their teaching based on these standards and being role models except for small samples in qualitative interviews. Alnujaidi (2008) was the only study found in the literature that examined the relationship between faculty members' integration of Web-based Instruction (WBI) in Saudi Araba and ISTE NETS-T standards. However, this study did not examine college of education faculty members. Alnujaidi (2008) emphasized the importance of ISTE NETS-T standards in integrating technology at higher education institutions in SA as the researcher recommended the use of these standards as a framework for future studies.

More importantly, none of these studies investigated important factors that affect faculty members of college of education's decision to use technology when their technology integration is examined in light of ISTE NETS-T except for Wetzel and Williams (2004), who examined a PT3 program at Arizona State University West. The study found that faculty members' technology integration improved when enabling factors, such as professional development, technology access, and leadership support, were offered.

Successful technology integration in any learning environment requires several conditions that influence the extent and quality of technology implementation (Zhao et al., 2002). The influential factors of technology are varied and intertwined. Effective technology integration factors are categorized into two main categories. One category is external factors that include outsider influences that faculty members have no control over that allow them to successfully integrate technology, such as access to technology and leadership and technical support (Ertmer, 1999; Ertmer et al., 2006; Goktas et al., 2009; Salentiny, 2012; Tondeur et al., 2012). Internal factors represent factors that are related to faculty beliefs about teaching and learning practices, such as technology attitudes and pedagogical practices (Ertmer, 1999; Ertmer, 2005; Ertmer, Ottenbreit-Leftwich, & York, 2006; Granston, 2004). The current study focuses on selected influential factors including attitudes toward technology, pedagogical beliefs, technical skills, faculty workload, professional development, technology accessibility, technical support, and leadership support (details are found in Chapter 2). More emphasis will be given to examine how these factors predict faculty members' technology integration within ISTE NETS-T standards framework.

Technology Integration in Teacher Education in Saudi Arabia

In response to the challenges that Saudi higher education has faced, the Ministry of Higher Education established a strategic plan to improve higher education learning (Ministry of Higher Education, 2009; Ministry of Higher Education, 2010). This plan, which is known as the Afaq (Horizon) project was established in 2007. To achieve excellence in education, improve college's learning environment, and prepare the community for the digital era, Afaq adopts applying e-learning as a primary element of the educational system (Ministry of Higher Education, 2010). The National Center for e-Learning and Distance Learning (NCeL) was established by the Ministry of Higher Education to offer the needed strategies, policies, and support, for the Saudi colleges in applying e-learning following a standardized approach in both virtual and blended learning environments (Alebaikan & Troudi, 2010; Ministry of Higher Education, 2009). Few studies found in the literature examined the status of technology integration in the Saudi colleges of education (Almaraee, 2003; Alshahri, 2015; Omar, 2016).

Almaraee (2003) examined the status of pre-service teacher preparation to use computer and the Internet in teaching mathematics curriculum in three different colleges of education in Saudi Arabia. Pre-service teachers from the three colleges indicated this preparation was less than adequate (M=1.75, SD= .446). In agreement with pre-service teachers, faculty members (n=5) who were interviewed in the study, asserted that pre-service teachers were not prepared to use computers and the internet for their future teaching as they referred weak preparation as several reasons including lack of computer lab, lack of fund, lack of awareness towards integrating technology. All participating faculty members suggested improving teacher preparation programs to prepare novice teachers to integrate computer and internet to create meaningful learning that align with constructivism theory.

In a recent study, Alshahri (2015), who compared between education faculty members perceptions in SA (n= 292) and the USA (n= 253) in applications and the use of ICT tools, found that only 26% of the Saudi faculty members taught online courses. Based on the study, the most highly tools used by the Saudi faculty members for instructional purposes were email (*M*= 4.14, *SD*= 1.33), Word Processing (*M*= 4.14, SD= 1.17), and social media applications (*M*= 3.39, *SD*= 1.62).

In a more recent study related to e-learning applications in the Saudi colleges of education, Omar (2016) examined faculty members' concerns (n=296) from nine departments of the College of Education at King Saud University related to their adoption of online teaching and their professional development needs. The tools most highly used by participants were mobile apps (64%), learning management system (60%), social media (47%), and web conferencing tool (32%). These two results of Alshahri (2015) and Omar's (2016) studies showed improvement in integrating educational technology either in online or blended learning in the college of education when compared with the Almaree (2003) study. However, regardless of the better conditions that have been offered in Saudi higher education to support technology integration (e.g., training, smart classroom, Blackboard LMS, and so on) (Omar, 2016), education faculty members are still at early stages in integrating technology effectively (E. Rogers, 1995). This agrees with Omar (2016) who found that education faculty members were at the early stages of using the innovation (teaching online) where these stages of concern (Hall & Hord, 2010) were ranked the highest, which means they did not use the innovation and need more information about it (nonuser profile) (Omar, 2016). Consequently, pre-service teachers are unprepared to use technology in their future classrooms. Therefore, there is still a need to examine to what extent education faculty members' technology integration aligns with widely accepted technology standards like ISTE for teachers and to explore the enabling factors that affect their decision to use or not to use technology in their teaching.

Technology Integration in Teacher Education at Taibah University

The College of education at Taibah University, which was established in 1977, offers both undergraduate and graduate degrees in education. To achieve excellence among the Saudi and Arab teacher preparation programs, the college of education at Taibah University strives for sustainable development and quality in the learning environment (Taibah University, 2016b). An important target of the college is to graduate highly qualified teachers through adapting active learning within an innovative learning environment.

The Distance Learning Deanship (DLD) at Taibah University aims to provide accredited education that utilizes e-learning in order to improve faculty members' academic performance as well as students' learning through the use of emerging educational technologies. Taibah University colleges, including the college of education, have already started several initiatives to integrate technology in both learning and teaching processes including, preparing faculty members to be able to teach with technology (Taibah University, 2016c).

The College of education at TU adopts the stand alone technology courses approach in preparing pre-service teachers to use technology. Three technology courses are offered that mandatory for all pre-service teachers in the college. These courses focus on preparing them to integrate technology in their future teaching. The courses gradually move from helping pre-service teachers to form a clear conceptual vision about educational technologies to reach understanding the most emerging technologies and how they can be employed in the educational process (e.g., using computer and internet in education) to design effective blended and online learning). During these courses, pre-service teachers are exposed to the learning theories and how they can be connected to integrating technology in teaching and learning. Pre-service teachers are introduced to the criteria of choosing and using ready-made educational software as well as gaining the skills of e-publishing, in addition to the ethical issues related to using electronic resources. Pre-service teachers also learn about the most modern technologies used in the library, in addition to the principles of scientific research, and how research papers and abstracts can be prepared using data bases and indices in order to help them developing positive attitudes towards the use of the library and take advantage of printed and non-printed sources of information (Aisha Bleyhesh, personal communication, October 6, 2015; Hashem El Sharnobiy, personal communication, April 6, 2016).

Statement of the Problem

While there have been several initiatives that have taken place in response to the growth and spreading of technology through K-12 classrooms, integrating technology in the Saudi Arabian educational system is still at a low level, focusing on drill and practice tasks, which mismatches the needs of today's students with developing 21st century skills. In-service teachers who are knowledgeable on how to integrate technology effectively are in low numbers, which is not surprising considering the inadequate or improper training they are getting. Unfortunately, this research also found that pre-service teachers leave teacher preparation programs with a limited set of knowledge and skills needed to achieve high quality technology integration in the 21st century (C. Jones & Czerniewicz, 2010; Oblinger & Oblinger, 2005; Richardson, 2011). Thus, there is a great desire to improve the quality of teacher preparation programs especially faculty members who can bridge the gap between students and curriculum. Faculty members as role models play a key factor in this preparation through modeling the effective use for their students and giving them the opportunity to practice technology in authentic hands-on activities.

In SA, research is still needed to understand how teacher preparation programs' faculty members integrate technology effectively in light of ISTE NETS-T standards that are widely accepted and adopted by accreditation associations. Technology integration influential factors also need to be investigated to ensure effective technology integration by faculty members.

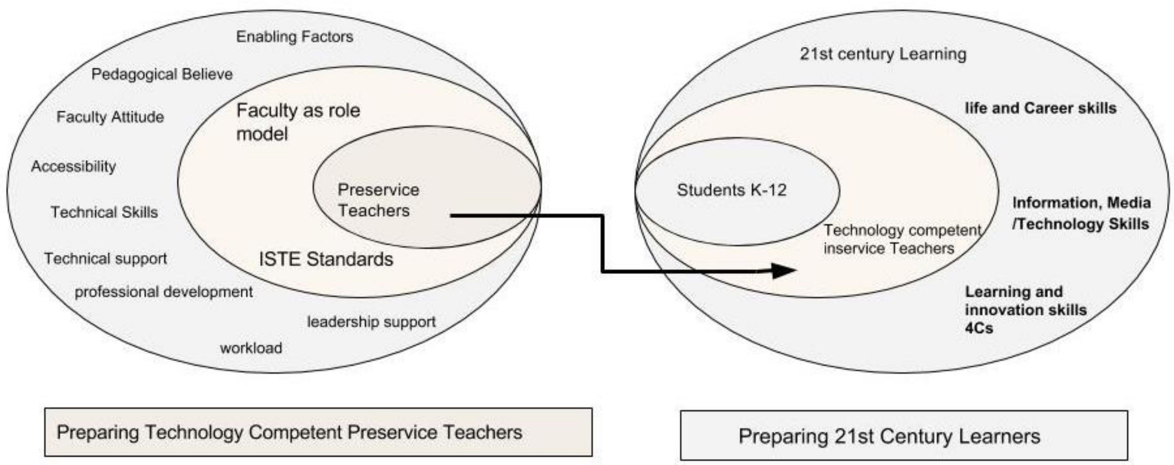

Figure 1.2. Faculty modeling to prepare preservice teachers for 21st century Learning

Purpose of the Study

This study intended to investigate the current status of education faculty members' technology integration practices at Tiabah University, in particular to what extent these practices are aligned with ISTE NETS-T standards. In order to understand the gap between faculty technology integration practices and ISTE NETS-T standards, the study explored the factors that influence faculty members technology integration practices.

Significance of the Study

Studies could not be found that examined college of education faculty practices in integrating technology effectively using ISTE NETS-T standards (2008) in SA. Such information could serve in determining how faculty members use technology on a standards-based approach. This study attempted to address the issues related to an unprepared teaching force who need to learn how to effectively use technology. This goal was achieved by examining college of education faculty members' practices in using technology effectively and the influential factors that enable them to be role models to better prepare teacher candidates to effectively integrate technology into their future teaching.

This study has important relevance and significance for a number of reasons. It provides useful information to stakeholders in the Saudi education system that will help in improving policies and strategies related to the progressive reform initiatives being conducted in the country, in integrating technology effectively to support a learner-centered approach. This study is about Taibah University pre-service teacher education in SA. Therefore, information generated from this study helps Saudi college of education administrators to update their programs regarding preparing pre-service teachers to integrate technology into their future classes; it is especially hoped the study will create a model based on widely accepted ISTE standards. Last but not least, this study responds to the Future Plan for Higher Education in SA (Aafaq) that calls for more research in major issues related to higher education in SA such as technology integration.

Methodology

The study applied a nonexperimental cross- sectional predictive quantitative design. The study aimed to predict eight independent variables representing technology influential factors. The whole population in the College of Education at Tiabah University in SA was surveyed including 257 faculty members. Data was collected through an online survey that includes 66 items divided into three sections. Data analysis was done using descriptive and linear multiple regression analyses, then the findings were summarized and represented in statistical statements, tables and figures.

Research Questions

To accomplish the research goals within this study, the following research questions were answered:

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

Based on the research questions, the study formulated and tested the following statistical research hypotheses:

H_0 *2.1:* There is no statistically significant relationship between *attitudes towards technology use* in teaching and faculty members' practices in technology integration in their teaching.

H_0 *2.2:* There is no statistically significant relationship between *pedagogical beliefs* and faculty members' practices in technology integration in their teaching.

H_0 *2.3:* There is no statistically significant relationship between *technical skill* and faculty members' practices in technology integration in their teaching.

H_0 *2.4:* There is no statistically significant relationship between *faculty workload* and faculty members' practices in technology integration in their teaching.

H_0 *2.5:* There is no statistically significant relationship between having *technology related professional development* and faculty members' practices in technology integration in their teaching.

H_0 *2.6:* There is no statistically significant relationship between *technology access* and faculty members' practices in technology integration in their teaching.

H_0 *2.7:* There is no statistically significant relationship between *technical support* and faculty members' practices in technology integration in their teaching.

H_0 *2.8:* There is no statistically significant relationship between *leadership support* and faculty members' practices in technology integration in their teaching.

Delimitations of the Study

This study had several boundaries that researcher intentionally sets, including the following:

- The study included only college of education faculty members and excluded other colleges (e.g., science, humanity, mathematics) at Taibah University in SA. The college of education was specifically chosen because it is the institution that is responsible for preparing future teachers in SA. The reader is advised regarding the generalizability of the results to populations that differ from this one.
- The study was conducted in a teacher education program that is not accredited by accreditation organizations that adopt widely accepted technology standards, like NCATE. However, it is possible that the faculty of the college of education might have been exposed to the ISTE NETS-T guidelines for their technology framework.
- Due to difficulty that the researcher might face in collecting data from pre-service teachers, they were excluded, especially since it was difficult to send the survey to them

electronically, according to the college administrators. Hard copies were also difficult as the only way to distribute them is during the lectures by the faculty members, which might cause duplication issues.

- The study investigated selected technology influential factors only, while personal characteristics (age, gender, country of graduation, and years of teaching experience) that were examined in several others studies were not included since they were collected but were not analyzed. This is because the scope of the study was to explore the enabling factors that influence faculty members of college of education at Tiabah University in their decision to use technology effectively.

Limitations of the Study

There were limiting factors that could affect the study, which the researcher can't control:

- Data collection strategy. The information gathered in the study was based on the faculty members' perceptions (self-reported). Therefore, the data collected were limited to the participants' abilities to be accurate in formatting their evaluations of themselves.
- Time constraints. Data collected in this study were limited to time of conducting the study in spring 2017.
- Population chosen**.** The study was limited to faculty members of the college of education at Taibah University in SA. Therefore, while these findings might be relevant to other colleges of education in Saudi Arabia, it cannot be extrapolated to the United States.

Definition of Terms

Digital literacy: The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action, and to reflect upon this process (Martin & Grudzieck, 2006, p. 255).

Digital immigrant: One who was not born into the digital world who has learned or adapted to the continuous use of technology in the world (Prensky, 2001).

Digital natives: People born after 1984 who have been raised with digital technologies and will expect use of new technologies in their education (Prensky, 2001).

Effective use of technology: Integrating technology in classrooms meaningfully by engaging students in active constructive, intentional, authentic, and cooperative learning to help students to drive more meaning and develop digital literacy (Jonassen et al., 2008).

Faculty members: Instructors teaching undergraduate or graduate level courses at higher education institutions including professor, associate professor, assistant professor, lecturer, and graduate teacher assistant.

Technology: Primarily focuses on computer, internet, and related technologies (e.g., personal computers, laptops, mobile devices, and Web-based tools like blogs and Wikis) that can be used in classrooms to enhance the learning process. Technology in this study might also include digital and audio software (e.g., audacity and movie maker) and presentation software that can be used to enhance visual and auditory instruction in addition to productivity tools (e.g., MS software).

Pedagogical beliefs: Faculty pedagogical beliefs represent preferred ways of teaching that faculty embrace, influence faculty's instructional decisions and classroom practice, and explain why faculty utilize technology in classroom (Becker, 2000; Ertmer, 1999; Ertmer, 2005; Zhao et al., 2002).

Overview of the Study

This study is organized into five chapters. Chapter one, provides an overview of the problem and describes why this research study is essential. It includes new century and new education demands, SA case, faculty member as a role model in integrating educational technology, International Society Technology in Education ISTE standards, technology integration status in colleges of education SA and more specifically at Taibah University, statement of the problem, purpose of the study, significance of the study, and research questions and hypotheses. Also, it includes delimitations, limitations, definitions of terms, and the organized body of the study. Chapter two provides a review of the literature focusing on demands for 21st century teachers, effective use of technology related to 21st century learning, is college of education using technology effectively, ISTE standards for teachers as a framework of the study and constructivism theory as a learning theory guides the whole study, educational technology in SA Higher Education and more specifically at Taibah University (the study population), and finally, the chapter ends with a discussion of the factors that influence faculty members' technology integration. Chapter three, describes the research methodology of the study including the study population and sampling issues, instrumentation, hypotheses, data collection, and data analysis. Chapter four, presents the findings of the study using appropriate tables and charts. Finally, chapter five, interprets the results and discusses the findings using the research questions as a guideline, implications of the study, recommendations for future research, and ends with the final conclusion of the study.

Chapter 2 - LITERATURE REVIEW

Chapter Overview

This chapter provides a literature review of topics related to the study. Firstly, a brief introduction about the demands on 21st century teachers is provided. Then, the study discusses how teachers use technology effectively in order to help students possess 21st century skills; in particular, the study focuses on meaningful learning with technology. The study also explains the importance and strategies of using technology in teacher preparation programs in order to prepare future teachers to use technology effectively. After that, the ISTE standards for teachers are described as a framework of the study because they align with constructivism theory. The study presents the current status of technology integration in higher education in Saudi Arabia (SA) with more focus on Taibah University (TU) as population of the study. Finally, the study examines technology integration influential factors.

International Demand for Twenty-First Century Teachers

In this rapidly changing world with increasing globalized and digital modernization and other challenges that individuals and societies face today, educational systems around the world need serious reform initiatives to better prepare students for their future academic and work life demands. The major processes to achieve this change requires "setting new educational objectives, preparing new curricula, developing digital instructional material aligned with learning standards, designing a new teaching and learning environment, training teachers, creating a school climate that is conducive to educational technology, and so on" (Rosen & Beck-Hill, 2012, p. 226).

These challenges brought ministers of education, teacher union leaders, outstanding teachers, school leaders, and other education experts from high-performing and rapidly improving countries and regions to meet during the International Summit on the Teaching Profession arranged by Organization for Economic Co-operation and Development (OECD). The first International Summit (2011) focused on the importance of the teaching profession and sharing the world's best policies and practices in developing a high-quality profession (Stewart, 2012). The second International Summit held in 2012 focused on "Preparing Teachers and Developing School Leaders" (Stewart, 2012). Considering the nature of the 21st century learning, in which student populations are more diverse than ever before and digital native students can easily find content knowledge within a simple Google search, teachers should be equipped to create a 21st century learning environment that will meet today's students' needs (Stewart, 2012). The second International Summit emphasized that "the quality of the teacher is the single biggest in school factor predicting student achievement, effective teachers and school leaders are at the very heart of education policy" (Stewart, 2012, p. 4).

In response to the demands of these changes and in recognition of the role of technology specifically in 21st century learning, the OECD comparative review identified several skills that teacher preparation programs should consider for preparing 21st century teachers. One important skill mentioned is the use of technology in an effective manner to enhance students' learning: "Teachers need to acquire strong skills in technology and the use of technology as an effective teaching tool, to both optimize the use of digital resources in their teaching and use information-management systems to track student learning" (Schleicher, 2012, p. 38). While teachers use technology at different levels for different purposes in the learning process, the emphasis is to use technology in effective ways rather than in a superficial level, as Schleicher (2012) emphasized "The use of new technologies should be adapted to fit the needs of students and teachers; it should not be an end in itself" (p. 44).

Effective Technology Use in Education

Regardless of the wide use of computers and other related emerging technologies in United States educational institutions, the use of these technologies is still disappointing, as research has indicated that most classroom teachers focus on low level technology usage, such as drills and practice and class management tasks (Zhao et al., 2002). Likewise, in SA, several studies were done to investigate the integration of technology in academic institutions for instructional purposes. Sadly, these studies proved that utilization of instructional technology is still in its early stage, which is below the sufficient level (Albalwi, 2008; Alharbi, 2002; Alnujaidi, 2008; Al-Sarrani, 2010; Asiri, bt Mahmud, Abu Bakar, & bin Mohd Ayub, Ahmad Fauzi, 2012; B. Kamal, 2013; Omar, 2016). However, technology has better and more beneficial uses for education when it is used in a meaningful way (Brush & Saye, 2009; Dede, 2014a; Jonassen et al., 2008; Prensky, 2010). Technology increases learning time beyond school boundaries, and more importantly, it offers an authentic environment, allows for collaborative knowledge construction, enhances creativity, and makes learning more engaging (Jonassen & Rohrer-Murphy, 1999). Jonassen et al. (2008) asserted that "when they [technologies] are used to engage students in active, constructivist, intentional, authentic, and cooperative learning, then students will derive more meaning" (p. vi).

The emergence of new technology has caused a shift in using technology in education from "learning from technology" to "learning with technology". Learning from technology represents the passive role of learners as they receive the information presented by technology (e.g., films and television programs) (Jonassen et al., 2008). In contrast, learning with technology adopts using technology as an intellectual partner in the learning process where technology supports the learner's thinking and meaning making (Jonassen et al., 2008). During this shift between these two concepts, learning from technology and learning with technology, several new literacies have emerged.

Emergence of New Literacy

In the 1980s, the computer was mainly used for word processing or to respond with the correct answer in tutorial or practice programs (Siegle, 2004). The focus was on possessing the skills to operate software packages effectively; this was known as computer literacy, which requires little creativity (Lankshear & Knobel, 2008; Siegle, 2004). A shift from using the computer as a productive instrument into a tool of learning (Siegle, 2004) in the 1990s meant that information literacy had gained more attention, which emphasizes searching for, comparing, and evaluating information; organizing, synthesizing and communicating information; and understanding the nature of information resources (Lankshear & Knobel, 2008; Siegle, 2004). During the 1990s, the term digital literacy was used in literature to mean “an ability to read and comprehend information items in the hypertext or multimedia formats which were then becoming available [text, image, sound…]” (Lankshear & Knobel, 2008, p. 18). This was considered a limited use of technology, focusing as it did on complementing digital resources with other materials in the library, such as printed magazines and journals, radio, and television (Lankshear & Knobel, 2008). This is understandable with the limitations of internet resources and digital formats at that time when compared to today’s formats.

The current advances in technology in the 21st century includes, but is not limited to, Google tools or the rise of social networking and various digital formats, which require a new and more comprehensive and broader definition of digital literacy (B. Jones & Flannigan, 2006; Lankshear & Knobel, 2008). Especially in learner-centered classrooms and data-driven learning, there is an abundance of “quality research that shows that technology use is most successful when used for strategic purposes in particular contextual settings and content areas" (cited in Siegle, 2004, p. 33), which reflects effective use of emerging technologies in education, such as web 2.0 tools.

While many definitions of digital literacy can be found in the literature (B. Jones & Flannigan, 2006; Lankshear & Knobel, 2008; Siegle, 2004), most definitions focus on reading and interpreting media with multiple formats, finding credible resources, analyzing and manipulating digital information, reproducing data, and applying new knowledge found in a digital environment. The DigEuLit project, funded by the European Council eLearning Initiative, defined digital literacy and developed a framework and tools for digital literacy development in European educational settings as follows:

> The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process. (Martin & Grudzieck, 2006, p. 255)

This definition meshes digital literacy with critical or reflective abilities (e.g., evaluate, analyze, synthesize, create, and communicate) (Lankshear & Knobel, 2008; Martin & Grudzieck, 2006) and connects it with 21st century requirements, which align with the eLearning Program of the European Commission perspective: "Digital literacy is fast becoming a prerequisite for creativity, innovation and entrepreneurship and without it citizens can neither participate fully in society nor acquire the skills and knowledge necessary to live in the 21st century" (Martin & Grudzieck, 2006, p. 254). Another important dimension of digital literacy is related to developing digital citizenship through safe, legal, and responsible use of digital technology

(ISTE, 2016). The nature of digital native students is to seek information by themselves via a wide range of web based resources with less preference for traditional resources such as teachers or librarians (Hague & Payton, 2010; Lankshear & Knobel, 2008).

Effective use of technology or digital literacy today focuses on critical thinking more than technical skills as it requires critical evaluation of information. This asserts that digital literacy, a life skill, is the appropriate, efficient, and effective use of technology by "determining how credible information is and to contextualize, analyze, and synthesize what is found online" (Lankshear & Knobel, 2008, p. 55). Another important part of it is learning to respect the copyright and intellectual property of others (Lankshear & Knobel, 2008). To be digitally literate, students should be able to collect data carefully, integrate relevant information critically, reproduce, and present content creatively in various formats, and reflect on their findings (Lankshear & Knobel, 2008; Siegle, 2004).

Using Technology Effectively in Teacher Preparation Programs

Importance of Technology Integration in Teacher Education

Living in this era of a highly competitive, knowledge-based economy requires preparing students with specific skills. Therefore, 21st century learning is becoming prominent in schools. Applying 21st century learning requires that current traditional learning practices shift into a more progressive learning environment. Emerging technology presents a new meaning to literacy and adds multi-dimensions concepts to teaching and learning today. Graduating digitally literate students is an important target of an educational system considering that today's schools are mostly filled by digital immigrant teachers preparing digital native learners (ISTE Advocacy, 2009). This indicates that teachers are required not only to have basic technology skills; rather, they should be competent in integrating technology into curriculum effectively. The U.S.

Secretary of Education Arne Duncan emphasized that "New technologies give teachers innovative tools and flexibility to engage students and work smarter. Yet these capacities offer their greatest benefits to students only when teachers and principals have the skills and supports to leverage them" (Mediaplanet, 2014, para. 1).

Several studies have shown that in-service teachers are not fully prepared to integrate technology, especially because insufficient or inappropriate in-service training is offered (Ertmer & Ottenbreit-Leftwich, 2010; A. Kamal, 2012; U.S. Congress, 1995; Wright et al., 2002), which leads a majority of teachers to use technology at low levels: "In general, low level technology uses tend to be associated with teacher-centered practices while high-level uses tend to be associated with student-centered, or constructivist, practices" (Ertmer, 2005p. 26). Duncan stressed this fact: "According to a recent survey, almost one-third of teachers said that the greatest obstacle to using technology in their classroom was their need for professional development" (Mediaplanet, 2014, para. 1). Therefore, it is more wise and efficient for stakeholders and policy makers to shift the focus toward preparing teachers during teacher preparation programs to be able to evaluate, choose, and implement new technologies in a way that will enhance students learning and help them develop 21st century skills and be ready for college and future work (Howland & Wedman, 2004; Mims et al., 2006).

Inadequate Technology Preparation of Pre-Service Teachers

Several studies showed that inadequate preparation of in-service teachers in using technology properly is believed to have its origin in the inappropriate or inadequate preparation provided to pre-service teachers at teacher education institutions (Alghanem, 2005; Almaraee, 2003; Chai et al., 2010; Ertmer & Ottenbreit-Leftwich, 2010; Sadaf et al., 2012; The CEO Forum on Education and Technology, 1999; Wetzel & Williams, 2004; Wright et al., 2002). Shih-

Hsiung (2012) studied 466 pre-service secondary school teachers who participated in school-based field practice. The study investigated the relationships between process factors and their direct and indirect effects on technology integration. The results indicated that pre-service teachers perceived that teacher education courses were insufficient in preparing them to integrate technology (Liu, 2012). Ertmer et al. (2006) examined the relative value of internal and external factors. Participants were exemplary technology user teachers who were selected from five Midwestern technology educator award programs. The 25 exemplary technology using teachers rated "preservice education preparation" (*M*= 2.69, *SD*= 1.08) as the lowest influential factor in using technology, which supports the idea that a low level of support is given in teacher preparation programs to prepare teachers to use technology in their future career.

Teacher Preparation Institution Instructors are Role Models for Technology Integration

The above concerns have forced many teacher education institutions to commit to not only improve their teacher preparation programs but also to focus on faculty members as models in integrating technology to help pre-service teachers developing positive technology attitudes and enable them to effectively integrate these technologies in their future teaching (Drent & Meelissen, 2008; Ertmer & Ottenbreit-Leftwich, 2010; The CEO Forum on Education and Technology, 1999; Wright et al., 2002). When the faculty of the College of Education at Arizona State University West (ASUW) tried to investigate why the college graduates feel that they are not prepared to use technology in their teaching, one main factor found was that "they did not see consistent or extensive modeling of the use of technology by faculty in their preservice classes" (Wetzel & Williams, 2004, p. 45). Hiring modeling faculty for the teacher preparation programs who are technology proficient has become an influential factor that enables technology integration in higher education. For example, the job application in the College of Education at the University of Wyoming requires the use of technology as one of the faculty member's qualifications (Strudler & Wetzel, 1999). Also, the Curriculum and Instruction Department at the University of Northern Iowa stated that "We aren't going to consider people for a faculty line unless they can model or demonstrate ways in which they are in fact already infusing technology into their teaching philosophy and some of the things that they're doing professionally" (Strudler & Wetzel, 1999, p. 74).

Zhao et al. (2002) stressed the role of teacher education programs in preparing future teachers for effective use of technology: "We also encourage teacher education institutions and other teacher professional development programs to broaden their views of the kind of preparation and support pre-service and in-service teachers need to thoughtfully and effectively integrate technology in their teaching" (p. 511). Ertmer and Ottenbreit-Lefwich (2010) emphasized the role of faculty members as models in using technology to help pre-service teachers to use technology in the future: "One of the most powerful strategies we can use to help our pre-service teachers gain the necessary knowledge is to provide opportunities for them to observe a variety of examples and models" (p. 268).

Although pre-service teachers who are digital natives are supposed to be tech savvy, they are still not capable in integrating technology effectively in their teaching because they do not possess the competences of technology-based pedagogy (Kaminski, Seel, & Cullen, 2003; Lei, 2009; Oblinger, Oblinger, & Lippincott, 2005; Sadaf et al., 2012). Salentiny (2012) surveyed 198 pre-service teachers and 21 teacher educators at a Midwestern university and interviewed nine of the pre-service teachers and three of the instructors. The study examined the significant difference in the frequency of technology use between instructors and pre-service teachers. It was found that instructors use technology primarily for work and productivity reasons, while pre-service teachers spent several hours a week using technology for entertainment and communication (Salentiny, 2012). The researcher concluded that "Further conversations about pre-service teachers' technology skills would reveal that while instructors did think their students were technology-savvy, they did not believe that those skills would automatically transfer to the classroom" (Salentiny, 2012, pp. 180-181).

Integrating technology in classrooms by in-service teachers is affected by the way that their teacher education programs faculty integrated technology during the program. If faculty were role models in applying technology effectively and specifically, the expectation of pre-service teachers would be to also integrating technology effectively (Grunwald Associates LLC, 2010; Russell et al., 2003). The Grunwald Associates LLC (2010) Report prepared for the College of Education at Walden University found that in-service teachers were not well prepared for using technology during their undergraduate study; instead, they were more likely better prepared during postgraduate programs. Therefore, teacher preparation programs should consider this result critically as "They have a critical role to play in improving pre-service teachers' competencies in using technology as a learning tool and fostering 21st century skills" (Grunwald Associates LLC, 2010, p. 27). According to the results of the case study that Bullock (2004) conducted, pre-service teachers were influenced by number of factors in whether to use or not to use technology in their future teaching. One important factor mentioned in the study was that when their faculty members integrated technology in their instructions during the program's courses, the pre-service teachers were encouraged to imitate their faculties' behavior by then integrating technology in their field training.

Teachers and Technology: Making the Connection report created by The Office of Technology Assessments (OTA) emphasized the idea that the "most direct and cost-effective way to educate teachers about technology is through the pre-service education they receive in colleges of education or other institutions" (U.S. Congress, 1995, pp. 166-167). This indicates that faculty members who are technology competent play a key factor in creating pre-service teachers who are capable of integrating technology in their future classrooms, which in turn means K-12 students gain 21st century skills. Achieving this goal starts with teacher preparation programs, specifically in the classroom use of technology by faculty members, as "Teacher education faculty need to serve as role models; their uses of, and attitudes towards, technology in the classroom will strongly influence the implementation of the technology by pre-service teachers" (Beach & Franklin, 2002, p. 2302).

Strategies for Preparing Pre-Service Teachers to Integrate Technology

Colleges of education should adopt strong preparation programs to help pre-service teachers be equipped with knowledge and practical skills that will allow them be digitally literate. This can be done by considering different initiatives that have tried to provide educators with a clearer vision of how to better prepare teachers to integrate technology in teaching and learning (Weinburgh, Collier, & Rivera, 2003). The U.S. Department of Education funded schools and teacher preparation programs with millions of dollars through The Preparing Tomorrow's Teachers to Use Technology (PT3) grants to help pre-service teachers be digitally literate and be able to evaluate, choose, and implement technology in their future work to help students gain 21st century skills and be ready for colleges and future work (Howland & Wedman, 2004; Mims et al., 2006). Several teacher preparation programs are exemplary models for preparing pre-service teachers to integrate technology (Howland & Wedman, 2004; Mims et al., 2006).

It has been argued that many teacher education programs are not preparing pre-service teachers for integrating instructional technology effectively in their future teaching (Liu, 2012; Salentiny, 2012). In most cases, technology is taught through isolated technology courses, which are only worth minimal credit hours. Moreover, many experiences and resources in these courses are not helpful in creating effective technology integration, according to pre-service teachers. This type of preparation can hardly generate students who possess needed technical skills for meaningful application. Instead, these programs focus mainly on technical skills or knowledge.

Instead of this, teacher preparation programs should integrate technology into methods courses to help pre-service teachers gain effective strategies for integrating technology in their future teaching instruction (Liu, 2012). As Salentiny (2012) recommended, "The implication here is that pedagogical technology use needs to be taught and exemplified throughout pre-service teacher education programs—not separated in to a separate course" (p. 234) too. In supporting the integrated idea of teaching technology at the teacher preparation programs, Wetzel and Williams (2004) emphasized that "Experiences with technology should be included in methods classes and integrated throughout the entire preparation program" (p. 45). More specifically, by adapting NCATE (now known as CAEP) guidelines, teacher educational programs are required to provide teacher candidates not only the knowledge, skills, and attitudes they need to be effective technology users, but also to help them acquire both the content and pedagogical understanding needed and the knowledge about the impact of technology on schools and society (Barbara, 1996). Therefore, teachers need to understand the connection between technology and the content knowledge through gaining the knowledge and skills of the technology-supported-pedagogy, which they can draw upon when planning to integrate technology in their teaching (Hughes, 2005). In method courses, pre-service teachers should be given opportunities to experience constructivist based technology applications as learners; pre-service teacher need to design lesson plans that incorporate technology effectively, which they can apply during their field experiences (Takkunen, 2008).

Studies Related to Preparing Pre-Service Teachers to Integrate Technology

Salentiny (2012) surveyed 198 pre-service teachers and 21 teacher educators at a Midwestern university and interviewed nine of the pre-service teachers and three of the instructors. The study focused on examining participants' technology characteristic (beliefs and use of technology) as well as factors that could lead to technology barriers. Regarding the use of technology, results indicated there was a significant difference [$F(1, 215) = 14.347$, $p = .000$] as instructors ($M = 65.000$, $SD = 43.529$) showed more frequent technology use than did pre-service teachers ($M = 42.117$, $SD = 23.852$).

When asked how often they see their instructors use technology in classrooms, most of the pre-service teachers rated it as "sometimes". Pre-service teachers rated their own technology uses as "sometimes" too. Based on the frequencies of using specific technology tools, the researcher concluded "it could be assumed that instructors were using these tools to deliver information to their students—not to engage students in integrated lessons" (cited in Salentiny, 2012, p. 183). When examining technology for traditional uses rather than more meaningful ones, interviews revealed that instructors used technology for productivity, research, and management uses while most of the pre-service teachers used technology for hobby, entertainment, and communication (email) purposes. While it was expected that pre-service teachers, who are tech-savvy, would hold a high positive attitudes towards technology, the results showed that their attitudes were neutral to positive only. This also emphasizes the need for preparing pre-service teachers for better pedagogical uses of technology to support students learning. Finally, pre-service teachers mentioned that they want "genuine use" of technology, which means more integrated practices that help in teaching technology literacy skills to students (Salentiny, 2012). In the focus interview group, one of the pre-service teachers mentioned the type of practical technology integration they received: "[The instructor] doesn't just say 'here, use this,' but he uses it himself and tells us to get our kids to use it" (cited inSalentiny, 2012, p. 186). This shows how teacher education faculty members themselves, as models, should use technology to exemplify it for their students before those students will use it in their future teaching.

The importance of modeling technology integration at teacher preparation institutions was emphasized through both quantitative and qualitative results. All instructors either agreed or strongly agreed that "it was important for students to see technology use in their education classes" (*M*= 3.57, *SD*= .507). This result was confirmed in the interview analysis as there was a consensus among all interviewees that technology is important to be used in classrooms for both pre-service teachers and K-12 students. One instructor said, "We do need to model the technologies. And model the technologies in a way that works for children, then…they need to have some practice, with support" (cited in Salentiny, 2012, p. 190). Instructors went furthermore to emphasis that technology should be used as "meaningful" or "genuine" to engage students through purposeful use of technology rather than "use for the sake of use."

A majority of pre-service teachers (63.1%) indicated that they were given what they needed to use technology, while 27.3% thought they were not adequately prepared for using technology in their future teaching. Qualitative results of this question indicated that they were prepared to some extent to use technology through a "technology for teachers" class. However, their answers focused on using specific tools, such as smartboard, without mentioning pedagogical aspects of instructional technology (Salentiny, 2012). This result was confirmed by instructors, as more than half (52.4 %) of them said that they had concerns about the preparedness of pre-service teachers for using technology. This uncertainty was emphasized in instructors' interviews. One instructor said "I think we're doing an adequate job," while another "admitted she knew some pre-service teachers were not as comfortable as others were with technology" (Salentiny, 2012, p. 194). Salentiny emphasized that "Instructors did not often reference methods or pedagogy when discussing pre-service teacher preparedness" (Salentiny, 2012, p. 195).

This study exemplifies the situation of teacher education program, especially in preparing pre-service teachers to integrate technology in their future classrooms, by showing that both instructors and pre-service teachers agreed on the importance of preparing pre-service teachers to be technology literate and ready for helping K-12 students to use technology in a meaningful way to gain 21st century skills. Instructors stated that pre-service technology should be "related to the development of pre-service teachers' technology literacy, rather than fluency" (Salentiny, 2012, p. 220). However, preparation has not yet reached to this level of integration, which requires further examination of faculty levels of technology usage and how much it aligns with high levels of technology use through adopting constructivist pedagogical practices; in particular, the study did not ask participants about using technology meaningfully. The emphasis was on faculty members as models in integrating technology through practical examples. This was seen as more important than talking in an abstract fashion about the importance of technology;

Salentiny (2012) recommended that “When considering preservice teacher education—it is important to consider not only whether technology is being taught, but also what the tools are and how they are being used…” (Salentiny, 2012, p. 217) in order to “prevent situations where instructors think they are modeling pedagogical use of technology, but the pre-service teachers do not experience it” (Salentiny, 2012, p. 217).

Garrett (2014) examined the technological, pedagogical, and content knowledge (TPACK) of faculty at a southeastern research university. Data collected used the HE-TPACK instrument, which is a valid and reliable revised version of the original TPACK instrument. Participants were 128 faculty members who responded with their perception about different dimensions of TPACK framework.

Descriptive results indicated that faculty members either agreed or strongly agreed with the statements in all dimensions and they were knowledgeable with all of the TPACK items. In understanding the effect of using technology on teaching 85.1% of participants “strongly agreed” or “agreed” with the statement “I understand how teaching and learning change when certain technologies are used” (Garrett, 2014, p. 84). The study also showed that participants were very aware with how to integrate technology to enhance content with appropriate methods. For example, 78.1% “Strongly Agreed” or “Agreed” with the statement, “I can effectively integrate educational technologies to increase student opportunities for interaction with ideas”. These results reflect faculty members, familiarity with technology tools to support teaching.

Guo (2006) conducted a study to investigate the status of information and communications technology (ICT) literacy among teacher education program at the University of British Columbia, Canada (UBC). This study focused on how teacher candidates are prepared and how they obtain ICT literacy by exploring characteristics related to ICT literacy including program effects on ICT competencies, gender, age, and attitudes toward technology and program effects on ICT use.

Mixed methods were applied to collect and analyze quantitative data (survey) and qualitative data through the survey's open-ended questions, interviews with student teachers, direct observations of participants in courses, videotapes of student teachers' microteaching sessions for evidence of pedagogical integration, and online communications. The data were collected from large-scale pre- and post-program surveys of student teachers in the 2001-2002 (n = 877) and 2003-2004 (n=828) years.

Factorial ANOVA analysis of participants' perception from quantitative data found both female and male ICT competencies were significantly increased between the pre- and post-programs [F (1, 2281) = 105.376, $p < .01$], which indicated the positive effect of the program on participants ICT competencies. Also, there was a significant change by the end of the program in the teacher candidates' attitudes toward technology. More importantly, the study indicated a strong correlation between student teacher's use of technology during their university course work and their use of technology during practicum in both years of the study ($r = .697$, $p < .01$).

All these results indicated the importance of ICT competencies and the use of technology during university courses in helping student teachers to use technology during their practicum and when they enter service. There were strong correlations between the students' perceptions of their ICT competencies and their ICT usage in schools. Results from this study inform the pedagogy of integrating technology into curriculum and instruction and suggest further research on effective uses of ICT in teacher education.

Analysis of videotaping of microteaching lessons showed student teachers had developed several technology skills, especially creating audio visual instructional materials. Cooperation and sharing skills were evident in knowledge construction during participants' work in group digital projects. During the group interview, all the five participants indicated that they were "comfortable using technology in classroom settings and they felt that it was a good phenomenon for learning technology in the course work" (Guo, 2006, p. 207). Some participants, however, mentioned the need to spend more time in teacher preparation programs to use various technology applications, such as webpage design, PowerPoint, Excel, and database programs (Guo, 2006).

This study presented a good model for a pre-service teacher preparation program as it helped in improving ICT teacher candidates' competencies in using technology. The study pointed out to the substantial role faculty members play in improving pre-service teachers' ICT competencies, therefore it is important to examine faculties' ICT competencies as the more competent ICT faculty are, the more positive effect there is on students teachers use of technology in school. The researcher asserted that "An important finding in this study is that there was a significant correlation between student teachers' perceptions of ICT competencies and their students' frequency of use of technologies" (Guo, 2006, p. 192).

Hakim (2015) studied the perception of secondary mathematics pre-service teachers in how they were prepared to use technology as a tool in teaching mathematics. One hundred and five pre-service teachers across New York State responded to a closed-ended questionnaire, while eight purposefully chosen to participate in a semi-constructed interview. In general, results indicated limited use of instructional technology during teacher preparation program. While this study showed the impact of some factors in using technology in teaching mathematics, such as instructional practices, software access, and technological and instructional support, participants' interview responses showed the need to have more emphasis in teacher preparation programs on using technology effectively and having exemplarily models among faculty during college courses, as “none of the pre-service teachers interviewed reported receiving instruction on how to structure lessons when using technology or how to manage technology in the classroom” (Hakim, 2015, p. 104). Some instructors used techniques to make pre-service teachers tech-savvy as they asked them to present new tools to others, which made them search for and learn about new technologies. Participants indicated that in some course they were introduced to some tools (e.g., web design programs and presentation tools), however, they insisted that there was no emphasis on using these tools in teaching.

Teacher Education Accreditation Organizations and Technology Standards in the United States

The widespread integration of technology in educational institutions has increased the need for setting baseline technology competency standards for all users. Therefore, “education reform must include the reform of teacher preparation” (NCATE, 2008, p. 3). In order to determine which technology integration strategies work best, educational institutions should use accreditation and technology standards as a guide to determine the competences that pre-service teachers need to possess in order to integrating technology effectively in their future classrooms (Anderson & Maninger, 2007), especially as the main goal of teacher education is “to prepare pre-service teachers to be able to teach specific content and skills in order for them to provide effective learning experiences for their students” (Friedman, Bolick, Berson, & Porfeli, 2009)

The National Council for Accreditation of Teacher Education (NCATE) and the Teacher Education Accreditation Council (TEAC) are the two teacher education accreditation organizations in the United States. Both accreditation organizations have unique technology standards. In 2013, NCATE and TEAC combined into one new accrediting body as a result of the recommendation by the design team appointed by the board of directors of the two organizations in 2009. The new organization, the Council for the Accreditation of Educators Preparation (CAEP), developed the next generation of accreditation standards and performance measures for educator preparation in 2012 that was expected to be fully implemented in 2016 (CAEP, 2015).

According to the Professional Standards Accreditation of Teacher Preparation Institutions, candidates who are prepared to work in schools as teachers need “to be able to appropriately and effectively integrate technology and information literacy in instruction to support student learning” (NCATE, 2008, p. 22). NCATE standard 5b, “Modeling Best Professional Practices in Teaching,” stressed the importance of faculty as a role model in integrating technology into their teaching, “Teaching by the professional education faculty reflects the proficiencies outlined in professional, state, and institutional standards; incorporates appropriate performance assessments; and integrates diversity and technology throughout coursework, field experiences, and clinical practices” (NCATE, 2008, p. 39). For preparing pre-service teachers to integrate technology, NCATE adapts ISTE NETS-T standards, “The NETS for Teachers (ISTE, 2008) presented standards for pre-service teachers and are aligned with National Council for the Accreditation of Teacher Education (NCATE) standards” (Friedman et al., 2009, p. 3).

International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS)

In the last 20 years, technology advances have greatly impacted society and how people learn and communicate. In response to 21st century needs and challenges, educational reform efforts have been continuous, including promising opportunities to integrate technology in classrooms to develop learning and teaching. This has put more pressure on teachers to develop their knowledge and skills for integrating technology for 21st century students in classrooms (Friedman et al., 2009; Kumar & Vigil, 2011).

Serving more than 100,000 worldwide education professional and stakeholders, the ISTE is the leading nonprofit organization dedicating for learning improvement through effective integration of technology in PK–12 and teacher education (ISTE, 2016; ISTE Advocacy, 2009). In order to have a fulfilling 21st century life, job and learning requirements , ISTE, a trusted source for educational technology professional development, knowledge generation, advocacy, and leadership for innovation, developed the National Educational Technology Standards (NETS) as a complete framework for effectively applying digital strategies to improve learning and teaching in today's digital world. Several standard based on targeted audience needs were developed through efforts from experts in the field and have been accepted and adopted worldwide: school-aged students (NETS-S), teachers (NETS-T), administrators (NETS-A), coaches (NETS-C), and computer science educators (NETS-CSE).

In 1998, ISTE created the original National Educational Technology Standards for Students (NETS-S), aimed to identify what students should know and be able to achieve using technology focusing on teaching students how to use computers (Sykora, 2015). In reaction to rapid changes in technology and to make standards remain relevant for educational missions to prepare students for their future, a refreshed version of NETS-S standards for students was released in 2007 that aimed to focus on shifting from how to use computer to learning with advanced technologies (Sykora, 2015).

ISTE Standards for Teachers (NETS-T)

In 2000, ISTE developed the NETS-T for teachers design based on the premise that educators should be proficient in integrating technology in order to support student learning (Willis, 2012a). The nature of the 21st century classroom has created new issues for educators who need to have technical abilities. To help teachers apply standards in classrooms, ISTE standards refreshed the original standards of NETS-T and the new version of teachers standards were released in 2008 to transform how students learn and teachers teach by providing a framework for the skills and knowledge educators need to possess in an increasingly linked global and digital society (ISTE, 2016).

The NETS-T 2008 standards are divided into five major standards along with a number of performance indicators that provide specific outcomes to be measured. Standards and performance indictors provide practical guidelines by defining the new skills and pedagogical practices that educators need to apply in their teaching in classrooms filled with the digital generation (ISTE, 2016; Willis, 2012b). Unlike ISTE 2000, ISTE NETS-T standards (2008) provide more professional practical activities reflecting constructivism learning theory as a model to help teachers to design, implement, and assess learning experiences, which leads to improved instructional learning and engages students (Willis, 2012a). Following the new NETS-T (2008) standards helps educators teach effectively, lead the desired change in the classroom, and prepare digital students for better future. The ISTE NETS-T standards (2008) are as follows:

1. Facilitate and Inspire Student Learning and Creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face to-face and virtual environments.

2. Design and Develop Digital-Age Learning Experiences and Assessments: Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS-S.
3. Model Digital-Age Work and Learning: Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.
4. Promote and Model Digital Citizenship and Responsibility: Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.
5. Engage in Professional Growth and Leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. (ISTE, 2016)

Indeed, preparing students for 21st century era starts with preparing pre-service teacher in teacher preparation programs. When NCATE adopts ISTE NETS-T standards to prepare pre-service teachers for integrating technology, it provides a means of generating 21st century teachers who are technology competent. Especially, ISTE strongly supports the Preparing Teachers for Digital Age Learners (PTDAL) program under Title II of the Higher Education Act, which "focuses on effective teaching with modern digital tools and content that substantially connect pre-service preparation of teacher candidates with high-needs schools or transform the way schools of education teach classroom technology integration to teacher candidates" (ISTE Advocacy, 2009, p. 11). It is then the responsibility of colleges of education to embed ISTE NETS-T standards into their curriculum.

ISTE NETS-T Standards and Teacher Preparation Programs in the Literature

Few studies found in the literature focus on examining technology integration in teacher preparation programs based on ISTE NETS-T standards. This section describes these studies.

Lewis (2013) examined to what extent pre-service teachers at Arizona State University (ASU) can recognize the ISTE NETS-T standards and to what extent pre-service teachers had the opportunity to use and apply technology in their preparation curriculum based on these standards. ASU adopted an integration-model technology courses rather than a stand-alone technology course approach. A closed-ended and open-ended survey to examine familiarity of pre-service teachers with ISTE NETS-T standards was distributed to 250 students with a 25% response rate. Fifteen pre-service teachers participated in the follow up interviews in addition to six faculty members and three administrators. Documents of purposefully selected five undergraduate and two graduated courses were analyzed. The awareness level of ISTE NETS-T standards were coded as I have not learned this = 1, Awareness = 2, Literacy= 3, Integration= 4, Leadership= 5 (Lewis, 2013).

Almost all participants (93%) indicated that they learned about technologies such as Web 2.0 tools, games, Microsoft Office suite, iMovie, and classroom tools (e.g., Smartboards, doc cams, and computers) in their teacher preparation education program courses. Participants' awareness level of ISTE NETS-T showed that most of them were at literacy (21%) and integration levels (24.2%) in using technology to facilitate and inspire students' creativity. In using technology in designing and developing digital-age learning experiences and assessments, most of participants rated their awareness level at the literacy (23.4%) or integration (18.6%) level. In the model digital-age work and learning category, participants, the highest rating was for the integration level (20.2%) and literacy level (19.4%). This category also showed an increase in the leadership level (17.4%) in a few subcategories when compared with the other categories.

Similarly, in the “promotes and models digital citizenship and responsibility” category, a majority of participants rated themselves between integration (21.4%) and literacy (17.8%). These results showed a minimum awareness of pre-service teachers at ASU in using technology based on ISTE NETS-T, as the highest rated levels were literacy level (20.3%) and integration level (20%).

In analyzing qualitative data, a general category “use of technology for pedagogy purposes” was created and examined. Analysis of the ASU College of Education website showed that only the early childhood program was identified under this category. Undergraduate curriculum, except for physics education, required students to enroll in one of two computer literacy courses that were identified under this category. Some programs required students to enroll in additional technology courses. Analysis of course objectives and syllabi indicated that “the core classes common to all education majors plan for little technology use above and beyond productivity and presentation of information purposes” (Lewis, 2013, p. 63), with the exception of some courses that were better aligned with ISTE NETS-T.

Students interviews revealed that they were unfamiliar with the “educational technology standards and digital citizenship” term. However, participants indicated that the availability of resources to explore unfamiliar technology topics in their future teaching did not occur due to a lack of skills or technology availability. Five of the six interviewed faculty members indicated that they were familiar with ISTE NETS-T standards. While technology integration was not required, most of the participants attempted to integrate technology at some level in their lessons. All three administrators indicated that they had a least a basic knowledge of ISTE NETS-T standards. Students were programmatically expected to graduate with the ability to integrate technology effectively in alignment with ISTE NETS-T standards (Lewis, 2013).

This study represented an excellent example of how ISTE NETS-T can be used as basis for examining how effectively pre-service teachers are prepared to integrate technology. The response rate for the survey was low (25%) and the missing data were noticeable. However, the qualitative data that included analyzing course documents and interviewing students, faculty members, and administrators provided a good level of understanding of the role of ISTE standards in preparing pre-service teachers for integrating technology effectively.

Easter (2012) conducted a descriptive case study to examine the Middle America University (MAU) Teacher Preparation Program, which was identified by The Educating Teachers Report: Educating School Teachers (Levine, 2006) as one of the top teacher preparation programs in the United States. This study focused on how pre-service teachers were prepared to integrate technology in their classrooms to determine how the program prepared them to be technology literate. While the data were examined based on TPACK framework, data were also compared and analyzed to insure the program incorporated ISTE NETS-T standards.

Through purposeful sampling, the data collection included interviews with five faculty members and four instructors, classroom observations in seven classes, and analysis of six course syllabi and accreditation documentations. The results of this study showed that this exemplary teacher preparation program prepared their students by using both the TPACK framework and the ISTE NETS-T to effectively integrate and use technology in both content and technology courses.

Based on ISTE NETS-T standards, the study used three instruments to measure the level of technology integration and the alignment of course works with these standards. To emphasize how close the courses were designed to reflect ISTE NETS-T standards, one participant mentioned “We work very closely with ISTE…generic uses of technology are not going to get us where we need to be. We organize around the pedagogy of a specific content area in how we integrate technology” (cited in Easter, 2012, p. 52). Analysis of course syllabi revealed that goals were well documented although not clearly associated with ISTE standards. Results also showed that there were no common assessment tools, such as rubrics or shared documentations, to show evidence of students gaining technology literacy within individual course.

This study examined an exemplary teacher preparation program that adopted the TPACK framework for technology integration in general. However, faculty member interviews, course work observation, and analysis of documentation and course syllabi emphasized the importance of ISTE NETS-T standards in integrating technology and evaluating its effectiveness in teacher preparation programs. Therefore, further studies with more participants are needed to evaluate the effective uses of technology integration based on ISTE NETS-T standards are still needed.

Koch (2009) examined the perceptions of pre-service teachers regarding their ability to integrate technology into a learning environment based on university coursework and field experience. Pre-service teachers within an NCATE accredited teacher education program were surveyed using the 2008 ISTE NETS-T standards as a framework. The study participants included 278 students representing all four years of the program (freshmen, sophomores, juniors, and seniors) within the Duquesne University Leading Teacher Program (LTP). Participants were asked to rate their ability to integrate technology based on a scale of 1-4 (1-beginning, 2-developing, 3-proficient, 4-transformative) (Koch, 2009).

Throughout the four grade levels, participants’ rating of their technology integration competency in all of the 25 questions ranged from 2.5-2.6 with a small averaging standard deviation (.75), which indicated placement between developing and proficient levels of integration. Descriptive analysis reported several technology integration related issues. When participants were asked about their use of several types of technology tools, such as social networking sites (Facebook, MySpace), instant text messages, and using the internet, the result was not unexpected within digital native participants as they evaluated their uses as "very often." Moreover, 75% of participants evaluated integrating technology by faculty members in required courses as "often" or "very often," while 40% rated elective courses' faculty members technology integration as "sometimes" and 57% of the participants rated them as "often" or "very often.". The results indicated that these digital natives' pre-service teachers were exposed to using technology in classroom before in enrolled in the LTP. More importantly, in examining how well the LTP prepared pre-service teachers for integrating technology, the results indicated that 66% of participants rated LTP in the two highest ratings "above average" and "very much," while less than 1% of them rated it as "poorly" (Koch, 2009).

This study was conducted in a NACTE accredited teacher preparation program and revealed above moderate level of how the college prepares students to use technology in their future teaching based on ISTE NETS-T standards. This study emphasized the importance of considering these standards in preparing pre-service teachers to integrate technology in their teaching. Therefore, further investigation of the effect of other factors, such as faculty members' attitudes towards using technology, professional development, access to software and hardware, and pedagogical believes, might be helpful in generalizing results of this study, especially when future studies are conducted within institutions with different cultural backgrounds and learning environments.

Alnujaidi (2008) conducted a quantitative study to examine the factors that influence the adoption and integration of Web-Based Instruction (WBI) by English language faculty members in their regular teaching in 20 Saudi Arabian universities. This is considered one of the few studies that covered participants who represented English language faculty from all over the country. Alnujaidi utilized Rogers' (1995) Diffusion of Innovations Model (DOI) and the ISTE NETS-T standards as a theoretical framework and applied descriptive and correlational analyses. Total responses were 320 participants, with a return rate of 66%. Participants were asked to report their level of agreement with the items on a 5-point Likert scale (1= Strong Disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree).

Pearson Correlation Coefficients were applied to measure if there is a significant relationship between the NETS-T standards and WBI adoption and integration in the Saudi higher education institutions. The study results found a significant relationship between the NETS-T standards and WBI adoption and integration in English departments in the Saudi higher education institutions ($r = .18$, $p = .002$) (Alnujaidi, 2008). This study emphasized the importance of ISTE NETS-T standards for adapting and integrating technology at higher education institutions in SA. Alnujaidi (2008) recommended that higher education in SA should utilize the ISTE NETS-T standards as a framework in integrating technology. Therefore, the current study will examine how faculty's practices in integrating technology in their teaching at teacher education program are aligned with ISTE NETS-T standards.

Alnujaidi (2008) investigated demographic factors that influence the integration of Web-Based Instruction (WBI) by English language faculty members in their regular teaching. He emphasized that universities should give more consideration to improving faculty members' knowledge and skills related to technology integration through appropriate professional development in order to improve their instructional performance and empower their students' learning experiences: "Faculty members need to learn the best practices associated with WBI in order to better employ it as a fundamental component of their teaching process" (Alnujaidi, 2008, p. 132). In addition, the study recommended providing faculty members with adequate internet access and technical support in order to enhance their adoption and integration of WBI. Therefore, the current study will investigate other factors (e.g., technical support, professional development, and internet access) that best predict faculty members' effective use of technology.

Investigating exemplary teacher education programs in preparation teachers for technology uses is important to give a deeper understanding about the standard they used and what factors make them successful. Wetzel and Williams (2004) examined a Preparing Tomorrow's Teachers to Use Technology (PT3) program. The study population included the faculty of the College of Education at Arizona State University West (ASUW) who were thought to be exemplary in their technology integration. The study attempted to evaluate the progress of teacher educators in the integration of technology in their classes by modeling and assignments and how this integration was aligned with the ISTE NETS-T.

The main factors found in the study that helped faculty members to use technology were ongoing participation in professional development support from technology specialists who helped faculty to create technology assisted activities based on ISTE NETS-T (73% of the 41 participants received one-on-one support), committed and informed leadership, departmental planning, and good access to software and hardware both at college and at home. The study found that only 22% of the faculty modeled the use of technology "frequently" or "always" in their instruction.

As a result of these factors, the study found that there was a significant improvement in faculty's technology integration. At the beginning of the program in spring 2000, only 20.6% of faculty members implemented technology, while in fall 2002, 69.2% of the participants did. The study indicated that to make effective change, it is important for all these factors to be considered, especially administration support and pressure to make the project succeed. Adopting ISTE NETS-T as a framework for integrating technology was found to be very important because these standards "are comprehensive and pointed to the gap between our present state and an optimal state" (Wetzel & Williams, 2004, p. 48).

This study showed the importance of improving faculty members' standard-based technology integration as a model for improving pre-service teachers' future usage of technology. The study indicated the importance of offering the factors that enable faculty members to implement technology effectively. Therefore, this current study focuses on examining faculty technology integration practices based on ISTE NETS-T as it is one of the most adopted standards for effective use of technology to support 21st century learning. In addition, the study will examine several popular influential factors that help faculty members to integrate technology.

Constructivism Learning Theory

Living in this era of a highly competitive, knowledge-based economy requires preparing students with specific skills. Therefore, 21st century learning is becoming important in schools. Applying 21st century learning requires shifting current traditional learning practices into a more progressive learning environment.

Traditional education delivers information and content knowledge in such a way that requires learners to passively receive and absorb it through static methods, such as lectures and texts. In this “jug and mug” learning environment, students are required to memorize distinct facts that are poured in by teachers, who are the center of the learning process and are the ones who possess the power and the authority of knowledge (C. Rogers & Freiberg, 1994). This educational environment lacks trust between teacher and students, is filled with fear of failure (C. Rogers & Freiberg, 1994). As Weegar and Pacis (2012) stated, “Much of today’s curriculum focuses on these memorized bits of information and concludes behaviorist practices are still relevant in today’s digitized world” (p. 14).

On the other hand, by following constructivism theory, a progressive learning environment focuses on authentic, challenging problems that touch students’ interests and needs, teachers are facilitators and directors who inspire and stimulate students to think critically and develop analytical skills. During this student-centered learning process, students are inquisitive, creative, and reflective, and they construct their own new knowledge through hands-on activities and with the help of their previous experiences (Fosnot, 1996; Fulton, Couros, & Maeers, 2000; Weegar & Pacis, 2012; Yilmaz, 2008). Weegar and Pacis (2012) emphasized the nature of constructivist learning as “active engagement, inquiry, problem solving, and collaboration with others” (p.6). As students take more responsibility about their learning, they become self-disciplined, self-confidant, and highly motivated (Bloemsma, 2013; Fulton et al., 2000).

Constructivism theory advocates the belief that knowledge cannot exist outside of the mind as it is constructed by individuals based on their previous unique experience (Fosnot, 1996; Yilmaz, 2008). Jean Piaget, one of the major contributors to constructivism, introduced the idea that knowledge cannot represent an independent reality (it is not a copy of reality); rather, it has an adaptive function (Fosnot, 1996). According to Piaget, “Knowledge, then, could be treated not as a more or less accurate representation of external things, situations, and events, but rather as a mapping of actions and conceptual operations that had proven viable in the knowing subject's experience" (Fosnot, 1996, p. 4). Therefore, the knowledge construction process requires learners' active participation through actions that take place within the environment. While receiving new information or a new idea, the learner undergoes a cognitive conflict (unbalance state), which requires adjustment through cognitive activities like assimilation and accommodation to reach equilibrium (M. G. Jones & Brader-Araje, 2002; Powell & Kalina, 2009; Yilmaz, 2008). This indicates that constructivist teachers must consider each learner's need to get knowledge, ability, and level of understanding by designing appropriate activities and differentiated instructions (Powell & Kalina, 2009).

As an originator of constructivist thinkers, John Dewey focused on the learner as a whole person including an individual's physical, social, emotional, and intellectual growth (Mayhew & Edwards, 1965; Stanchfield, 2013). Combining physical and intellectual activities and using a variety of instructional methods helps in designing differentiated lessons to fulfil students' needs and interests. This will increase the teacher's ability to motivate students, inspire their discovery sense, and inculcate their desire to learn (Stanchfield, 2013). Dewey (1944) rejected the idea that schools should focus on repetitive and rote memorization, theorizing that students learn best through experience rather than through lecture as knowledge construction primarily depends on two social factors: situations and interactions (Conrad & Donaldson, 2011; Dewey, 1944). Dewey (1944) also emphasized the importance of engaging learners in challenging real-life problems that meet their interests:

As people learn better by watching and collaborating with others (Mellis, Carvalho, & Thompson, 2013), Vygotsky added social interaction as an integral part of learning where learners construct their knowledge through interaction with the teacher and other students

(Powell & Kalina, 2009). Vygotsky (1978) asserted that "learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with peers" (Vygotsky, 1978, p. 90). During social interaction, language and culture serve as psychological tools in the meaning making process, and this is constructed as a result of the interactions and dialog between learner and teachers or more experienced peers (Huang, 2002; M. G. Jones & Brader-Araje, 2002; Powell & Kalina, 2009). Therefore, designing instruction that embraces today's diverse classroom in a collaborative learning environment helps internalization to occur more effectively during social interaction among heterogonous groups (Powell & Kalina, 2009). During this interaction process, learners progress through the three stages of the Zone of Proximal Development (ZPD) proposed by Vygotsky. At first, learners learn by listening and watching others without any help. Then, learners get help from the more capable others to master concepts and perform tasks that they cannot understand on their own. At the third stage, learners become independent as they can perform the tasks with their own abilities (M. G. Jones & Brader-Araje, 2002; Powell & Kalina, 2009; Vygotsky, 1978). Vygotsky (1978) defined the ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

Bruner was influenced by Vygotsky's work as he believed that social interaction is the root of good learning. Bruner expanded the work of dialogue (Socratic learning) and proposed the concept of scaffolding (Fosnot, 1996). Based on Bruner's thought, instruction should be designed to engage students in an active dialog with peers and teacher. Learners are challenged in problem solving situations that require them to discover facts, relationships, and new information building on past experiences and existing knowledge (Culatta, 2013; Fosnot, 1996; University College Dublin, n.d.).

Based on the work of these scholars (Piaget, Dewey, Vygotsky, and Bruner), constructivism learning theory offers teachers guidelines for their instructional practices that are associated with 21st century skills learning through "viewing learning as an active process, taking students' prior knowledge into consideration, building on preconceptions, and eliciting cognitive conflict…[this] goes beyond rote learning to meaningful learning that is more likely to lead to deeper, longer lasting understandings" (M. G. Jones & Brader-Araje, 2002, p. 4).

Constructivism Theory and ISTE NETS-T Standards

Different from the first edition of the ISTE NETS-T, the 2008 version was constructed with more constructivist language (Willis, 2012a). A closer look to the performance indicators emphasizes this claim. ISTE NETS-T standards are grounded to effectively apply technology as they support sound pedagogical theory and practice: "The ISTE standards support the development of technology capable students through the application of constructivist learning theory" (ISTE, 2002, p. 5). Constructivism learning theory provides an excellent context for using technology as a cognitive tool based on ISTE NETS-T to support meaningful learner-centered learning (Nanjappa & Grant, 2003). To emphasize the practical and application of these standards, the performance indicators are stated in more practical and measurable action verbs, such as "design" rather than "know" (Morphew, 2012). This type of technology use engages students, which is a constructivist aim as advocated by constructivist scholars, and helps them building knowledge by themselves "as designers engage the learners more and result in more meaningful and transferable knowledge" (cited in Nanjappa & Grant, 2003, para. 9).

ISTE NETS-T supports learner-center approach, which is a key element of constructivist learning where students are active participants and take more responsibility for their learning through setting their own goals, choosing appropriate resources, and assessing their progress (Willis, 2012a). This is clear in the second standard (the 2b indicator) that emphasizes "Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress" (ISTE, 2016). The same idea is also asserted in the third indicator under the same standard (2c), "Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources" (ISTE, 2016).

ISTE NETS-T emphasizes engaging students in real world authentic problems: "Engage students in exploring real-world issues and solving authentic problems using digital tools and resources" (1b indicator). One good example of technology to help such engagement is to design activities that utilize complex games and simulation software as "Problem-solving software comes in a variety of forms, such as computer games and simulations that engage higher-level thinking (Morphew, 2012, p. 35).

Similar to constructivism theory, ISTE NETS-T standards, through many indicators, support using technology to solve problems, make decisions, communicate, collaborate, and share ideas with others. Under the first standard, the 3rd performance indicator states, "Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes" (ISTE, 2016). Google Docs, Wikis, collaborative mind mapping (e.g. MindMeister), discussion board, and slideshare are a few examples of technology tools that teachers can utilize to help student collaborate, share ideas, support each other, and learn together easily and effectively (Morphew, 2012). Building knowledge through social interaction with others (locally and globally) is further addressed in the standards, "Participate in local and global learning communities to explore creative applications of technology to improve student learning" (5a indicator) (ISTE, 2016). Students also can use blogging for reflection on their learning. Reflection as a metacognition cognitive activity fosters creativity through examining and modifying old experiences and construct new deep knowledge through interacting with others (Morphew, 2012; Nanjappa & Grant, 2003).

Other constructivist strategies, such as problem and project-based learning, are supported by ISTE NETS-T standards as they encourage students to be problem solvers and decision makers (Morphew, 2012; Takkunen, 2008). Through appropriately designed activities, teachers as facilitators can utilize several technology tools for various tasks during the project, such as searching for information, analyzing data, evaluating content, constructing, and sharing solutions. In the third standard, the fourth indicator says "Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning" (ISTE, 2016).

Today, constructivism theory is being adopted by several teacher education programs and technology is penetrating education institutions rapidly. It is helpful to adopt ISTE NETS-T standards in modeling technology integration by teacher education instructors in order to prepare pre-service teachers in applying technology effectively in their future classrooms, especially as these standards and their performance indicators focus on professional practice (Willis, 2012a). ISTE asserted that "These program standards will assist teacher education units, and professional organizations and agencies in understanding and evaluating the educational preparation needed for specialization within the field" (ISTE, 2002, p. 3).

Educational Technology in Saudi Arabian Higher Education

Technology users, especially computer and internet users in the Saudi society in general and more specifically in education, have made noticeable progress in the last two decades. In 1993, the King Fahd University of Petroleum and Minerals (KFUPM) in Dhahran was the first Saudi institution to connect to the internet (Chanchary & Islam, 2011). In 1999 the internet access was made available to the public in SA. From 2000 to 2005, the number of internet users grew from 200,000 to 2.54 million. The biggest jumping in the number of internet users happened in 2014 when it reached 19.6 million, which represents 63.7% of the population (Communications and Information Technology Commission, 2016).

Recently, there has been increased demand for internet services and broadband as a result of high usage of social networking applications, link channels, video downloading, and gaming by customers, especially youth who seek higher speeds and larger data packages. Moreover, 19.3 % of the Saudi population are young people who are between 15-24 years old (IndexMundi, n.d.) are considered digital natives and use new technologies faster than expected. In accordance with this respect of rapid growing in internet users in SA, higher education has adapted new technology-assisted learning strategies including blended learning and distance learning (Alebaikan & Troudi, 2010). The strategic element of ICT, which was set by the National Communications and Information Technology Plan (NCITP), includes seven objectives focusing on science and technology. The general objective related to e-learning emphasized on integrating technology in education.

Future Plan of Higher Education in Saudi Arabia- (Afaq) and Technology Use

The higher educational system plays an essential role in meeting the country's development requirements through building good citizens within the framework of the Islamic law and qualified graduates who have high-profile technical expertise. Saudi higher education has faced several challenges such as a shortage of college seats for an increased number of high school graduates, a lack of scientific research and technical development in higher education institutions and a low capacity in keeping up with globalization demands and accelerated technological development (Ministry of Higher Education, 2009; Ministry of Higher Education, 2010). In response to current and future challenges, the Ministry of Higher Education took the initiative in applying a comprehensive reform process to the higher educational system by creating a long-term plan for university education.

This "Plan for the Future of University Education" was established in 2007 and is known as the Afaq (Horizon) project, which set out to develop a 25 years plan to define the vision of university education, along with identifying its needs, forms, outcomes quality, and sources of financial support. It also developed an executive plan for the first five years of the project (Ministry of Education-Higher Education, 2015). The Afaq project was officially issued in 2011 (Al-Ghabban & Zaman, 2013). The plan involved all higher education institutions in the process of the development project, where each institution apply a number of projects.

As a part of Afaq plan, the e-learning and distance education project is set to make e-learning a primary part of the college educational system and be a supplement to other educational sectors in order to achieve excellence in teaching and learning environment. In addition to many main objectives the project aims to diversifying the learning environment through virtual learning by implementing information technology in college teaching, improving learning opportunities, upgrading the internal efficiency of programs and universities, preparing the community for the era of digital systems, and bridging the digital gap in order to build a knowledge-based society (Ministry of Higher Education, 2010).

The National Center for e-Learning and Distance Learning (NCeL)

Through the means of its strategic plan (Afaq), the Ministry of Higher Education strives to achieve its ambitious vision that emphasizes on e-learning. The National Center for e-Learning and Distance Learning (NCeL) was established in 2006 as a backbone to embody the country strategy for the promising future of education through spreading knowledge and information with the support of e-learning and its environment (Alebaikan & Troudi, 2010; Ministry of Higher Education, 2009). NCeL aims to be an international leader in e-learning research, development, and implementation, as well as building related architecture and infrastructure based on open standards (Mirza & Al-Abdulkareem, 2011). To achieve the desire of uplifting traditional education through investing in the latest and best advancement applications of e-learning, the center vision and goals align with the mission of the Ministry of Higher Education as it considers

> E-Learning is not just an “added value” to facilitate and accelerate traditional education. It is an evolving environment integrated with various elements of the educational process, in order to be enriched from within. E-Learning does not only provide massive information “vessels”, but it also stimulates in the learning mechanisms of information acquisition, its processing, and sharing with others in its construction, and conversion into interactive positive information. (cited in Unnisa, 2014, p. 152)

The goal of the NCeL is to encourage e-learning and distance education in higher education institutions and provide technical support, tools, and the means that are essential for developing digital educational content. The center works as a vehicle that enhances technology integration in all Saudi universities based on standardized approach through utilizing all available capabilities to support not only the educational process in higher education institutions, but also to use information technology effectively at optimal level to improve communication and meet the individuals and society needs (Alebaikan & Troudi, 2010). **Jusur** is an example of the projects that were created by NCel to fulfill its goals and achieve excellence in e-learning. Jusur has been established in 2007 as a learning management system (LMS) in Arabic language to support blended and distance learning in Saudi universities. Similar to Blackboard, Jusur is designed to help in managing the entire learning process including instructional activities, implementation, and assessment (NCeL, 2014).

Studies on Technology Integration in Saudi Arabian Higher Education

Several studies have been conducted to examine the use of technology in higher education colleges at different universities in SA. These studies reflect the current status of technology integration in higher education institutions as well as the factors that influence faculty members in their use of technology (Alaugab, 2007; Albalwi, 2008; Al-Sarrani, 2010; B. Kamal, 2013).

Al-Sarrani (2010) investigated the concerns of Science faculty at TU including three departments (biology, chemistry, and physics) in adopting Blended Learning (BL) and how these concerns are related to faculty professional development needs (n=148, 58.8% response rate). Mixed methods were employed to design a non-experimental, cross-sectional survey. Al-Sarrani studied the significant relationship between science faculty contextual characteristics (gender, age, academic rank, nationality, content area, country of graduation, and years of teaching experience) and their concerns in adopting blended learning. It also examined the significant relationship between science faculty technographic characteristics (attitudes towards technology integration in the science curriculum, perceptions of the effects of BL use on pedagogy, and perceptions of technology professional development needs) and faculty use of technology in teaching by department.

The study found that 90% of faculty members either agreed or strongly agreed that integrating technology in teaching was very important. However, the use of technology was at a low level as the results revealed that 95% of science faculty members at TU almost always used computer-based technology frequently in personal communication and document preparation for teaching, while 77% used it for classroom management and student evaluation purposes. In general, the study found that “the integration of technology into science faculty teaching, especially online teaching, was still in its early stage” (Al-Sarrani, 2010, p. 154).

Al-Sarrani (2010) recommended to better prepare faculty members in learner-centered methods (collaborative learning, and problem-based) so that they can use technology properly. This recommendation is aligned with the focus of current study through using ISTE NETS-T standards to examine faculty members’ technology usage. This is important as these standards adopt a constructivist learning through effective technology usage. Al-Sarrani (2010) also recommended providing other factors for the effective use of technology, including proper professional developments to design their courses, technical support staff to solve hardware concerns, software, technical support, internet access for faculty and classroom, and a technology plan. Finally the researcher also recommended replicating this study in the Liberal Arts Colleges at TU, The current study will examine the factors recommended by Al-Sarrani (2010) and will be conducted in a Liberal Arts college as he suggested.

B. Kamal (2012) utilized the Concerns Based Adoption Model as a theoretical framework to examine faculty concerns in the adoption of online teaching and professional development needs in six departments in the College of Arts and Humanities at King Abdulaziz University.

Participants were 147 faculty members with a return rate 63.9%. The study used a non-experimental, cross-sectional quantitative survey design, incorporating the Stages of Concern Questionnaire.

Quantitative analysis (descriptive and inferential analysis) was employed to address the relationship between faculty's personal characteristics (age, gender, country of graduation, and years of teaching experience), contextual characteristics (administrative support of technology, college/department, and academic rank), and their concerns about adopting online teaching. The study addressed the influence of faculty's technographic characteristics (prior instructional technology use, technology-related professional development, and attitudes toward teaching with technology) on their use of technology in teaching. Almost half of the faculty members at King Abdulaziz University College of Arts and Humanities used at least one type of LMS investigated in the study. Fifty-seven percent mentioned that they used CENTRA (an LMS) for at least one semester in the past, while 48.3% of them used EMES (an LMS) at least one semester in the past. However, few of participants (11.6%) used mobile technology in communicating with students and 78.2% did not use DDL-Data Collection System in their teaching. While these results indicated a weak use of technology, almost half of the faculty members still believed that online learning would be beneficial for their students.

B. Kamal (2013) recommended that a professional development program is important for both faculty and administrators. Faculty training focuses on how to integrate technology with curriculum while administrator technology training can increase their support of faculty in integrating technology to improve students learning. For successful technology implementation at any institution, he also recommended that internet access should be available for both faculty members students as well as offering 24/7 technical support. The study recommends that future studies apply qualitative analysis that helps stakeholders to gain more insight to determine, compare, and evaluate data regarding technology integration status in any institution. B. Kamal (2013) also recommends addressing how a constructivist approach can be applied in higher education at SA to achieve student-centered learning in technology environment. The current study will investigate how the factors that were recommended (e.g., technical support, administrator support, professional development, and internet access) predict faculty's effective technology integration in their teaching at TU College of Education.

Alaugab (2007) investigated female faculty and students' attitudes toward online instruction and its benefits, as well as the most important barriers that might prevent effective implementation of online instruction in two female institutions of higher education. The total participants included 630 female faculty and students (130 faculty, 500 students) with a return rate of 49.2% (310) at the Girls' Studying Center at Imam University in Riyadh City and the Girls' Education College in Buraidah City in SA. The multiple regression analysis was conducted to determine whether any of the 17 demographic variables (e.g., age, marital status, major, rank, department, experience, location, ESL ability, and reward) could predict faculty's willingness to teach online, but it was not significant at the .05 level ($R^2 = .324$, $p = .469$). All female participants faculty and students noted that there were several barriers preventing implementation of online instruction ($M = 3.91$, $SD = 1.19$).

The results of demographic variables of the study were not able to predict faculty's willingness to teach online, which indicates that other variables should be examined as predictors for faculty technology implementation. The study recommended that future studies consider faculty's characteristics that promote positive attitudes, professional development, access to update software and hardware, technical support, and infrastructure improvement. In general, the study revealed attitudes has a greater importance in technology integration and it influences other factors (Alaugab, 2007).

Albalwi (2008) investigated the intrinsic and extrinsic factors that influence faculty members to adopt and use e-learning in both Humanities and Scientific Colleges at King Abdulaziz University. He examined potential differences among participants with four dependent variables (expertise, current use, motivation, and barriers) and three independent variables (academic field, teaching experience, and sex). Participants were 227 faculty members, with a response rate of 55%.

The study found that participants had a positive sense of technological expertise (*M*= 2.33. *SD*=.977) as a majority of them (78.3%) rated themselves as “intermediate” at least. However, the study revealed that participants’ positive sense of technological expertise was in traditional technology uses (low level), but they did not have the same sense of expertise in advanced technology usage (high level). In the current technology use, a majority of participants (63.4%) rated their usage of e-learning technologies as "seldom" (*M*=1.41, *SD*= .714).

The results showed that motivational factors were positively influential (*M*= 2.99 out of 4.00) as 78.5% rated them “encouraging” or “highly encouraging.” The study also concluded that intrinsic motivational factors are more important than extrinsic factors in encouraging instructors to adopt and use e-learning as the top two motivational factors found were intrinsic. These factors were my computer skills (*M*= 3.25, *SD*=.969) and the opportunity to improve teaching (*M*= 3.23 *SD*= .917).

Barriers were found positively influential (*M*=2.70 out of 4.00), and the majority of participants (64.7%) rated barriers as being “some” or “many.” It is found that the top three barriers were extrinsic; lack of technological infrastructure (*M*= 3.20, *SD*= 1.125), lack of students' access to resources (*M*= 3.16, *SD*= 1.210), and lack of technical support in solving computer problems (*M*= 3.10, *SD*= 1.122).

This study found that faculty had high expertise in low level technology usage in e-learning in higher education. The growth of educational technology opportunities that the Ministry of Education has offered and adapted in the recent years to improve the learning process through better technology practices by faculty members makes it important to examine faculty's high level technology usage in their teaching practices based on technology constructivist standards like ISTE NETS-T standards. While the study examined only three independent variables (academic field, teaching experience, and sex), the results revealed others factors including intrinsic and extrinsic fundamental motivations and barriers that should be addressed in predicting technology uses at other higher education institutions.

Studies on Technology Integration in Colleges of Education in Saudi Arabia

Few studies found in the literature examined the current status of technology integration in colleges of education in Saudi Arabia (Almaraee, 2003; Alshahri, 2015; Omar, 2016). Almaraee (2003) conducted a study in three Colleges of Education in SA (CESA) at Makkah (CEM), Maddina (CEMD), and Abha (CEA) to examine the degree to which pre-service mathematics teachers programs prepare students to integrate technology (the computer and the Internet) in the mathematics curriculum. The data were collected using mixed methods including quantitative (questionnaire) and qualitative (interview) approaches. While student teachers responded to the closed and opened-ended questionnaire, the interviewing was conducted with professors only in the three colleges.

In responding to preparing students to use the computer and the internet for preparation and administrative tasks, student teachers from all colleges rated it as less than adequate

(*M*=1.75, *SD*= .446), where there were no significant differences among CEM, CEMD, and CEA based on the one-way ANOVA analysis (Almaraee, 2003). For preparing student teachers to use the computer and the internet for communication (e.g., colleagues & professionals, parents, student outside the class, and posting homework and other requirements), student teachers from all colleges rated their colleges' level of preparation as less than adequate (*M*=1.45, *SD*= .458) with no significant difference between the three colleges (Almaraee, 2003).

When students were asked to consider how well prepared they were to use the computer and internet for instructional activities (e.g., problem solving, simulations, produce multimedia report, project, research using internet, computer applications, correspond with experts via email, data analysis, and graphical presentation) during their future teaching, student teachers from all colleges rated their colleges' level of preparation as less than adequate (*M*=1.64, *SD*= .503) (Almaraee, 2003). In responding to preparing students to use computer and internet in their future teaching (e.g., generating students' ideas, collecting data, understanding concepts, demonstrating graphs, etc.), student teachers from all colleges rated their colleges' level of preparation as very low (*M*=l .55, *SD*= .459). The differences among three colleges' overall ratings were not significant based on the one-way ANOVA analysis (Almaraee, 2003). All respondents generally considered competencies of preparing students to integrate computers and the internet into their teaching as very important and really needed in CESA programs (*M*= 3.20, *SD*= .372).

Almaraee (2003) focused on using technology in terms of computer and the internet and did not focus on how to prepare pre-service teachers to be professional digitally literate in order to help their students in classrooms gain 21st century skills with the help of technology. In addition, the results of this study showed a low level students preparation for their future teaching and indicated social, economic, and academic obstacles that caused these results. However, after more than ten years since the time of conducting this study, there have been improvements in Saudi Arabian higher education, especially in using technology (Unnisa, 2014). Therefore, a new investigation is needed to examine how pre-service teachers are prepared to use technology effectively with consideration of (1) the development of technology in Saudi Arabian education, (2) examination of all departments in the college of education not only mathematics, and (3) examination of different factors that influence technology integration.

Alshahri (2015) compared between education faculty members perceptions in SA (n= 292) and the USA (n= 253) in applications and the use of ICT tools. Saudi participants were sampled from five universities including Taibah University. While 65% of the US faculty members taught online courses, 26% of the Saudi counterparts did. However, the result indicated that the Saudi faculty members used social media more often than the US faculty members. Similarly, Saudi faculty used Google Documents, Photos and Website links more than the US faculty while US who used podcasts and text documents more. The highest tools used by the Saudi education faculty members for instructional purposes were email (M= 4.14, SD= 1.33), Word Processing (M = 4.14, SD = 1.17), and social media applications (M = 3.39, SD = 1.62). The result also indicated that ease of ICT tool use and the perceived value of ICT tools use are important factors in faculty members' consideration to use ICT technologies.

Omar (2016) examined faculty members' concerns (n=296) from nine departments of the College of Education at King Saud University related to their adoption of online teaching and their professional development needs. The study found that 64% of participants used mobile apps for at least one semester while the second common tool used by 60% of them was learning management system and social media used by 47% of the participated faculty members. The least tool used by 32% of the participants was web conferencing applications. Participants also showed positive attitudes towards teaching with technology. Results of the stages of concern in online teaching indicated that education faculty members were at the early stages of using the innovation (teaching online) as these stages were ranked the highest, which means they did not use the innovation and need more information about it (nonuser profile) (Omar, 2016).

These two recent studies Alshahri (2015), and Omar (2016) indicted an improvement in using technology for instructional purposes when compared with the previous studies. However, the studies did not investigate for what purposes these technologies were used and to what extent these uses align with meaningful learning. While these studies indicated to some factors that influence education faculty members' decision in integrate technology (e. g., attitude, professional development, administration support), still there are some other factors found in the literature should be addressed.

Taibah University Overview

Taibah University (TU) was established in 2003 in Medina, SA. The number of enrolled students (male and female) has increased from 7761 students in 2003 to 63815 students today. The adapted vision of TU is to be an internationally accredited and comprehensive state university dedicated to excellence in teaching, research, and community service.

Today, at TU the number of colleges reaches 28 and two institutes and the total number of academic staff is 2694, which is classified into 1436 faculty members and 1424 teaching assistants, lecturers, and language teachers. TU has 156 academic programs including 94 graduate studies programs and seven degrees awarded (Diploma, Associate, Bachelor's, General Diploma, Higher Diploma, Master's, and Doctorate). TU offers parallel and distance education using advanced technology and partial face-to-face training. These programs enable students from the Madinah Region to pursue their studies in various fields (Taibah University, 2016a).

Taibah University Faculty Technology Integration

In response to the accelerating movement toward technology integration in higher education institutions in the country, the Deanship of Distance Learning has been assigned as responsible for the development and localization of the e-learning and distance learning through setting up its policies, rules, and programs for the whole university sectors. To fulfill this responsibility, the Distance Learning Deanship (DLD) formulated several objectives based on its vision. For example, it aims to provide accredited education that utilize e-learning in order to improve faculty members academic performance as well as students learning through the use of emerging educational technologies. The DLD also aims to offer continuing education opportunities to serve the society through utilizing distance education capabilities. Moreover, DLD prepares the appropriate facilities and equipment (hardware and software) and produces electronic content materials necessary for e-learning (Taibah University, 2016c). The DLD is responsible for preparing and providing the needed manpower to achieve a quality e-learning (Taibah University, 2016c).

Factors Influence Technology Integration

Although technology is available more than ever in educational institutions, many faculty members barely integrate it into their teaching, even in those faculty who embrace technology (Osika et al., 2009). Therefore, a fundamental issue to be considered in technology integration is the conditions that insure the effective use of technology to enhance student learning (Zhao et al., 2002). While the current study investigates the factors that contribute to the decision of faculty members to use or not use technology in their teaching in teacher education programs, a broader literature review about factors that influence integrating technology will be examined including a variety of perspectives, including in-service teachers, pre-service teachers, and, with emphasis, faculty members. This review will also look at studies that discuss barriers to integrating technology (Ertmer, 1999; Goktas, Yildirim, & Yildirim, 2009; Osika et al., 2009).

Factors affecting technology integration are varied and intertwined as Zhao et al. (2002) stressed:

> The list of proposed explanations runs long: from the incompatibility between technology and the current culture of schooling to the inherent unreliability of technology; from the ill-preparedness of teachers to the poor quality of educational software; and from the predominance of conservative pedagogy to the power of standardized assessment. (p. 484)

Therefore, these factors should be organized or classified in a way to help understanding their nature and effects on the technology integration process. Ertmer (1999) classified barriers for integrating technology in education into first order (external to educators: e.g., physical environment, support) and second order barriers (internal to individual educator: e.g., believes, knowledge). Fewer studies were found with technology integration enabling factors (Ertmer et al., 2006). Similar to barriers, Ertmer et al. (2006) and others identified two types of influential factors for supporting technology integration. External factors include outsider influences that faculty member have no control over that enable them to successfully integrate technology (Ertmer, 1999; Ertmer et al., 2006; Goktas et al., 2009; Salentiny, 2012; Tondeur et al., 2012). Examples of these factors are technical support, technology access, and administration and peer support. The external factors show only one side of the coin while internal factors show the other side, which are issues related to faculty beliefs about teaching and learning practices

(Ertmer, 2005). Examples of these factors are attitudes, self-efficacy, and pedagogical practices (Ertmer, 1999; Ertmer et al., 2006; Granston, 2004). Internal factors have more weight in making the decision to use or not to use technology (Ertmer, 1999; Ertmer et al., 2006). While having access to quality technology is important (external factor), when it is offered that does not mean technology will be used effectively if teachers have a negative attitude toward technology or do not see a way to use it (internal factors) (Ertmer, 1999; Ertmer, 2005; Ertmer et al., 2006). Results of paired-samples *t*-test of the 25 exemplary technology using teachers participated in Ertmer et al. (2006) indicated that there was a significance difference [$t(24) = 7.23$, $p < .001$) between participants' ratings of the influence of internal (intrinsic) ($M = 4.51$, $SD = 0.31$) and external (extrinsic) ($M = 3.86$, $SD = 0.51$) factors. This result showed that the intrinsic factors had more importance in making the decision of using technology than the extrinsic factors (Ertmer et al., 2006).

Technology barriers and enabling factors are likely to be inversely related, as more control over the barriers leads to offering better conditions for technology integration: "it is likely that either a decrease in barriers or an increase in enablers would lead to greater technology use" (Ertmer et al., 2006, p. 55). Since these factors are interrelated, effective technology integration in classroom applications is not linked to the availability or absence of one single factor, but instead it is determined through a dynamic process involving a set of interrelated factors (Afshari et al., 2009). Therefore, addressing to what extent these barriers are controlled and the factors are supported affects the success of integrating technology at the individual and institutional levels (Buabeng-Andoh, 2012).

Summary of Studies Reviewed Technology Integration Factors

Tondeur et al (2012) reviewed nineteen articles from eight journals and six different countries by using meta-ethnography qualitative analysis approach. These studies focused on approaches to prepare pre-service teachers to integrate technology into their lessons.
The results from the study were divided into two key themes. The first key included seven sub-themes explicitly related to the preparation of pre-service teachers including aligning theory and practice, using teacher educators as role models, reflecting on attitudes about the role of technology in education, learning technology by design, collaborating with peers, scaffolding authentic technology experiences, and moving from traditional assessment to continuous feedback for pre-service teachers. The second key included five sub-themes related to institutional conditions essential to implement technology: technology planning and leadership, co-operation within and between institutions, staff development, access to resources, and systematic and systemic change efforts (Tondeur et al., 2012). This literature review study highlighted important factors in preparing pre-service teachers to integrate technology and identified effective strategies through providing a model to illustrate how these themes are connected to each other.

Strudler and Wetzel (1999) investigated the efforts of four exemplary colleges of education that were selected for the Office of Technology Assessment (OTA) study (U.S. Congress, 1995) regarding their approaches to prepare pre-service teachers to use technology. The study explored critical enabling factors that support both student learning opportunities and successful technology integration goals for pre-service teachers. The data were collected through multiple sources including direct observation and interviews with faculty members, administrators, pre-service teachers, recent graduates, and technology-support providers. The results indicated that leadership vision and goals was the main theme that emerged across the case studies. Based on the study analysis, other factors including training and support, technology access, pedagogical fit, and personal issues were found to be affected by leadership vision and goals and consequently affect technology integration in classrooms (Strudler & Wetzel, 1999).

Hew and Brush (2007) reviewed 48 studies including 43 peer-reviewed journals, two research reports, two conference presentations, and one book report in their 10-year empirical study on technology integration. The study examined the current barriers related to the integration of technology into the curriculum in K-12 schools both in the United States and other countries and identified strategies to overcome these barriers. The study explored 123 various technology integration barriers that were classified into six major categories: (a) resources (technology, access to available technology, time, and technical support), (b) knowledge and skills (technological, pedagogical, and classroom management), (c) institutional (leadership, school time-tabling structure, and school planning), (d) teachers' attitudes and beliefs (educational beliefs about teaching and learning such as pedagogical beliefs and their beliefs about technology), (e) assessment (pressures related to high-stakes testing gave teachers little time to attempt new instructional methods involving technology, content coverage within a limited amount of time), and (f) subject culture (technology seems incompatible with subject content, subject pedagogy, and subject assessment). To understand how these barriers can be eliminated or minimized, the study provided various strategies that were classified into five main categories: (a) having a shared vision and technology integration plan, (b) overcoming the scarcity of resources, (c) changing attitudes and beliefs, (d) conducting professional development, and (e) reconsidering assessments (Hew & Brush, 2007).

Afshari et al. (2009) reviewed factors influence ICT implementation at K-12 schools. Factors were categorized into manipulative and non-manipulative factors. Non-manipulative factors included the ones that influence teachers to use technology that neither they nor the schools have control over. These factors mainly include demographics attributes, such as gender, age, and teaching experience, in addition to parents' and community commitment (Afshari et al., 2009). On the other hand, manipulative factors are more related to teachers attitudes towards teaching and ICT; their ICT skills and knowledge; school support including ICT plans and vision; offering access to technology and the needed technical support; availability of time for preparing, practicing, and reflecting on ICT use; school culture including assumptions, norms, and values shared among school's members; computer attributes related to innovation acceptance including relative advantage, compatibility, complexity, observability and trialibility; and professional development offered for teachers and other school staff (Afshari et al., 2009).

Zhao et al. (2002) examined the factors that facilitate or hinder teachers' effective use of technology. Participants were ten K-12 teachers who were among the 118 winners of an innovation state grant. Qualitative data including classroom observation, interviews, and artifacts were analyzed using grounded theory. Factors found were placed into three categories: the innovator, the innovation, and the context. The study found three factors that were associated to the innovator or the instructor, which are technology proficiency, pedagogical compatibility, and social awareness. The second category found was the nature of the innovation itself. This means how far the innovation is from the status quo (school culture, current practices, and available technology resources). It also meant the dependence of the innovation on other people or resources that are beyond the instructor's ability. The context refers to the supportive factors inside the learning environment of an institution including human infrastructure (technical staff, administrative staff, and institutionalized policies), technological infrastructure (resources, facilities, and access), and social support (colleagues and administrators) (Zhao et al., 2002).

Selected Technology Integration Influential Factors

As illustrated earlier, a wide range of factors that influence the decision of educators to use or not to use technology in their instructional practices have been found in the literature. However, factors other than demographics have been given more emphasis (Afshari et al., 2009; Buabeng-Andoh, 2012; Ertmer, 2005; Ertmer et al., 2006; Ertmer & Ottenbreit-Leftwich, 2010; Hew & Brush, 2007; Strudler & Wetzel, 1999; Tondeur et al., 2012). The current study focuses on the selected technology influential factors including attitudes toward technology, pedagogical beliefs, technical skills, faculty workload, professional development, technology accessibility, technical support, and leadership support.

Attitudes toward Technology Integration

Instructors' beliefs and attitudes regarding integrating technology into their teaching practices and the whole learning process are of crucial importance in their technology adoption (Buabeng-Andoh, 2012; Ertmer, 2005). Attitudes represent person's feeling and tendencies that influence decisions towards liking or disliking something (Hew & Brush, 2007; Schafer & Tait, 1986). Fishbein and Ajzen defined attitudes as "predisposition to respond in a consistently or unfavorable manner with respect to given object" (Fishbein & Ajzen, 1975, p. 6). Therefore, faculty members' attitudes should be considered for any technology integration initiative to be successful. In fact, attitude as an intrinsic factor is a difficult characteristic to be changed because it is fed by extrinsic factors such as access, professional development, and support. Attitude could have a greater negative affect in technology integration than extrinsic factors and cannot be easily reduced by changing a physical environment (Asiri et al., 2012; Zhao et al., 2002).

Faculty members who hold positive attitudes toward technology feel comfortable using it and are more willing to overcome obstacles. According to Ertmer (2005), an instructor's decision to use or not use technology mainly depends on that person's beliefs about technology. Transforming education through innovative ideas requires developing positive attitudes toward these new innovations, as negative attitudes inhibit acceptance of technology usage in teaching: "a positive, anxiety free attitude toward computing [is] a necessary prerequisite of computer literacy" (cited in Woodrow, 1992, p. 3).

Samarawickrema and Stacey (2007) conducted a qualitative case study to investigate factors influencing faculty members to use learning management system in a large urban Australian university. Purposeful sampling was used to select innovative teaching academics (n = 22, four of them were from the collage of education) from across the six university campuses who used web-based approaches to teach both on and off-campus learners. Faculty members with open attitudes to online learning were found to adopt technology more easily.

Positive attitudes towards technology benefit teacher educators not only in implementing technology in their classrooms but also in getting more from the technology training that is offered. As Afshari et al. (2009) emphasize, "Positive attitudes often encourage less technologically capable teachers to learn the skills necessary for the implementation of technology-based activities in the classroom" (p. 90). The more involved instructors are with technology through understanding its usefulness and being comfortable through having the knowledge and skills needed to use it, the more positive an attitude they will develop. In turns, such attitudes help faculty members to embrace technology (Afshari et al., 2009; Woodrow, 1992). Buabeng-Andoh (2012) asserted that "for successful transformation in educational practice, user need to develop positive attitudes toward the innovation" (p. 3). Drent and Meelissen (2008) examined factors that influenced 210 teacher educators innovative use of ICT in Netherlands. Among factors found in the study, positive attitudes towards computers was positively related to using ICT innovatively (β= .18) (Drent & Meelissen, 2008). In their response to open-ended questions, the exemplary technology users in Ertmer et al.'s (2006) study mentioned that they had a commitment to use technology in their teaching because it improved their ability to facilitate and enhance students' learning and make them successful while engaged. More importantly, dialogue between teacher educators and pre-service teachers during methods courses in discussing technology usefulness was essential to enhance pre-service teachers' technology positive attitudes development (Tondeur et al., 2012).

Therefore, holding positive technology attitudes helps faculty members to overcome obstacles they might face and provides useful insights for better technology integration. Regardless of a lack of hardware and software, positive attitudes of 79 high school teachers towards using Geographic Information Systems (GIS) in Turkey was found to be a critical factor in their successful use of GIS in geography classes (Demirci, 2009).

Marzilli et al. (2014) conducted a mix methods study to examine the perceptions of 72 faculty members' attitudes toward technology use and their levels of technology readiness to incorporate innovative technologies for student learning in the classroom at one regional university in Southwestern United States and how their attitudes relate to their reported skills and usage (Marzilli et al., 2014). The study examined faculty's technology attitudes through three statements: creates excitement and enhances learning, improves my teaching, and makes teaching more convenient. The results found that faculty members had high positive attitudes

(M= 7.9, SD= 1.46) on a scale ranges from 3 to 9. The study found that only class usage was predicted by faculty's overall attitudes toward technology use (r = .41, p < .00, Beta coefficient to show the direct effect was not reported) (Marzilli et al., 2014).

Salentiny (2012) study's qualitative data analysis indicated that both pre-service teachers and faculty members had positive attitudes toward using technology in teaching and learning. Quantitative data analysis showed that there was a significant difference [F(1, 217) = 3.946, p= .048] in technology attitudes between pre-service teachers and instructors where the former were better. Pre-service teachers showed neutral to positive technology attitudes (M= 17.26, SD= 4.33), while instructors were closer to neutral (M= 15.29, SD= 4.44) (Salentiny, 2012). This result surprised instructors as they had expected pre-service teachers as digital natives would have highly positive attitudes towards technology. This result noted the significant difference in technology skills [F(1, 217) = 8.141, p= .005] between pre-service teachers (M= 2.74, SD= .755) and instructors (M= 2.24, SD= .831). This result was confirmed when the technology skills items were omitted from the overall attitude scale as no significant difference was found; the finding confirms that technology attitudes are influenced by technology skills level (Salentiny, 2012).

Techer educators "agreed" (scale=3) or "strongly agreed" (scale=4) on the importance of pre-service teachers being able to see technology used in their classrooms during courses taught at the collage (M= 3.57, SD= 0.507). To stress the importance of modeling technology uses by teacher educators in developing positive technology attitudes of pre-service teachers, one instructor mentioned, "We do need to model the technologies. And model the technologies in a way that works for children, then…they need to have some practice, with support" (cited in Salentiny, 2012, p. 190). Additionally, to emphasis instructors' positive attitudes towards technology, they “agreed” or “strongly agreed” that students (pre-service teachers) should use technology for completing assignments during the program (*M*= 3.35, *SD*= .587).

In a similar fashion, studies conducted in SA indicated that faculty members had positive attitudes towards using technology in education (Al Saif, 2005; Alaugab, 2007; Albalawi, 2007; Albalwi, 2008; Alharbi, 2002; Al-Sarrani, 2010; Asiri et al., 2012; B. Kamal, 2013). Al-Sarrani (2010) examined science college faculty members at Taibah University’s use of technology. The study found attitudes of faculty members towards integrating technology were highly positive as more than 85% of them rated their attitudes as “strongly agree” or “agree” on the attitude scale.

Al Saif (2005) surveyed 500 instructors at Qassim University and found that participants had positive attitudes towards the use of computer, internet, and WBI as most of them either “agreed” or “strongly agreed” that “they enjoy working with computer” (*M*=4.24, *SD*=0.73) and “they would like to learn more about it” (*M*= 4.34, *SD*=0.74). Instructors who participated in the study also either “agreed” or “strongly agreed” that “using computer, internet in teaching and learning is important to provide better solutions for many instructional problems” (*M*=4.29, *SD*=0.85). However, most of them did not consider “WBI superior to the conventional learning setting” (*M*=2.79, *SD*=1.07). In supporting participants’ WBI positive attitudes, the study found that there was a strong correlation between faculty attitudes and motivating factors (r= .59, p= .00).

B. Kamal (2013) found among the technographic characteristics that influenced faculty members’ use of technology in teaching was their attitudes towards teaching with technology. The results indicated positive attitudes of faculty members as over 82 % of them were highly interested in learning how to use technology and changing their pedagogy to fit with online teaching. Also, around half of participants believed that online classes would be beneficial to their students, while 16.5% were not. The results emphasized the positive attitudes of participants through their interest in attending workshops on how to teach online classes (70.8%), using mobile devices with students for assignments, reminders, or advising (52.4%), and believing online learning requires necessary curriculum reforms (80.9%) (B. Kamal, 2013). In the college of education at King Saud University, participants had positive attitudes towards teaching with technology, as 79% of them were interested to learn how to integrate technology into online teaching, 66% were interested to learn how to change their pedagogy to be able to teach online, 75% believed that online classes could be beneficial to their students, and 71% were interested in attending workshops on how to teach online (Omar, 2016).

Alaugab (2007) investigated female faculty and students' attitudes toward online instruction. Findings indicated that both faculty (*M*= 3.75, *SD*= 0.96) and students (*M*= 3.86, *SD*= 0.99) had positive attitudes toward online instruction, where students had a significantly better positive attitude towards online instruction than faculty [$t(308)= 2.146$, $p= .033$]. The study found different factors that correlate with technology attitudes. Faculty attitudes had a significant relationship with the numbers of online courses that they took ($r= .268$, $p= .036$), while teaching experience was significantly inversely correlated with faculty's overall attitudes toward online instruction ($r= -.301$, $p= .018$). Alshahri (2015) also found that Saudi education faculty members' attitudes towards ICT use were significantly related with their Perceived Value of technology ($\beta= .65$). In a mixed methods study, Alharbi (2002) examined faculty members and administrators' attitudes toward implementation of online classes in Imam Muhammad Ben Saud University (n= 237, response rate= 67.7%). The study found they had very positive attitudes (*M*=74.36, *SD*= 17.03). Albalwi (2008) also found that participants had a positive sense of technological expertise (*M*=2.33. *SD*=.977), as majority of them (78.3%) rated themselves as "intermediate" at least, in which a positive sense of technological expertise was found to be in traditional technology uses (low level).

In general, faculty attitude is a key factor that leads to the success or failure of technology integration or applying new innovation or change in education. However, having technology positive attitudes doesn't automatically guarantee technology use in a classroom. Therefore, investigating faculty attitudes helps stakeholders to determine faculty's acceptance level of technology implementation in the educational institutions and to take further steps to offer other factors.

Pedagogical Beliefs

Faculty members' beliefs about pedagogy and their teaching practices is another factor that influences their usage of technology and students' opportunities to learn with technology (Becker, 2000; Strudler & Wetzel, 1999; Zhao et al., 2002). Several research studies indicated that teacher pedagogical beliefs play a serious role, more than external factors, in successful technology integration and influencing teaching practices. Teacher pedagogical beliefs represent preferred ways of teaching that teachers embrace, influence teacher's instructional decisions and classroom practices, and explain why teacher utilize technology in classroom (Becker, 2000; Ertmer, 1999; Ertmer, 2005; Zhao et al., 2002). Consequently, instructors' pedagogical beliefs influence their teaching behaviors and have a key factor in transforming classrooms with the use of technology (Anderson & Maninger, 2007; Ertmer, 1999; Ertmer, 2005).

The consistent between faculty members' pedagogical methods and their selected technology generally leads to increased usage of technology in a learning environment. Zhao et al. (2002) indicated that teachers who were aware and reflective about their own pedagogical beliefs and goals were more likely to be successful in using technology in their classrooms, for

"When teachers choose a technology that is compatible with their pedagogical orientation the integration goes much more smoothly" (p. 492). In addition, positive results from technology integration were found when it was used as "the means to an end, rather than an end itself" (p. 492). In the exemplary technology integration colleges of education examined, it is found that "Faculty did not appear to use technology for technology's sake. Rather they used it because it fit with and enhanced their current instructional styles and practices" (Strudler & Wetzel, 1999, p. 74). Consequently, in order to help pre-service teachers understand the benefits of technology, it is important to link technology usage practices with theory (Tondeur et al., 2012).

According to the study conducted by Michigan Virtual University where more than 90,000 teachers in Michigan answered the survey, a very small number of teachers (as low as almost one in each nine teachers) indicated that they were unfamiliar with using technology constructively to create meaningful learning activities (Ertmer, 2005). Traditional teaching practices (teacher-centered) leads to using technology at a low level, while a student-centered constructivist learning approach requires a high level of technology usage that enhances students learning (Ertmer, 2005). According to Pajares (1992), teachers' beliefs affect their perception and judgment, which is reflected in their classroom behavior and practices (Pajares, 1992).

High level technology uses, such as problem-solving, data analysis, and knowledge synthesis and construction, are tied to constructivist learning. Therefore, to improve instructors' uses of technology, it is essential to examine how their pedagogical practices, which are affected by their beliefs, are aligned with the constructivist approach (Ertmer, 2005). Rather than repeating their traditional way of teaching, meaningful learning with technology requires teachers to adapt pedagogical practices that reflect constructivist learning. An & Reigeluth (2011) examined teachers beliefs about creating learner-centered learning using technology.

Valid responses were obtained from teachers (n= 126) who showed positive beliefs towards technology and its importance for students learning (*M*= 4.73, *SD*= 0.48) in a 5-point Likert scale ranging from 1 to 5. Both quantitative and qualitative data indicated that participants had a positive perception of learner-centered learning. This result supports the argument that the study found, "In general, high-level technology uses tend to be associated with learner-centered or constructivist" (An & Reigeluth, 2011, p. 56).

In Hakim (2015) study, results of regression analysis showed that constructivist instructional practices and the usage of technology were positively associated [β = .334, *p*= .001]. In a study of Netherlands teacher educators, a learner-centered pedagogical approach was found positively related to innovative uses of technology [β= .18, p < .05] (Drent & Meelissen, 2008). This weak relationship emphasizes the need to further examining the influence of this factor on the decision of teacher educators in using technology in their classrooms, especially as Afshari et al. (2009) asserted that "In fact, the integration of ICT is associated with a shift from instructivist to constructivist philosophies of teaching and learning" (p. 96).

On the other hand, teacher pedagogical beliefs were not found to be a predictor of technology integration in the Saudi studies reviewed except by Al Saif (2005), who found that pedagogical factors (*r*= .20, *p*= .004) have a weak positive correlation with the WBI use. The lack of examining this important factor in the Saudi studies emphasizes the need to examine this factor in the current study, especially since it focuses on examining the effective use of technology that is related to constructivist and meaningful of technology uses.

Technical Skills

ICT skills are considered one of the important factors that influence educators to use technology (Buabeng-Andoh, 2012; Osika et al., 2009; Pelgrum, 2001; Peralta & Costata, 2007).

Successful implementation of educational innovations is affected by instructors' knowledge and skills related to this innovation (Osika et al., 2009; Pelgrum, 2001). Osika et al. (2009) found that being technology incompetent is a major cause for faculty members to not use technology in their classrooms. Being ICT competent means be able to use various types of computer applications for a wide range of purposes (Asiri et al., 2012; Buabeng-Andoh, 2012). ICT proficiency is not limited to "the ability to operate a piece of equipment or use a software application" (Zhao et al., 2002, p. 489); it also means being aware of the enabling conditions required to use a tool efficiently and properly (Zhao et al., 2002). This requires a change in the instructor's role, as B. Kamal (2013) recommended that instructors should be trained to be ready for the new roles in teaching with technology such as online course designer or technology expert. Zhao et al. (2002) found that most participants were proficient in basic computer applications while differences among them were significant when using advanced computer applications.

The importance of technical skills was also noted in the Saudi studies. Alaugab (2007) indicated that among the range of factors that influence faculty decision to adopt online courses was the lack of technology skills and computer literacy (43.5%) (Alaugab, 2007). Al-Amri (1993) investigated the factors that affected King Saud University faculty members' decision to use or not to use computers. The study found that there were two major factors that inhibit faculty members from using computers, which were a lack of technology skills and lack of enough time to learn technology skills (Al-Amri, 1993). At Qassim University, both computer (r= .18, p= .00) and internet skills (r= .210, p= .00) were positively correlated with motivation for WBI use (Al Saif, 2005).

Faculty Workload

Integrating technology into classroom practices means more requirements for faculty members, including reconstructing their lessons, frequent updates, checking students' emails, and finding appropriate strategies. All these new teaching tasks require faculty members to learn new skills and needs time too. One faculty member pointed out that a "Lack of faculty time to locate and incorporate technologies---Our time is EXTREMELY packed now, and it is almost easier to continue on the same course, rather than spend the amount of time required to incorporate newer ideas" (Marzilli et al., 2014, p. 10). Results of Samarawickrema and Stacey's (2007) study indicated that an increased workload was a major factor that affected faculty members' use of a learning management system, especially as it required "acquiring skills in the area and developing learning materials without adequate lead times" (Samarawickrema & Stacey, 2007, p. 322).

Faculty members' workload was also apparent in the literature review of the Saudi studies related to technology factors. B. Kamal (2013) found more than 42% of the participants thought that King Abdulaziz University administrators recognized that teaching online courses comes with an additional workload. Similarly, 43.6% of the participants thought that administrators at the College of Art also recognized the additional workload that is required to teach online. Faculty members in college of education at King Saud University agreed or strongly agreed that their administration recognized the additional workload to teach with technology (50% and 48%) (Omar, 2016). Faculty members in Alharbi's study (2002) pointed out that an increased workload was the first barrier (69%) that they faced in implementing online course. The second barrier was noted by 28.5% of faculty who identified extra time or in-load assignment as the second factor that they faced in implementing an online course. Albalwi

(2008) found time available to learn or pursue the integration of e-learning technologies (*M*= 2.93, *SD*= 1.197) and a reduced teaching load (*M*= 2.82, *SD*= 1.17) were among the motivational factors that affected faculty to use technology in e-learning.

Professional Development

Professional development to provide faculty members with knowledge and skills (pedagogical and technical) needed to integrate technology, improve faculty members' attitudes towards technology integration, and to help them be aware of the potential of technology in students' learning is another important factor (Buabeng-Andoh, 2012; Hew & Brush, 2007; Strudler & Wetzel, 1999; Tondeur et al., 2012; Zhao et al., 2002). Marzilli et al. (2014) did a qualitative analysis of the barriers that faculty members experienced in using technology for educational purposes and found that faculty had a lack of technology knowledge that prevented them from using technology easily and appropriately in classrooms. One faculty member indicated that "The main barrier to teaching is trying to stay current on the available technology - how to use each new iteration" (cited in Marzilli et al., 2014, p. 10).

Successful technology training that leads to effective technology usage and meaningful learning should focus on pedagogical technology related issues more than technical ones (Ertmer, 1999; Samarawickrema & Stacey, 2007; Zhao et al., 2002). Zhao et al. (2002) emphasized that "Many in-service workshops often take the format of motivational speeches by a forward-looking visionary plus sessions on how to use a piece of software. Few pay much attention to the pedagogical or curricular connection" (p. 511). Practical professional development programs need enough time to introduce new technologies within contextual activities focusing on subject maters. Participants in the Samarawickrema and Stacey (2007) study found that valuable professional development was appropriate, applicable, and relevant.

During effective training, educators work in groups under technology expert trainers who guide them to understand how technology integrated with new methods improves students learning and attainment (Buabeng-Andoh, 2012). Therefore, trainers should be "familiar with the applications within the discipline and can suggest strategies for employing them" (Strudler & Wetzel, 1999, p. 70). Woodrow (1992) examined the change in attitudes toward computers and computer literacy of pre-service teachers enrolled in a programming oriented computer training course. Results indicated significant improvement in most attitudes dimensions examined in the study. For example, computer liking was significantly different [$t(36) = 2.3$, $p < .05$] from the pretest ($M= 34.7$, $SD= 7.0$) to the posttest ($M= 37.8$, $SD= 6.0$) (Woodrow, 1992). Meanwhile, training should also provide instructors with at least the minimum technical skills required to operate technology tools and devices (Hew & Brush, 2007).

One important support for faculty to use technology is to find someone that they can easily consult in getting support for accurately designing their instructions using technology, such as either a fulltime instructional technologist or a part-time faculty member who is an expert in using technology (Ertmer, 1999; Strudler & Wetzel, 1999; Zhao et al., 2002). At the University of Virginia, a faculty member with a half time assignment was assigned as a technology-staff-development specialist although his real responsibility was to help faculty use technology to improve their teaching (Strudler & Wetzel, 1999). It was found that "Faculty across cases noted that the one-on-one approach is an effective practice in providing support for professors to use technology in teaching and learning (Strudler & Wetzel, 1999, p. 70).

Once in a while training (one shot) will not result in attaining the intended goals of the professional development programs. Therefore, training should be continuous to help faculty members be updated and familiar with the ever-changing technologies (Afshari et al., 2009;

Ertmer, 1999). For innovation adaptation sustainability, teacher educators should be supported (Price, Roth, Shott, & Andrews, 2012). According to Kozma (2003), essential support for innovative pedagogical uses of technology includes how teachers perceive technology, student support, and professional development for teachers.

In a similar fashion, the Saudi studies indicated that professional development was among the important factors that helped faculty members integrate technology in their teaching. Al-Sarrani (2010) found that science faculty members' use of technology in teaching was influenced by their perceptions of technology as it related to professional development needs. The study indicated that 61% of science faculty members mentioned that they didn't have any formal training in using web-based learning management system and 86% of them either agreed or strongly agreed that they need more training in teaching strategies to integrate technology. An indication of the lack of technology professional development was noted in the annual plan of the university, and the main theme in the qualitative data analysis was professional development and workshops (Al-Sarrani, 2010). More importantly, professional development should be designed based on faculties' technology needs as 98% of science faculty believed that their voice should be strongly considered in the technology professional development program. Al-Sarrani (2010) recommended having an instructional design specialist help faculty design and develop courses materials and learning activities for effective technology use.

B. Kamal (2013) at King Abdulaziz University's College of Arts and Humanities, found that there was a significant difference in faculty's use of technology based on technology-related professional development needs [(Pillai's Trace (24, 168) = .756 , $p < .05$, with partial eta= was not reported] (B. Kamal, 2013). The results of the study stressed that professional development was a great need for faculty members in order to use technology, since 74.6% either "agreed" or “strongly agreed” that they need an immediate technology training; in the last two years, over 40% of faculty members had attended less than five hours only of computer technology related professional development, while around 28% of them had participated in six to ten training hours (B. Kamal, 2013). As a result, 84.3% of faculty members “agreed” or “strongly agreed” that they needed regular instructional technology seminars or workshops. Also, 90% of participants indicated that a professional development program should meet their technology needs, topics, and choices (B. Kamal, 2013).

Omar (2016) found 31% of college of education faculty did not have any technology-related training at all in the past two years, while (19%) of them had more than 20 hours of training. In between these two ends, different of technology training hours were found; 16% of faculty members had fewer than five hours, 17% had between six and 10 hours, 11% had between 11 and 15 hours, and only 7% had between 16 and 20 hours. These results indicated that faculty members were in need to get ongoing technology professional developments to improve their teaching, since (80%) of faculty members either agreed or strongly agreed that they have an immediate need for more training to integrate technology in their teaching. When they were asked about university’s faculty technology professional development plan, almost half of the participants agreed or strongly agreed that it meets their technology needs (Omar, 2016). Alaugab (2007) found that 39 % of faculty members in the study selected “lack of training for online instruction” as a factor that affected their use of online instruction. Albalwi (2008) found that training programs and support (M= 2.95, SD= 1.15) was mentioned among the motivational factors that affected faculty in use technology in e-learning. These studies indicate that there is a great need to address professional development as vital factor in integrating technology in higher education teaching.

In conclusion, effective professional development related to technology integration requires attention to several factors, as suggested by Zhao et al. (2002):

> To integrate technology in teaching, teachers need to know the affordances and constraints of various technologies and how specific technologies might support their own teaching practices and curricular goals. They also need to know how to utilize the technologies. Moreover, teachers need to be aware of the enabling conditions of the technology they plan to use—what contextual factors make it work. (p. 511)

Accessibility

Having access to technology resources is a condition for faculty members to use technology (Buabeng-Andoh, 2012; Ertmer, 1999; Strudler & Wetzel, 1999; Tondeur et al., 2012), because without technology availability none of the other factors will be useful. Zhao et al. (2002) examined several cases of the technology project and found that they were either delayed or completely stopped because they required buying software licenses, installing new software, or purchasing and updating hardware. Insufficient resources were reported by Marzilli et al. (2014) as an obstacle for faculty members to be successful with technology.

Accessibility includes ICT infrastructure, access to resources, high speed internet, hardware, and updated software. In teacher preparation programs, both faculty members and students should have equal access to technology. Dexter and Reidel (2003) compared technology accessibility for faculty and students in a teacher preparation program. Results found that faculty had more access (37.4%) than students (14.4%) (Dexter & Riedel, 2003). Also, Marzilli et al. (2014) indicated several technology access issues that were faced by faculty members in the study including hardware or software platforms unreliability, unfriendly and unpredictable tools, and outdated or not useful platforms. Pre-service teachers in Hakim's

(2015) study also indicated to a statically positive relationship between the use of technology in teaching mathematics and increased access to software with instructional and technical support [β= .217, *p*= .036].

Similarly, Saudi studies found that access to hardware and software was an important factor in integrating technology in education. Al-Sarrani (2010) found qualitative results of faculty members concerns in adopting BL included internet connection, having enough computer labs and facilities for students, and software applications. This result emphasized that science faculty members at TU lacked important technology tools like computers and internet connection. At King Abdulaziz University, B. Kamal (2013) found that 93.1% of the participants either agreed or strongly agreed that they were highly in need for reliable internet connections. Al Saif (2005) also found that the technological factors (poor internet connection, lack of technical support and computer access, and lack of internet access) were among the significant inhibitors for faculty members at Qassim University to use WBI.

Alaugab (2007) found that the lack of internet access (45.5%) and the lack of equipment and infrastructure (45.5%) were the two most important barriers that might affect faculty to fully embrace online education. Albalwi (2008) found motivational factors that influenced faculty to use technology in e-learning were positively influential. Among the factors found in the study related to technology access were technology infrastructure (*M*=3.22, *SD*= 1.15), resources about how to apply technology in teaching (*M*= 3.18, *SD*= 1.35), access to software tools for enhancing teaching with technology (*M*= 2.88, *SD*= 1.19), and students' access to resources (*M*= 3.15, *SD*= 1.14) (Albalwi, 2008).

Technical Support

Frequent technology failure hinders faculty members from using technology. Therefore, technical support plays an important factor in technology integration (Buabeng-Andoh, 2012). NCATE indicated that failing to find immediate support when technology lags or fails was a major barrier for instructors to use technology in their classrooms (Afshari et al., 2009). Immediate technical assistance encourages faculty members to use technology without wasting instructional time. Unstable or unreliable technology was mentioned as a hinder in the Samarawickrema and Stacey (2007) study of the 22 faculty members at the Australian university. Two faculty members indicated that "the lack of prompt technical support, the need to remind and follow up technical staff, and the additional stress generated when technology does not work as it should as serious deterrents" (p. 327).

A similar situation was found in the Saudi studies. Al-Sarrani (2010) found that technical support was an important requirement for participants at TU for successfully adopting BL. One faculty member said "the university has to establish a technical center that helps professors apply BL" (cited in Al-Sarrani, 2010, p. 155). At King Abdulaziz University, more than half (55.1%) of Arts and Humanities faculty members indicated that they had access to technical support assistants who could help them with issues related to online learning, while 75.2% of them strongly agreed that faculty members needed more technical support to support using technology in instruction (B. Kamal, 2013). In Omar's (2016) study 87% of education faculty members either agreed or strongly agreed that they need technical support to support using technology for instructional purposes. Alaugab (2007) indicated that around 44.1% of faculty members in the study considered a lack of technical support (server, network, power, etc.) as the greatest factor that prevented them from integrating technology and using online courses in their teaching.

Among the motivational factors for faculty to use technology in e-leaning in Albalwi (2008) study was technical support in solving computer problems (*M*= 2.88, *SD*= 1.19).

Leadership Support

Educational institution leaders' support through a clear technology plan stimulates faculty members to adopt and adapt technology systemically (Buabeng-Andoh, 2012). In order to classify social cognitive factors that influenced a faculty member's decision to integrate technology for teaching and learning, Dusick (1998) found through reviewing the research literature that leadership support was a critical factor for fostering instructors to adopt innovations, even though they might face some classroom environmental obstacles that they could control (Dusick, 1998). Leaders who advocate and implement technology fuel their staff to use technology within the institution's vision. Faculty members in Samarawickrema and Stacey's (2007) research mentioned effective and supportive institutional technology related policies as important enabling factors in their technology uptake. Institutional technology related policies are especially important because there issues that are beyond instructors' abilities while that affect their technology uses such as technology infrastructure (Zhao et al., 2002).

Knowledgeable leaders not only encourage their faculty members to embrace technology, but more importantly they have a clear vision and goals that guide effective technology use (Strudler & Wetzel, 1999; Tondeur et al., 2012). Studies found leadership support is essential in sharing vision, giving individualized support, creating school cultures, identifying and facilitating professional development needs, and involving educators in the decision-making process (Dexter & Riedel, 2003; Ng, 2008). Having a clear vision is a very important factor in the decision of technology integration, as Ertmer (1999) declared that "A vision gives us a place to start, a goal to reach for, as well as a guidepost along the way" (p. 54). At the University of

Wyoming, the College of Education Dean showed her support through different aspects, such allocating grants for offering innovative technologies and setting technology plans based on ISTE/NCATE standards (Strudler & Wetzel, 1999). In addition, collective planning efforts that involved both top management and other staff (teacher educators, instructional technology educators, students, and support personnel within the college and university wide) facilitate successful technology implementation (Afshari et al., 2009; Strudler & Wetzel, 1999; Tondeur et al., 2012). Hew and Brush (2007) noted that "Having a shared vision of learning and teaching can serve as a driving force for overcoming leadership barriers to technology use" (p. 232).

Leadership support was also found to be an important factor for integrating technology by Saudi faculty members. Al-Sarrani (2010) in his recommendation for TU suggested developing a strategic technology plan to help faculty to adopt online or BL courses. Instructors at Qassim University ranked the organizational factors as the most important inhibitors for using WBI (Al Saif, 2005). The mean and standard deviation for the two items related to this inhibitor found were as follows: "lack of administrative, technical, and financial support" (*M*=3.83, *SD*=1.06) and "lack of support and encouragement from the administrators inhibit WBI use" (*M*=3.87, *SD*=0.97).

In B. Kamal's (2013) study, administrators in Arts and Humanities College at King Abdulaziz University were supportive for faculty members who taught online classes as reported by half of the participants in the study, while 21.1% of the participants thought that college administrators were not supportive. Similarly Omar's (2016) study in college of education at King Saud University, found half of participants agreed or strongly agreed in having administrative support at the college and the department to use technology (47% and 50%

respectively), and they also agreed or strongly agreed that college and department administration communicated with them about the value of technology (53% and 56%) (Omar, 2016).

Alharbi (2002) identified support and encouragement from administrators (8.1%) as a factor that encouraged faculty members and administrators to implement online courses, while a lack of technology fund was a barrier that inhibited faculty from implementing online courses (7.8%). Alaugab (2007) found that 34.2% of faculty members indicated the lack of administrative support and encouragement were among the barriers to adopt online courses, while 43.5% of participants indicated that the lack of financial support was a greater barrier. Albalwi (2008) found more than one motivational factor related to leadership support that affected faculty to use technology in e-learning, including funding for materials and expenses (M= 3.07, SD=1.21) and administrative encouragement and support (M= 2.96, SD=1.06).

In conclusion, creating a promising and successful implementation of technology in higher education needs more than a learning environment rich with technology; although important, it is insufficient. The instructor's acceptance and readiness to use technology in their teaching plays a vital role for the best technology integration and motivation of students to use technology in learning (Asiri et al., 2012). Therefore, higher education leaders should consider the role of faculty members as the most important factor and they should strive to support all aspects that can lead to successful technology implementation and eliminate the barriers that they might face (Asiri et al., 2012).

Chapter Summary

As technology usage increases in today's schools, its positive impact on student learning and engagement have been widely noted in literature. However, a digital divide exists not only for K-12 students but also for pre-service teachers; based on a literature review, this divide is not only about those who have access to technology and those who don't, but instead it is about the effective use of technology. Preparing pre-service teachers for teaching in 21st century classrooms is the most critical issue facing teacher preparation programs. Among several strategies that teacher preparation programs have applied to prepare pre-service to be competent in using technology in their future classrooms, one of the best is the effective use of technology by their faculty members. The reviewed studies emphasize that modeling the use of technology by teacher education faculty members in all courses through exposing pre-service teachers to hands-on experiences contributes positively to their preparation as they will feel its importance, believe in it, and will be more likely to integrate technology in future teaching.

For teacher preparation programs to ensure the effective use of technology in their courses, ISTE standards should be applied. ISTE NETS-T standards, which align with constructivism theory, are a road map designed to guide faculty members to create meaningful learning with technology. ISTE standards provide models for integrating technology in the teacher preparation process for integrating technology effectively for improving learning and helping students to possess 21st skills.

Having technology competent faculty members doesn't ensure successful usage. Teacher preparation programs need to consider the factors that influence faculty members' decision in using technology in their teaching and improve their teaching and learning environments. The literatures review indicated various factors (demographic, technographic and contextual) including those that faculty themselves have control over and other factors related to a technology environment. The current study investigated several selected influential factors including faculty attitudes, pedagogical beliefs, technical skills, faculty workload, professional development, technology accessibility, technical support, and leadership support.

In response to the increasingly growing uses of computer, internet, and other related technologies in SA, the Ministry of Higher Education established The Future Plan of Higher Education in Saudi Arabia (Afaq) to help higher education institutions to achieve their goals to improve student's achievement by adapting new instructional strategies supported by optimal utilization of ICT (Ministry of Higher Education, 2009; Ministry of Higher Education, 2010). However, studies indicated that technology integration at higher education institutions remains at levels lower than at optimal.

The College of Education at TU in SA will be investigated in this study. To fulfill the Afaq plan, Tiabah University, through the Dean of Distance Learning, developed its own e-learning plan that aims to reach a distinguished level of e-learning applications. Its plan emphasizes improving faculty members and students in modern e-learning technologies through providing training programs to prepare faculty members for instructional technology usage and offering appropriate facilities and equipment (hardware and software) necessary for e-learning. Therefore, this study examines the College of Education faculty members' practices in using technology effectively and the influential factors that enable them to use technology in order to better understand the state of technology integration in pre-service education.

Chapter 3 - METHODOLOGY

Chapter Overview

This study aimed to explore the current status of technology integration practices of education faculty at Taibah University, in particular to what extent these practices are aligned with ISTE NETS-T standards. The study included an investigation of the factors that influence faculty members' technology integration practices. This chapter will describe all aspects of the research methodology used in this study, including the research questions, the design of the study with its rationale, the research setting, how data was collected and analyzed, the issues related to reliability and validity, and ethical considerations.

Research Questions

Two research questions guided this study. These research questions, along with their accompanying statistical null hypotheses, are listed below:

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

Based on the research questions, the study formulated and tested the following statistical research hypotheses:

H_0 *2.1:* There is no statistically significant relationship between *attitudes towards technology use in teaching* and faculty members' practices in technology integration in their teaching.

H_0 2.2: There is no statistically significant relationship between *pedagogical belief*s and faculty members’ practices in technology integration in their teaching.

H_0 2.3: There is no statistically significant relationship between *technical skill* and faculty members’ practices in technology integration in their teaching.

H_0 2.4: There is no statistically significant relationship between *faculty workload* and faculty members’ practices in technology integration in their teaching.

H_0 2.5: There is no statistically significant relationship between having *technology-related professional development* and faculty members’ practices in technology integration in their teaching.

H_0 2.6: There is no statistically significant relationship between *technology access* and faculty members’ practices in technology integration in their teaching.

H_0 2.7: There is no statistically significant relationship between *technical support* and faculty members’ practices in technology integration in their teaching.

H_0 2.8: There is no statistically significant relationship between *leadership support* and faculty members’ practices in technology integration in their teaching.

Research Design

This study used a quantitative research design. Following the confirmatory scientific method, quantitative research relies on collecting numerical data that can be assigned as values to variables to test predetermined hypotheses (Creswell & Plano Clark, 2011; Gall, Gall, & Borg, 2010; R. B. Johnson & Christensen, 2014). Using deductive reasoning, quantitative research attempts to reach conclusions based on accepting or rejecting the hypotheses because “In quantitative research, it is assumed that cognition and behavior are highly predictable and explainable” (R. B. Johnson & Christensen, 2014, Kindle Locations 1681-1682). Through avoiding biases that occur in qualitative research and using a large-enough number of participants, quantitative research aims to generalize findings from the sample to the whole population through reporting statistically-significant testing. While qualitative research has its own advantages, several studies conducted in Saudi Arabia concluded that quantitative studies are more preferable and doable in that cultural context, especially because interviews as a key qualitative data collection method are not a part of the educational culture in Saudi Arabia (Al-Sarrani, 2010; A. Kamal, 2012; B. Kamal, 2013).

According to B. Johnson (2001), nonexperimental research can be classified based on its objectives and data collection time. Based on the research objectives, nonexperimental research can be classified into descriptive (describing the phenomenon and documenting its characteristics), predictive (predicting some events or issues related the phenomenon), and explanatory (developing or testing a theory related to the phenomenon). Regarding the time dimension, nonexperimental quantitative research is classified into cross-sectional (data are collected at a single point in time), longitudinal (data are collected at more than one time point), and retrospective (data are collected backward in time) (B. Johnson, 2001). The current study applied a nonexperimental cross-sectional predictive quantitative design as data was collected at a single point in time and the research aim was predictive (B. Johnson, 2001). Nonexperimental quantitative design is important in educational research because "there are so many important but non-manipulatable independent variables needing further study in the field of education" (B. Johnson, 2001, p. 3).

Research Setting

This study was conducted in the College of Education at Taibah University in Madinah City, Saudi Arabia. In 1977, this teacher education college was established as the nucleus of the

King Abdul Aziz University at the Madinah branch. At the beginning, the college offered only a bachelor's degree in education, and in 1981 the graduate studies program was established and the college was renamed the College of Education and Human Sciences (Taibah University, 2016b).

The College of Education at Taibah University wants to achieve excellence among Saudi Arabia and Arab teacher preparation programs. To achieve this goal, the college emphasizes Islamic identity, works in partnership with the Saudi and Arab community institutions, and improves personnel in administration, research, and academia. The college also strives for sustainable development and quality in the learning environment in order to achieve "processes of instruction, scientific research, community service, discovering and fostering talents and contributing to the improvement of learning and instruction in the different education stages" (Taibah University, 2016b). Among several values the college of education adheres to are active learning and academic excellence. Fundamental targets of the College of Education are to provide highly qualified graduates in general education and to create a learning environment that is full of creation, excellence, and positive interaction in and outside the college (Taibah University, 2016b).

Participants

This study focuses on how education colleges prepare pre-service teachers to use technology in their future teaching through the modeling of technology use by faculty members and offering enabling factors that make the use of technology possible. Therefore, finding the appropriate participants who could share thoughtful and valuable information that address the research questions is a basic step in the inquiry process (Creswell & Plano Clark, 2011; R. B. Johnson & Christensen, 2014). The researcher contacted many Saudi Arabian colleges of education to get permission to conduct the study until she was welcomed by the College of

Education at Taibah University (see Appendix A for the permission letter). Taibah University's Dean of the College of Education thought the study would be beneficial as it could help in investigating the status quo of using technology in the college and to what extent these factors are available in the college considering that the Ministry of Higher Education plan "Afaq" emphasizes technology integration for instructional purposes. In addition, Taibah University established the Distance Learning Deanship (DLD) to improve online learning among all colleges by designing the infrastructure of online learning for the university. DLD strategies aim to prepare faculty members to integrate technology in both online and blended learning. It also prepares interactive e-curriculum materials to improve student learning and offer the infrastructure (hardware and software) needed for technology integration (Taibah University, 2016c).

The target population for this study was faculty members in the College of Education at Taibah University in Saudi Arabia. The participants included both male and female professors, associate professors, assistant professors, lecturers, and teaching assistants from different department in the college. At the time of this study, based on the college database, the total number of potential participants was 257, which included 180 professors, associate professors, and assistant professors, 33 lecturers, and 44 graduate teacher assistants. Among the 257 were 160 males and 97 females (See Table 3.1). In Saudi Arabian universities, lecturers and teaching assistants have full time positions and similar teaching duties (except for teaching graduate courses and conducting research); also, they are accorded faculty status upon doctoral degree completion (Al-Sarrani, 2010).

Table 3.1 *College of Education Faculty Members at Taibah University*

Faculty Members	Males	Females
Professor	28	4
Associate Professor	44	4
Assistant Professor	48	52
Lecturer (Master's degree holders)	16	17
Graduate Teacher Assistant (Bachelor's degree holders)	24	20
	160	97
Total	**257**	

The College of Education has eight departments: Curriculum and Instruction, Educational Foundations, Educational Psychology, Educational Administration, Special Education, Art Education, Physical Education, and Educational Technology. As education in Saudi Arabia is a segregated system, each department has two divisions, one at the male campus and the other at the female campus, except for Physical Education, which is only found in the male campus (See Table 3.2).

Table 3.2 *Numbers of Faculty Members Based on Departments*

Departments	Number of faculty	Departments	Number of faculty
Curriculum and Instruction	89	Special Education	29
Educational Foundations	21	Art Education	20
Educational Psychology	32	Physical Education	20
Educational Administration	26	Educational Technology	20
Total = 275			

Sampling

Sampling is "the process of drawing a sample from a population" (R. B. Johnson & Christensen, 2014, p. 248). When the whole population is too large to be investigated, sampling becomes essential. A sample should be carefully selected so it is representative of the population in order to make an appropriate generalization from the sample to the whole group (R. B. Johnson & Christensen, 2014). Being able to investigate every individual in the population makes the generalizability more accurate. In addition, the larger the sample size, the better the study is, especially for statistical analysis accuracy, as Creswell and Plano Clark (2011) emphasized: "The sample size needed for a rigorous quantitative study is typically quite large. The sample needs to be large enough to meet the requirements of statistical tests" (p. 175). The same situation is true for regression analysis. Field (2013) noted that "it's important to collect enough data to obtain a reliable regression model" (p. 313). Different rules of thumb are found in the literature. In general, it is indicated that a researcher needs to have 10 or 15 cases per predictor to get a high-enough level of statistical power or effect (larger *R*) (Field, 2013). Therefore, in this study the whole population was surveyed considering the response rate and missing data issues. This type of research is called a census study because information is collected from every individual in the population (R. B. Johnson & Christensen, 2014, p. 248).

Data Collection Methods

Through collecting data properly, a researcher tries to insure that the information gathered addresses the research questions in the study (Creswell & Plano Clark, 2011). This study collected data using a cross-sectional electronic survey that includes closed-ended questions. The survey items focused on examining faculty members' practices in integrating technology in their teaching based on ISTE standards; it also examined the influential factors that affect their technology integration practices.

A survey is defined as "a set of questions in paper-and-pencil or computer format that typically measure many variables" (Gall et al., 2010, p. 133). It is also defined as a direct way to gather required information from participants, which Fink (2009) defines as "information-collection methods used to describe, compare, or explain individual and societal knowledge, feelings, values, preferences, and behavior" (p. 1). Considering the recent advancement in using technology in the College of Education at TU, especially in communication between faculty members (e.g., official university email accounts, college WhatsApp group), the college's officers (in recent communication after proposal approval) suggested that using the electronic version of the survey was preferred and could be sent to faculty members through their official email and the college's WhatsApp group. Developing appropriate survey items came from analyzing previous studies, revising several surveys, and reviewing the literature.

Instrument Elements

The survey used in this study addresses two purposes. The first purpose was to examine the faculty members' practices in integrating technology effectively in their teaching based on ISTE standards for teachers and the enabling factors that influence their practices. The second purpose was to collect data related to participants' demographic information. The entire survey involves three sections. Sections I and II include items that focus on the study purposes while section III is related to demographic information. The survey uses a five point Likert rating scale (Strongly Agree= 5, Agree= 4, Neutral= 3, Disagree= 2, Strongly Disagree= 1) where participants chose the answer that best reflects their opinion based on the wording of each item. (See Appendix C for the English version of the survey.)

- Section I examines faculty technology integration practices using ISTE-NETS-T Standards. It contains items 1-10, which address faculty members' effective use of technology in their teaching practices.
- Section II examines factors that influence faculty members in technology integration. It includes eight subsections (A-B-C-D-E-F-G-H) that examine the enabling factors that influence faculty members' teaching practices in using technology effectively.

- Subsection A contains items 11-17, which examine faculty attitudes towards technology integration in teaching. It contains items 11-17.
- Subsection B contains items 18-24, which examine faculty pedagogical beliefs that harmonize with constructivist practices and support high-level technology use.
- Subsection C contains items 25-30, which examine faculty technical skills that are related to the knowledge and skills needed to use technology tools, including how to select and operate them in addition to the best conditions for their operation.
- Subsection D contains items 31-35, which examine faculty workload that are related to time and efforts required when integrating technology.
- Subsection E contains items 36-43, which examine faculty professional development that are related to the types of preparation faculty needs to use technology effectively.
- Subsection F contains items 44-50, which examine faculty technology accessibility that are related to software, hardware, and other tools needed to help faculty members and students use technology easily and efficiently.
- Subsection G contains items 51-53, which examine faculty technical support that are related to support that faculty or students need for trouble shooting.
- Subsection H contains items 54-59, which examine faculty leadership support that are related to the support faculty members need from administration staff at different levels.

- Section III contains items 60-66, which examine demographic information including age, gender, department, country of graduation, years of teaching experiences, academic rank, and the type of student populations that faculty teach.

Survey Resources and Permissions to Use

To design the study instrument, the researcher reviewed, examined, and benefitted from research related to the scope of the study. After deciding which items from this research could be used to compile the current study instrument, the researcher contacted the authors of these studies for use permission. Modifications were made to some of the extracted items so that they were worded appropriately for the current study's scope.

Section I of the survey, items 1-10, was extracted from A. Kamal's (2012) study, who built his survey items after extensive revision of ISTE standards for teachers. His study focused on examining the alignment of participants' technology uses with these standards. With 710 valid responses, the study found a high reliability coefficient for this section ($\alpha = .95$) (A. Kamal, 2012) (See Appendix F for permission).

Section II of the survey, items 11-17, were extracted from the "Faculty Attitudes toward Information Technology" (FAIT 1.1) survey that was first modified by Knezek (1998) after extensive analysis and then validated by several studies, especially Elizabeth (1998) who found the total reliability of the scale as .7 in his dissertation study. FAIT was drawn from a subset of the "Survey of Teachers' Attitudes toward Computers," which is 99-199 items designed by Knezek and Christensen (1998) (Institute for the Integration of Technology into Teaching and Learning (IITTL), 2016). The FAIT uses 68 items on a five point Likert instrument to gather data on five factors (See Appendix G for permission).

In section II, items 18-20 were drawn from Hakim (2015) (See Appendix H for permission), while items 21-24 were extracted from A. Kamal (2012); both studies examined instructors' constructivist pedagogical beliefs and practices. Items 25-29, 52-53, and 56-57 were extracted from the "National Survey of Teacher Education Programs" (Voithofer, 2015), which was designed by Voithofer (See Appendix I for permission). The survey aimed to understand the state and direction of technology integration preparation in accredited teacher preparation programs. Items 36-42, 45-48, and 51 were revised from Yidana (2007), who examined attitudes and professional development needs of faculty members in integrating technology (See Appendix J for permission). Items 58-60 were revised from Petherbridge (2007), who explored the influence of selected variables on faculty members' concerns in the LMS adoption in a higher educational setting. Stepwise regression analysis was used to identify potential predictive variables (e.g., administrative support and professional development needs) of faculty members' concerns regarding the use of LMSs (See Appendix K for permission). Items 30-35, 43, 44, 47, 49, 50, 54, and 55 were formulated by the researcher. For more information about the connection between survey items and sources they were extracted from (See Appendix L).

Validity

Content Validity

Validity indicates "whether an instrument actually measures what it sets out to measure" (Field, 2013, p. 11). Content or face validity is one important criteria for a good instrument (Gay, Mills, & Airasian, 2009). It "assesses the degree to which individual items represent the construct being measured" (Field, 2013, p. 12). Content validity can be achieved through an expert review panel (Gay et al., 2009). Based on Tashakkori and Teddlie (1998), one strategy to establish content validity is "to ask 'experts' to help you judge the degree to which a particular measurement instrument seems to measure what it is supposed to measure" (p. 81). Through this review process, a solid instrument is built as experts in the field make sure the questions are representative of the tests that the research wants to examine (Fink, 2009). As a valid survey offers accurate information, it is important to validate the survey through examining its content and making sure that all items accurately represent the characteristics they are intended to measure (Fink, 2009).

Expert Review Panel

Initially, the survey was reviewed by four faculty members in the College of Education at Kansas State University who are experts in technology and quantitative research. First, the survey was reviewed by the researcher's dissertation co-chair, Dr. Kang, who specializes in the area of adult online education. The second reviewer was Dr. Talab, who specializes in educational technology and has more than 30 years of experience in teaching technology courses and supervising doctoral students with a technology focus. The third reviewer was Dr. Subramony, who specializes in the area of culturally relevant/cognizant technology use and instructional systems design. Finally, the survey was reviewed by the researcher's major advisor, Dr. Allen, who specializes in mathematics education with a quantitative research focus. The survey items were modified and updated after receiving comments and suggestions from these experts.

Once the English language version of the survey was confirmed by experts, the researcher translated the survey into the Arabic language since the participants' first language is Arabic (See Appendix E). In order to ensure translation accuracy, the survey was reviewed by a Saudi academic (Dr. A. Kamal). Dr. A. Kamal has his doctoral degree in Curriculum and Instruction from the Kansas State University and is familiar with technology terminology in both languages. The Arabic version of the survey was then emailed to three reviewers in Saudi Arabia to review its validity and appropriateness for the goals of the study, especially for the study setting. Expert panel members were asked to examine the survey's organization, design, wording, grammar, clarity of directions given, and most importantly, representativeness and relevance of the items being tested (Fink, 2009). The first reviewer was Dr. Al Motari, the dean of University Development from the College of Education at Taibah University. He has his doctoral degree in Curriculum and Instruction from the University of Kansas and he has a Master's degree in Educational Psychology and Research that focuses on educational measurements and quantitative methods. The second reviewer was Dr. Faqeehi from Jazan University, who has a doctoral degree in Educational Communication in Technology from the University of Kansas. The third reviewer was Dr. Al-Alwani, who has a doctoral degree in Educational Communication in Technology from the University of Kansas. He was the dean of Yanbu University College and is currently the chair of the Educational Technology and Innovation department while being a visiting scholar in the eLearning Design Lab at The University of Kansas.

The survey was revised and updated based on the Saudi academics' feedback and comments. Revisions included rewriting some items to be more accurate and to ensure consistency between items. Saudi reviewers also suggested adding some English terminology to ensure that participants would not get confused. Also, some Arabic grammar was modified. Finally, based on their suggestions, one item was also shortened and one item was deleted since its idea was repeated in another item.

Internal Validity Threats

Internal validity is "the basic minimum without which any experiment is uninterpretable" (Campbell & Stanley, 1963, p. 5). Since this study used a survey that was given to participants at one time and there was no pretest or treatment, several internal validity threats mentioned by Campbell and Stanley (1963) were controlled for, such as history, maturation, testing, and instrumentation. Statistical regression threat was also controlled for since there was no selection of participants and instead the whole population was examined. Mortality or attrition might be an internal threat for the study if some participants had decided not to complete the survey items (Gay et al., 2009).

External Validity Threats

External validity "asks the question of generalizability: To what populations, settings, treatment variables, and measurement variables can this effect be generalized?" (Campbell & Stanley, 1963, p. 5). Therefore, the more less control on internal validity threats, the more generalizable the results become (Campbell & Stanley, 1963; Gay et al., 2009). One external threat that could affect the generalizability of the study findings is the Hawthorne effect, which happens when participants answer improperly as they change their behavior, attitudes, feeling, or perceptions just because they know they are part of a study (Campbell & Stanley, 1963; Fink, 2009; Gay et al., 2009). Another external threat that could affect the validity of the study is the reactive effect, which occurs as a result of introducing participants to a new intervention, such as a workshop or new technology tool, just before or during the distribution of the survey (Campbell & Stanley, 1963; Fink, 2009; Gay et al., 2009).

Reliability

Similar to validity, reliability is another characteristic of a good questionnaire; both of them are important to consider. A reliable instrument produces consistent participant responses regardless of their background fluctuations (Creswell & Plano Clark, 2011; Fink, 2009), as it "reflects the true score- one that is free from random errors" (Fink, 2009, p. 41). Different strategies can be used to examine a questionnaire's reliability, including test-retest, alternative forms equivalence, and internal consistency (Fink, 2009). As a reliable survey provides consistent information, the current study applies internal consistency to measure reliability where the coefficient alpha (Cronbach's alpha) is calculated. This strategy is the most suitable for this study because the survey uses several items to measure one characteristic. Based on Fink (2009), Cronbach's alpha measures "how well different items complements each other in their instrument of the same quality or dimension" (p. 42). Reliability coefficients of .50 or above are acceptable (Fink, 2009).

Pilot Study

Pilot testing is important in establishing reliability and content validity as it helps in improving the questions, format, and scales of an instrument (Fink, 2009; Gall et al., 2010). In this study, the instrument was distributed to a sample of 16 faculty members in the College of Education at Al Taif University in Saudi Arabia. Those participants were not involved as part of the main study population; however, they are similar to them (Creswell & Plano Clark, 2011; Fink, 2009). Fink (2009) advised researchers to "choose respondents similar to the ones who will eventually complete the survey" (p. 44).

These pilot-test participants were asked to complete the instrument and comment about the clarity of the questions, directions provided, leading questions, and length of the survey (Fink, 2009). The researcher sent an email to the participants in the pilot study to explain the pilot study procedure (see Appendix M) and provide the link to the online version of the instrument. There were no major modifications made as all items were answered, none of the items were answered by choosing more than one answer, and no written comments were provided (Fink, 2009). Cronbach's alpha coefficient was calculated to find the reliability of each section of the survey as well as the reliability of the whole survey to ensure the survey's consistency. The highest value found was the faculty members' technology integration practices based on ISTE NETS-T (alpha equals .963) while the lowest value found was the pedagogical beliefs with alpha equals .654. The reliability of the whole survey was .817, which means the instrument was reliable (See Table 3.3).

Table 3.3 *Pilot Study Cronbach's alpha Values*

Section	Cronbach's alpha Value
ISTE NETS-T	.963
Attitudes	.714
Pedagogical Beliefs	.654
Technical Skills	.836
Workload	.843
Professional Development	.766
Accessibility	.769
Technical Support	.806
Leadership Support	.765
Total Survey Items	.817

Survey Administration

Before distribution, the survey was first approved by the researcher's advisors. Then the Arabic version of the survey was reviewed by experts (a review panel) from the College of Education at Taibah University. Next, a pilot study was conducted as the survey was sent to the participants from College of Education at Taif University. After the final version of the survey and the whole proposal received approval from the dissertation committee members, the survey was approved by the IRB committee (See Appendix N).

On February 6, 2017, the data collection process started. The link of the web-based survey was sent to the Assistant Dean of College of Education at Taibah University to allow for distribution. Also, the invitation letter and consent form were emailed to all College of Education faculty members. Faculty members were given one week to respond to the survey. At that point, February 13, 2017, a follow-up WhatsApp reminder message was sent to the Assistant

Dean asking him to send an email reminder to all faculty members, because the response rate thus far was low (28 responses only). This reminder increased the responses to 58. The researcher asked the College of Education for an updated list of faculty members' contacts. At the beginning of the third week, February 22, 2017, the researcher sent a WhatsApp message to each department head, requesting him to send the survey link to faculty members in their deportments and encourage them to participate in the study. Department heads were very cooperative and responded to the researcher with supportive messages; however, responses increased by only four more. Therefore, two days later, February 24, 2017, the researcher contacted all faculty members directly through personalized emails that included each faculty member's name and title. To those for whom the emails were undeliverable, the researcher sent personalized WhatsApp messages to encourage them to participate in the study. These direct, personalized emails and WhatsApp messages increased the number to 108 responses. At the beginning of the fourth week, March 3, 2017, the researcher emailed all faculty members to remind them about the study and to encourage their participation. Two days later, the researcher contacted the department heads for the second time via WhatsApp to remind them to encourage faculty participation. These latest reminders improved the number slightly as it reached 120 responses. As the number of female participants was significantly less than males, the researcher emailed the Assistant Dean for the female section to encourage female faculty members to participate in the study. Unfortunately, she did not respond. Upon this the researcher contacted the secretary of the female section via phone who was very helpful and sent the survey link to the WhatsApp female faculty members' group. However, the researcher did not get any new responses. After that, at the beginning of the fifth week, March 10, 2017, the researcher sent an email to the College's Assistant Dean asking him to send a final reminder and encouragement for all faculty members (male and female) to participate in the study. Meanwhile, the researcher contacted all faculty members directly via WhatsApp through personalized messages. This method worked well as it increased the number of participants to 174 within five days. The data collection process took place in 40 days.

Data Analysis

This study aimed to investigate to what extent faculty members' technology integration practices aligned with ISTE NETS-T standards and the factors that influence their decision to integrate technology in teaching. The study conducted was a nonexperimental cross-sectional predictive quantitative design. Data was analyzed following a five-set procedure including data preparation for analysis, data exploration, data analysis representation, data interpretation, and validation of data (Creswell & Plano Clark, 2011).

Two types of analysis were proposed for quantitative data, including descriptive statistics and inferential analysis. Means, modes, standard deviations, and frequencies were determined, and multiple regression analysis was conducted to determine the strength of correlation between the predictor variables and faculty members' perception of their practices in instructional technology integration in their teaching. The following linear stages were applied to analyze data.

Data preparation. First, the researcher coded data by assigning numeric values so it would be ready for analysis using the Statistical Package for Social Sciences (SPSS) software. The first and second sections of the survey used a Likert scale with five options (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5) for participants' responses to report their level of agreement with the items.

Data exploration. During the exploring stage, data were screened for normality, linearity, outliers, homoscedasticity, multicollinearity, and freedom from independent errors. The internal consistency reliability of the data was tested by computing Cronbach's alpha coefficient. Items consistently measuring behaviors from the same domain should have an internal consistency reliability coefficient of .50 or better (Fink, 2009).

Data analysis. Following this, data were analyzed using descriptive analysis and multiple linear regression to test the eight hypotheses of the study. The findings were summarized and represented in statistical statements, tables, and figures.

Data interpretation and validation. In quantitative research, the interpretation stage means comparing the results with the primary research questions asked to determine how the question or hypotheses were answered in the study. It also means comparing the results with prior predictions or explanations drawn from past research studies or theories, which provide explanations for what the researcher has found (Creswell & Plano Clark, 2011).

Independent and Dependent Variables

- The independent (predictor) variables (IV) in this study were the College of Education enabling factors (attitude toward technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support)
- The dependent (criterion/outcome) variable (DV) in this study was faculty instructional practices in integrating technology based on ISTE NETS-T standards in Taibah University's College of Education.

Table 3.4 *Independent and Dependent Variables and Their Related Survey Items*

Research question	Dependent Variables	Data Scale	Independent Variables	Data Scale	Section	Survey Items	Data Analysis
RQ1	Faculty instructional practices in integrating technology based on ISTE NETS-T Standards	Interval			Section I	1-10	Descriptive
RQ2	Faculty instructional practices in integrating technology based on ISTE NETS-T standards (1-10) Total mean	Interval	Faculty Attitudes toward technology use	Interval	Section II-A	11-17	Descriptive & Multiple Regression
			Pedagogical beliefs	Interval	Section II-B	18-24	
			Technical skills	Interval	Section II-C	25-30	
			Workload	Interval	Section II-D	31-35	
			Technology related-Professional Development	Interval	Section II-E	36-43	
			Accessibility	Interval	Section II-F	44-50	
			Technical support	Interval	Section II-G	51-53	
			Leadership support	Interval	Section II-H	54-59	
	Demographic Information				Section III	60-66	Descriptive

Descriptive Analysis

Descriptive statistics (frequency distributions, percentages, means, modes, and standard deviations) were computed to determine faculty members' instructional practices in integrating technology based on ISTE NETS-T standards. This type of analysis helps in summarizing the responses of the intended questions (Fink, 2009). In this study, descriptive statistics were applied to summarize the data in sections I, II, and III of the survey. In section I, the descriptive statistics summarize faculty members' technology integration practices in their teaching based on ISTE NETS-T standards. In section II, descriptive statistics summarize faculty members' responses to technology integration influential factors. In section III, descriptive statistics provide a summary of the participants' demographic data. Reporting means, modes, and standard deviations help in understanding the data behavior, especially its central tendency and variations. In addition, frequencies give an idea about how technology is used by faculty members and for what purposes based on the ISTE NETS-T standards.

Multiple Linear Regression Analysis

Multiple linear regression is a predictive analysis used to model the relationship between a dependent variable (outcome) and multiple independent variables (predictors), which help in predicting the future (Field, 2013). Tabachnick and Fidell (2007) defined multiple regression as "a set of statistical techniques that allow one to assess the relationship between one DV and several IVs" (p. 117). Based on the equation of a straight line, multiple regression quantifies the relationship between the outcome and predictors. This relationship can be either positive or negative (Field, 2013). Through calculating R^2, this type of analysis helps in finding how much of the variance in the outcome is accounted for or explained by the regression model and the relative contribution of each predictor in the total variance (Field, 2013). While several methods of regression can be used, this study used the forced entry (standard) method where all predictors, which were chosen based on the literature review, were forced to the regression model at the same time since there is no theoretical background that indicates the importance of one predictor over the other (Field, 2013; Tabachnick & Fidell, 2007). The model was examined for significance at a .05 level.

Multiple linear regression assumptions. Before regression analysis, data must be assessed for several assumptions to ensure that data is appropriate to be analyzed using linear regression (Field, 2013). While the dependent factor should be continuous (interval or ratio scale), the independent factors can be ratio, interval, or nominal as long as it is a binary/dicotmouse type (e.g., male and female). Data must also be examined for linearity where the outcome variable is linearly related with each predictor (Field, 2013). Linearity is examined using the scatterplot in SPSS where oval-shaped indicates linearity (Tabachnick & Fidell, 2007). Variables should be also normally distributed, which can be ignored for a large sample data as Field (2009) and Tabachnick and Fidell (2007) assert. Linear regression also assumes homoscedasticity at each level of predictors (have the same variance). Normality, homoscedasticity, and linearity can be examined using the standardized residuals versus standardized predict values in SPSS (residual scatterplots) (Tabachnick & Fidell, 2007) where the graph "should look like a random array of dots, if the graph funnels out then that is a sign of heteroscedasticity and any curve suggest non-linearity" (Field, 2013, p. 348). Data should be free of independent errors (uncorrelated). Independent errors in this study were examined by running the Durbin-Watson test. Values of this test vary between 0 and 4, where values less than one or greater than three indicate concern (very conservative rule) (Field, 2013). Predictor variables in multiple regression should not be strongly correlated (multicollinearity) (Tabachnick & Fidell, 2007). Highly correlated variables have a correlation coefficient greater than .80 or .90 (Field, 2013). Multicollinearity was tested using the Variance Inflation Factor (VIF). The critical VIF value should be less than 10 to prove the absence of multicollinearity (Field, 2013). Finally, data should be checked for outliers using Mahalanobis distance or Cook's distance tests (Field, 2013; Tabachnick & Fidell, 2007).

Protection of Human Subjects and Ethical Considerations

To meet the guidelines of the Kansas State University Committee for Research Involving Human Subjects, the researcher submitted an Application for Approval to the Institutional Review Board (IRB) prior to the study (See Appendix N). In order to receive this approval, the researcher completed the six IRB training modules for personnel proposing to conduct research involving human subjects, the International Research, the IRB Researchers and personnel on IRB protocols, and the Responsible Conduct of Research. A consent form for participants was given to participants with the required information to make an informed decision on whether to participate in the research study, especially noting that no specific personal information was required, which reduces the amount of discomfort as a result of participating in the study. After the researcher received approval from the IRB, participants were informed that their identities and survey responses would be kept confidential by the researcher and electronic data would be entered into SPSS by the researcher. Participants were also informed that the study's results would be available to them upon request. For the individual consent form, see Appendix B for the English version and Appendix D for the Arabic version.

Summary

This chapter introduced the research questions and explained why a quantitative research design was the best fit for these questions. It then provided an overview of the research methodology. The data collection instrument, a survey, was designed for collecting quantitative data through closed-ended questions. The survey was distributed to the whole population, which included 257 male and female faculty members in the College of Education at Taibah University. The chapter also discussed the study's use of descriptive analysis and inferential multiple linear regression analysis to analyze quantitative data collected in order to determine the greatest influential factors that predict faculty members in integrating technology in teaching based on ISTE standard for teachers. In Chapter 4, the researcher will discuss the findings of the study.

Chapter 4 - DATA ANALYSIS AND FINDINGS

Chapter Overview

This study investigated the gap between faculty members' technology integration practices and ISTE NETS-T standards in the College of Education at Tiabah University. The study also examined eight factors that influence faculty members' technology integration practices in their teaching (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support). The study used a web-based survey to collect data that contained 66 closed-ended items.

This chapter presents data analysis and findings in four sections. The **first section** discusses missing data, data screening for multiple linear regression assumptions, and results of survey items' reliability. **The second section** first presents descriptive analysis through reporting frequencies and percentages of participants' demographic information (age, gender, department, country of graduation, years of teaching experience, academic rank, and students population you teach) and is followed by a summary of the descriptive statistics (mean, mode, median, and standard deviation) for the dependent and independent variables used in the study. The **third section** focuses on research question one through presenting detailed descriptive statistics of faculty members' technology practices based on ISTE NETS-T standards. **The fourth section** focuses on research question two, which tested the predicting factors of faculty members' technology integration practices. The section summarizes multiple linear regression analysis results to test the eight hypotheses related to research question two. Data analyses were conducted using SPSS package 24. Results are summarized in tables and charts.

Research Questions and Null Hypothesis

Two research questions guided this study. These research questions, along with their accompanying statistical null hypotheses, are listed below:

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

Based on the research questions, the study formulated and tested the following statistical research hypotheses:

H_0 *2.1:* There is no statistically significant relationship between *attitudes towards technology use in teaching* and faculty members' practices in technology integration in their teaching.

H_0 *2.2:* There is no statistically significant relationship between *pedagogical beliefs* and faculty members' practices in technology integration in their teaching.

H_0 *2.3:* There is no statistically significant relationship between *technical skill* and faculty members' practices in technology integration in their teaching.

H_0 *2.4:* There is no statistically significant relationship between *faculty workload* and faculty members' practices in technology integration in their teaching.

H_0 *2.5:* There is no statistically significant relationship between having *technology related professional development* and faculty members' practices in technology integration in their teaching.

H_0 2.6: There is no statistically significant relationship between *technology access* and faculty members' practices in technology integration in their teaching.

H_0 2.7: There is no statistically significant relationship between *technical support* and faculty members' practices in technology integration in their teaching.

H_0 2.8: There is no statistically significant relationship between *leadership support* and faculty members' practices in technology integration in their teaching.

Data Screening

Before starting the data analysis stage, data should be first screened for missing data and assumptions of the specific analysis (multiple regression) should be diagnosed (Field, 2013; Tabachnick & Fidell, 2007). This screening helps in avoiding any problem might occur during the analysis stage and ensure proper analysis (Field, 2013; Tabachnick & Fidell, 2007).

Missing Data

The electronic survey was sent to the 257 faculty members of the College of Education at Taibah University. The researcher received 174 responses, a 68% response rate. Four responses were deleted as most of the items were left blank. Tabachnick and Fidell (2007) emphasized that "Deletion of cases is a reasonable choice if the pattern appears random and if only a very few cases have missing data" (p. 71). Based on the Frequencies analysis results, 22 scattered missing data were found in the main survey items (excluding the demographic data). These items were replaced using the mean substitution technique. The overall mean of the specific item was calculated from the available data and used to replace the missing data (Pigott, 2001; Tabachnick & Fidell, 2007). In the demographic data (items 60-66) the number of scattered missing data was 34; fortunately these data do not affect the main analysis of the study (regression analysis), and therefore they were included in the study without any replacement and will be mentioned in the descriptive analysis section. The final number of valid responses in the study was 170, a 66% response rate.

Multiple Linear Regression Assumptions Diagnoses

After cleaning the data, they were examined for the assumptions required for the multiple linear regression analysis mentioned in chapter three. Multicollinearity was tested through looking at the values of the correlation coefficient between predictors, the highest value found was between attitudes and pedagogical beliefs (r= .58, p < .00), which indicated that predictors chosen are measuring different things and there is an absence of multicollinearity (Field, 2013). Absence of multicollinearity was also confirmed by the Variance Inflation Factor (VIF) values, which were much smaller than the critical value of 10 (the highest VIF value found was 1.93 for professional development factor). The Durbin-Watson test was used to ensure that the data were free of independent errors. The Durbin-Watson value found was 1.96, which indicates that the data was free of independent errors (uncorrelated), as Field (2013) asserted that "the closer to 2 that the [Durbin-Watson] value is, the better" (p. 337).

Homoscedasticity and linearity were examined using the residual scatterplots of standardized residuals versus standardized predicted values in SPSS (Field, 2013; Tabachnick & Fidell, 2007). Points in the graph (Figure 4.1) are randomly dispersed through the plot (no funnel shape noticed), which indicates that the assumptions of linearity and homoscedasticity were met.

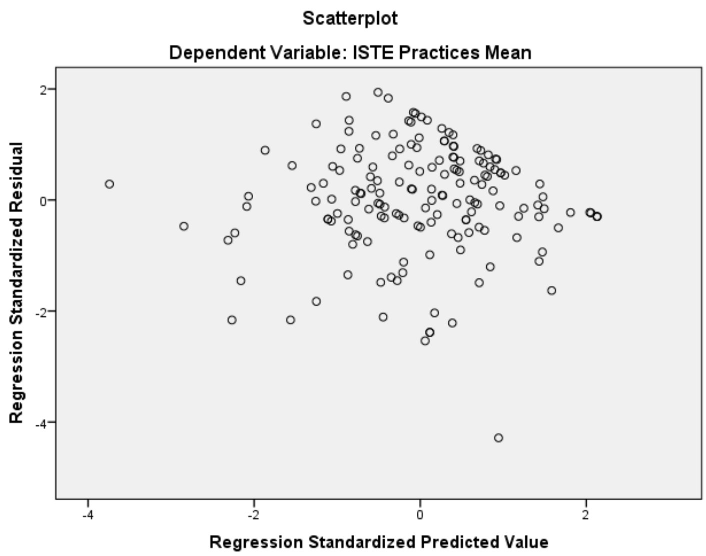

Figure 4.1. Residual scatterplots of standardized residuals vs. standardized predicted values

Regression analysis assumes normally distributed variables, which can be ignored in the case of a large sample size (Field, 2013; Tabachnick & Fidell, 2007). However, the histogram of the residual was almost normally distributed (bell shaped) (Figure 4.2). Moreover, the normal probability plot of the residuals indicated normality as most of the dots lie almost exactly on the diagonal (Figure 4.3).

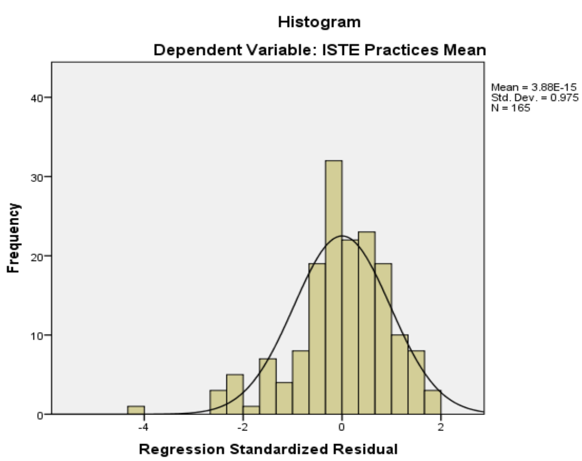

Figure 4.2. Residuals histogram

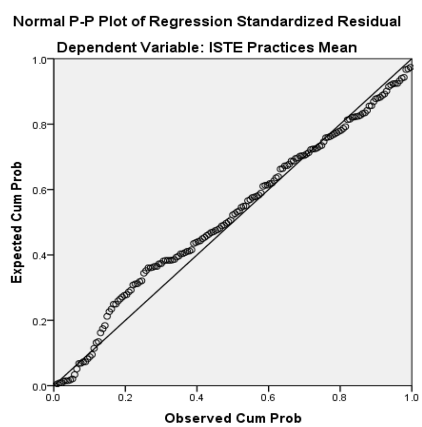

Figure 4.3. Residuals probability plot

Finally, outliers were examined through Cook's distance test. No outlier was found as Cook's values for all items were less than 1 where the highest value found was .11. Field (2013) asserted that "[If] Cook's distance is < 1, there is no real need to delete the point since it does not have a large effect on the regression analysis" (p. 309).

Reliability of Survey Items

Running reliability analysis for the survey items revealed the instrument was highly reliable with Cronbach's alpha value equaling .812. The highest value found was leadership support (alpha equals .955) while the lowest value found was technology accessibility with alpha equaling .612 (See Table 4.1).

Table 4.1 *Survey Items Cronbach's alpha Values*

Section	Cronbach's alpha Value
ISTE NETS-T	.911
Attitudes	.849
Pedagogical Beliefs	.737
Technical Skills	.850
Workload	.889
Professional Development	.816
Accessibility	.620
Technical Support	.858
Leadership Support	.955
Total Survey Items	.812

Descriptive Analysis

Respondents' Characteristics

To explain the study population, the researcher asked respondents to answer seven items that focused on their demographic information, including age, gender, department, country of graduation, years of teaching experience, academic rank, and student population taught by the faculty member. Descriptive statistics including frequencies and percentages will be reported in tables and charts.

Gender

Results showed that more males (55.3%) participated in the study than females (41.2%) while 3.5% did not report their gender (See Table 4.2 and Figure 4.4).

Table 4.2 *Gender of Respondents*

Gender	Frequency	Percentage
Male	94	55.3%
Female	70	41.2%
Missing	6	3.5%
Total	**170**	**100**

Figure 4.4. Gender of respondents

Age

Table 4.3 and Figure 4.5 show that the highest percentage (23.5%) of participants was in the age range of 40-44 years old followed by the age group of 50 and above (20.6%); 19.4% were in the age range 45-49; 15.3% were in the age range 35-39; 11.8% were in the age range 30-34; and the lowest percentage (9.4%) was in the range of less than 30 years old.

Table 4.3 *Age Frequencies and Percentages*

Age Range	Frequency	Percentage
less than 30	16	9.4%
30-34	20	11.8%
35-39	26	15.3%
40-44	40	23.5%
45-49	33	19.4%
50 and above	35	20.6%
Total	**170**	**100%**

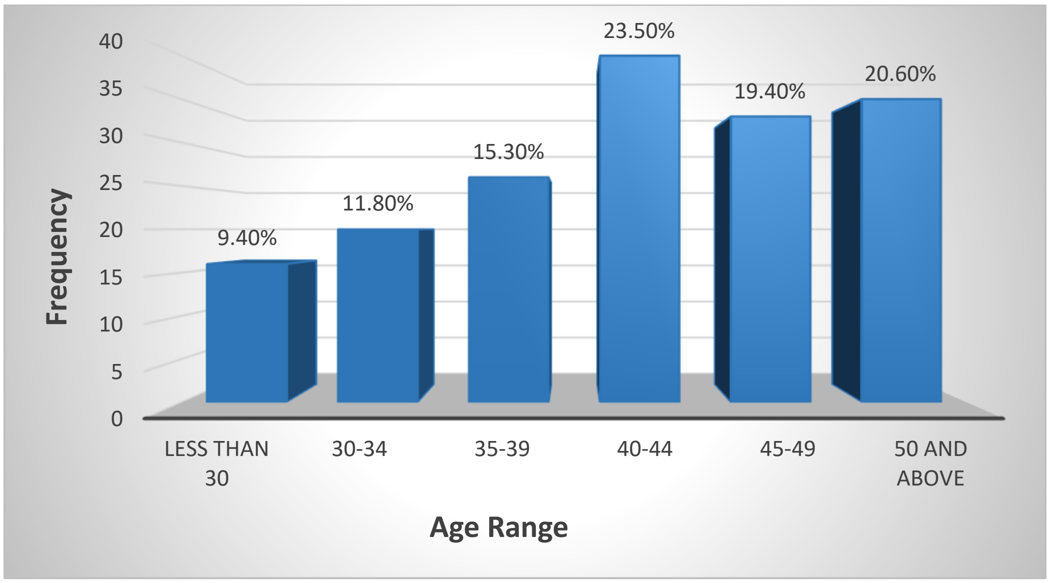

Figure 4.5. Age frequencies and percentages

Department

Figure 4.6 and Table 4.4 show that the highest number of participants was from the Curriculum and Instruction department with 47 responses (27.6%), followed by Special Education department with 24 responses (14.1%), Art Education department with 16 responses (9.4%), Educational Technology department with 15 responses (8.8%), Psychology department with 15 responses (8.8%), Fundamentals of Education department with 13 responses (7.6%), and Physical Education department with 12 responses (7.1%). The lowest number came from the Educational Administration department with 11 responses (6.5%). Seventeen participants (10%) did not respond. Though participants' responses and percentages of some departments seem low, they almost reflect the number of faculty in the department. For example, though the

Physical Education department response rate was only 12 (7.1%), this number represents 60% of the 20 total faculty members in the department.

Table 4.4 *Respondents Departments*

Department	Frequency	Percentage
Curriculum & Instruction	47	27.6%
Fundamentals of Education	13	7.6%
Educational Administration	11	6.5%
Educational Technology	15	8.8%
Art Education	16	9.4%
Physical Education	12	7.1%
Psychology	15	8.8%
Special Education	24	14.1%
Missing	17	10.0%
Total	**170**	**100%**

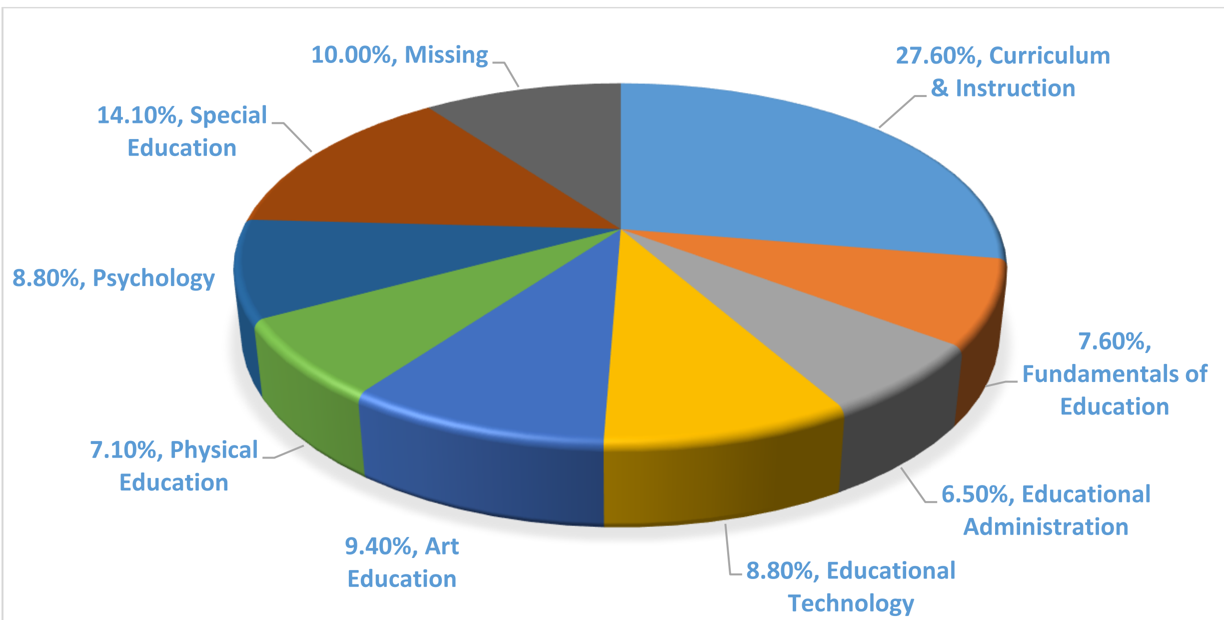

Figure 4.6. Respondents' departments

Country of Graduation

Table 4.5 and Figure 4.7 present that most of the participants got their last degree from Arab institutions (71.2%) while 24.7% graduated from non-Arab countries. Seven respondents did not report which country they gained their last degree from.

Table 4.5 *Country of Graduation*

Country of Graduation	Frequency	Percentage
Arab Country	121	71.2%
Non-Arab Country	42	24.7%
Missing	7	4.1%
Total	**170**	**100%**

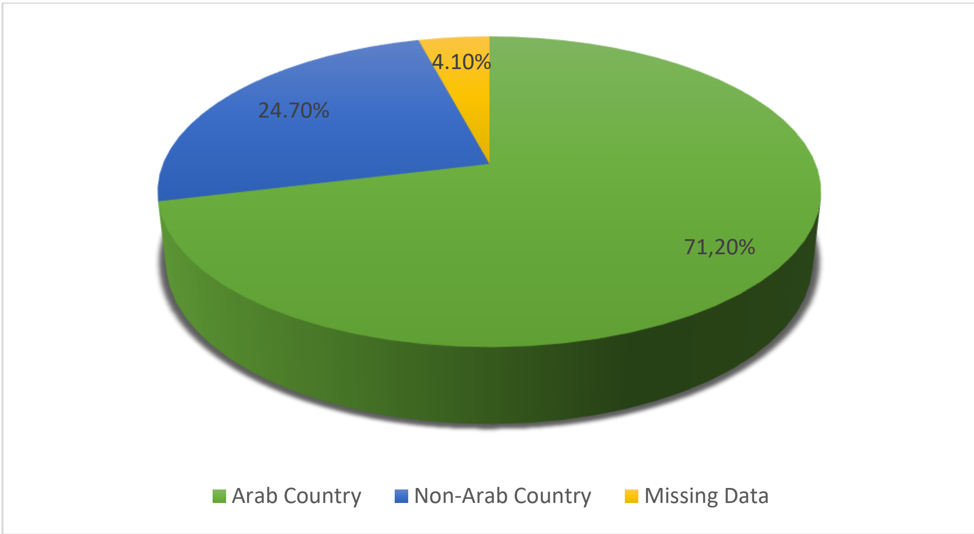

Figure 4.7. Country of graduation

Years of Teaching Experience

Table 4.6 and Figure 4.8 show years of teaching experience. Most participants (46.5%) indicated that they had 16-plus years of teaching experience, followed by those who taught from 1-5 years (19%), and faculty who taught from 6-10 (17%). The lowest percentage belonged to the group with 11-15 years of teaching experience (16.5%).

Table 4.6. *Years of Teaching Experience*

Years of Teaching Experience	Frequency	Percentage
1-5	33	19.4%
6-10	30	17.6%
11-15	28	16.5%
16 and more	79	46.5%
Total	**170**	**100%**

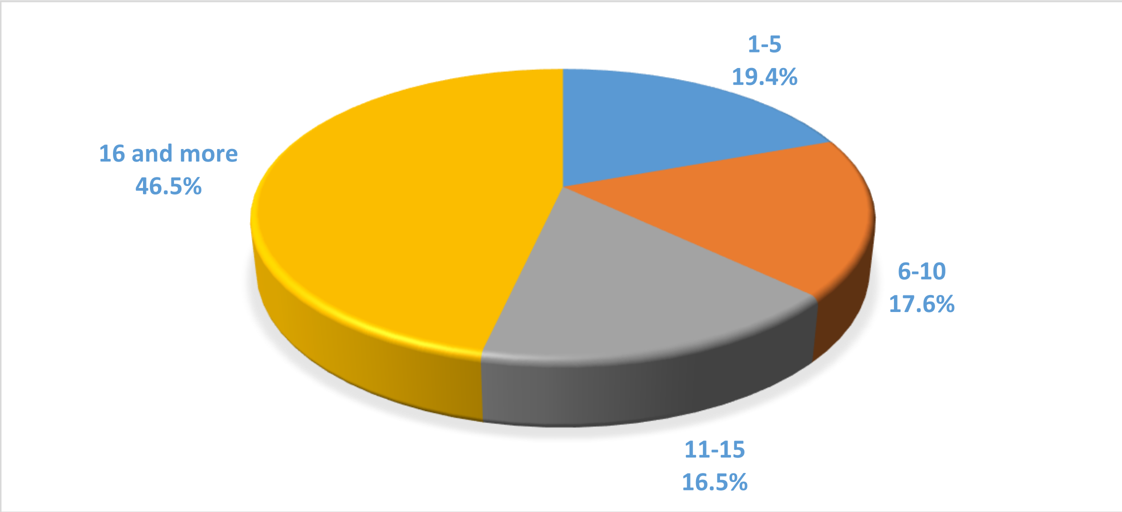

Figure 4.8. Years of teaching experience

Academic Rank

Table 4.7 and Figure 4.9 show participants' academic rank. The highest percentage (37.6%) was Assistant Professor, followed by 22.9% Associate Professor, 18.8% Lecturer, and 13.5% Professor. The rank of Graduate Teacher comprised 5.90%. Only two participants (1.20%) did not indicate their academic rank.

Table 4.7 *Academic Rank*

Academic Rank	Frequency	Percentage
Professor	23	13.5%
Associate Professor	39	22.9%
Assistant Professor	64	37.6%
Lecturer	32	18.8%
Graduate Teacher Assistant	10	5.9%
Missing	2	1.2%
Total	**170**	**100%**

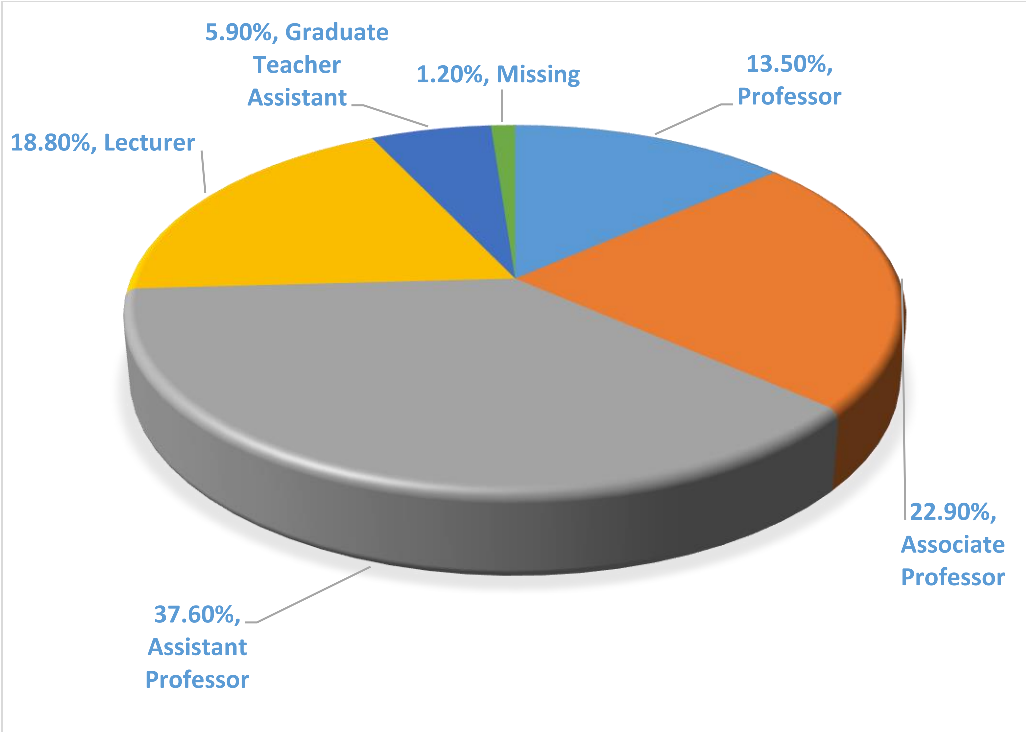

Figure 4.9. Academic rank

Student Population Faculty Members Teach

Table 4.8 and Figure 4.10 show that more than half of participants (54.7%) indicated that they teach both undergraduate and graduate students while 37.6% teach only undergraduates and 6.5% teach only graduate students. Two participants (1.2%) did not indicate the student population they teach.

Table 4.8. *Student Population Faculty Members Teach*

Students population you teach	Frequency	Percentage
Undergraduate	64	37.6%
Graduate	11	6.5%
Both (Undergraduate and graduate)	93	54.7%
Missing	2	1.2%
Total	**170**	**100%**

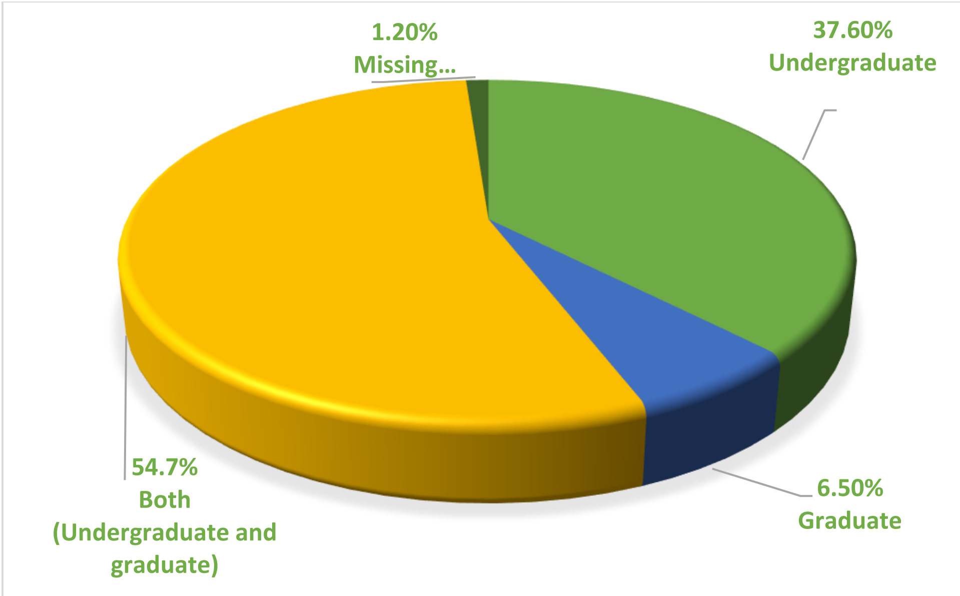

Figure 4.10. Student population faculty members teach

Dependent and Independent Variables Descriptive Statistics

The composite mean of the items used to measure each independent variable was calculated to find their relationship with the dependent variable. Table 4.9 shows the summary of the descriptive statistics of these variables. Among the independent variables, the highest mean was Technology Attitudes (*M= 4.44, SD= .54*) which is followed by Pedagogical Beliefs (*M*= 4.27, *SD*= 0.50), Technology Accessibility (*M*= 4.16, *SD*= 0.51), Faculty Workload (*M*= 3.90, *SD*= 0.87), Technical Skills (*M*= 3.75, *SD*= 0.75), Professional Development (*M*= 3.58, *SD*= 0.73) and Leadership Support (*M*= 3.23, *SD*= 1.14). Technical support was the lowest (*M*= 1.63, *SD*= .71). For the dependent variable (faculty members' technology integration practices based on ISTE NETS-T standards) the composite mean for its ten items was also calculated (*M*= 4.25, *SD*= .64).

Although in all variables the maximum value was five ("Strongly Agree"), it was four ("Agree") in technical support, indicating that none of the participants strongly agreed with the need for any type of technical support mentioned in the survey items. The data also show that in all variables, mean and median values were very close, which emphasizes the absence of significant outliers in all variables. Looking at the standard deviation values in all variables indicates that most of the data are clustered around the mean since values are close to zero except for the Leadership support factor. In the leadership support factor, the standard deviation was 1.14, which indicates more variation in the data when compared to other factors.

Table 4.9 *Dependent and Independent Variables Descriptive Statistics Summary*

Variables (DV/IV)	**N**	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Minimum**	**Maximum**
Technology Practices based on ISTE (DV)	170	4.25	4.35	5	0.64	2.2	5
Technology Attitudes (**IV**)	170	4.44	4.57	5	0.54	1.57	5
Pedagogical Beliefs(**IV**)	170	4.27	4.29	4.43	0.50	2.71	5
Technical Skills(**IV**)	170	3.75	3.83	3.83	0.75	1.17	5
Faculty Workload(**IV**)	170	3.90	4	5	0.87	1	5
Professional Development(**IV**)	170	3.58	3.63	3.63	0.73	1.25	5
Technology Accessibility(**IV**)	170	4.16	4.29	4.43	0.51	1.86	5
Technical Support(**IV**)	170	1.63	1.67	1	0.71	1	4
Leadership Support (**IV**)	170	3.23	3.17	5	1.14	1	5

The following tables (4.10 - 4.17) show descriptive statistic including mean, mode, medium, standard deviation, minimum, and maximum values for the items in each independent variable.

Table 4.10 *Technology Attitudes Scale Statistics*

Item #	**Statements of the items**	**N**	**Mean**	**Median**	**Mode**	**Std. Deviation**	**Min**	**Max**
11.	I enjoy preparing class activities that integrate technology.	170	4.34	4.00	5	0.776	2	5
12.	I believe technology-based teaching would enhance preservice teacher preparation.	170	4.58	5.00	5	0.650	2	5
13.	I believe technology provides an instructional methodology that appeal to a variety of student learning styles.	170	4.41	5.00	5	0.818	1	5
14.	I believe using technology improves quality of my students' education.	170	4.25	4.00	5	0.827	1	5
15.	I believe all faculty should know how to use technology.	170	4.61	5.00	5	0.627	1	5
16.	I believe technology integration would encourage students to work with each other.	170	4.36	4.50	5	0.773	1	5
17.	I believe integrating technology would help me organize my work and increase my productivity.	170	4.55	5.00	5	0.688	1	5

Table 4.11 *Pedagogical Beliefs Scale Statistics*

Item #	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
18.	Faculty members should be facilitators who mediate the environment for students.	170	4.71	5.00	5	0.494	3	5
19.	Students should work collaboratively when learning, not individually.	170	4.15	4.00	5	0.875	2	5
20.	There are better alternatives to testing when assessing students learning.	170	4.26	4.00	5	0.874	1	5
21.	In my teaching there is an emphasis on skills beyond academics.	169	4.41	4.00	5	0.668	1	5
22.	I belief that students should have more responsibility about their learning.	170	4.49	5.00	5	0.557	3	5
23.	Students are required to evaluate and defend their ideas and reflect on their learning.	170	4.31	5.00	5	0.851	1	5
24.	My college allows students to participate in community- or work-based projects or internships.	170	3.56	4.00	4	1.114	1	5

Table 4.12 *Technical Skills Scale Statistics*

Item #	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
25.	I know how to solve my own technical problems.	170	3.58	4.00	4	1.024	1	5
26.	I have had sufficient opportunities to work with different technologies.	170	3.54	4.00	4	1.110	1	5
27.	I select technologies to use in my classroom that enhance what I teach.	170	3.99	4.00	4	0.863	1	5
28.	I can train faculty members to develop lessons that combine content and technologies.	170	3.57	4.00	4	1.114	1	5
29.	I prepare my students to become leaders in the use of content, technologies and teaching approaches.	170	3.91	4.00	4	0.956	1	5
30.	I have the skills to design my instructions with technology to enhance students learning.	170	3.90	4.00	4	0.895	1	5

Table 4.13 *Workload Scale Statistics*

Item #	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
31.	Integrating technology in my teaching puts more workload and needs more time.	170	3.68	4.00	4	1.165	1	5
32.	I need more time to change the curriculum to incorporate technology.	170	3.84	4.00	4	1.097	1	5
33.	Integrating technology in my teaching requires me more time to gain needed knowledge and skills.	170	3.88	4.00	4	1.022	1	5
34.	Integrating technology in my teaching requires me more time to keep up with updated tools.	170	4.01	4.00	4	0.961	1	5
35.	Integrating technology in my teaching needs more work and time to update course material, reply to students' emails.	170	4.12	4.00	5	0.974	1	5

Table 4.14 *Professional Development Scale Statistics*

Item #	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
36.	I have an immediate need for more training with curriculum that integrates technology.	170	3.89	4.00	4	1.096	1	5
37.	I need more resources that illustrate how to integrate technology into the curriculum.	170	3.98	4.00	4	1.037	1	5
38.	I need more training opportunities with teaching strategies that integrate technology.	170	3.92	4.00	4	1.085	1	5
39.	I need more compelling reasons why I should incorporate technology into teaching.	170	2.80	3.00	2	1.290	1	5
40.	I need more regular (ongoing) instructional technology Seminars /workshops.	170	4.00	4.00	4	0.961	1	5
41.	I would like to collaborate with my colleagues on instructional technology issues.	170	4.12	4.00	4	0.858	1	5
42.	My university's faculty technology professional development plan meets my technology needs.	170	3.14	3.00	3	1.176	1	5
43.	I get enough support from the instructional designer staff in my College/University or Department.	170	2.77	3.00	3	1.221	1	5

Table 4.15 *Technology Accessibility Scale Statistics*

Item #	Statements of the Items	N	Mean	Median	Mode	Std. Deviation	Min	Max
44.	I need adequate access to computers.	170	3.98	4.00	4	0.979	1	5
45.	I need convenient access to more computers for my students.	170	4.31	5.00	5	0.864	1	5
46.	I need more reliable access to the Internet at office and classroom.	170	4.64	5.00	5	0.641	1	5
47.	My students need more reliable access to the Internet in campus.	170	4.61	5.00	5	0.599	2	5
48.	I need more licensed software that is subject/curricular-based.	170	4.29	5.00	5	0.901	2	5
49.	My classroom has adequate technology facilities and Infrastructure.	170	2.81	3.00	1	1.427	1	5
50.	I need updated software and hardware.	170	4.51	5.00	5	0.748	1	5

Table 4.16 *Technical Support Scale Statistics*

Item #	Statements of the items	N	Mean	Medi an	Mode	Std. Deviation	Min	Max
51.	I need immediate technical support to keep the computers and other tools working during instruction.	170	1.47	1.00	1	0.723	1	5
52.	I need 24/7 support from the Information Technology (IT) staff at my institution to teach with technology.	170	1.72	2.00	1	0.890	1	5
53.	My students need 24/7 support from the Information Technology (IT) staff at my institution.	170	1.69	2.00	1	0.786	1	4

Table 4.17 *Leadership Support Scale Statistics*

Item #	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
54.	My college has a clear vision and plan for integrating technology in the learning process.	170	3.14	3.00	3	1.270	1	5
55.	My college offers the needed funds for integrating technology in the learning process.	170	3.28	3.00	3	1.217	1	5
56.	My college adopts integrating technology across all courses.	170	3.21	3.00	3	1.217	1	5
57.	Administrators in my college/department are supportive of faculty members who teach blended/online classes.	170	3.18	3.00	3	1.276	1	5
58.	Administrators in my college/department recognize the additional workload required to integrate technology in teaching.	170	3.26	3.00	3	1.302	1	5
59.	Administrators in my college/department communicate with faculty about the value of teaching blended/online classes.	170	3.31	3.00	3	1.302	1	5

Research Question #1

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

Education faculty members' instructional technology practices based on ISTE NETS-T standards (2008) were examined in the first section in the survey. This section included ten closed-ended items (1-10). To understand faculty members technology integration and to what extent it aligns with ISTE NETS-T standards, descriptive statistics analysis of mean, median, mode, standard deviation, and frequencies is reported (See Tables 4.18 and 4.19). In general faculty members' instructional technology practices were highly matched with ISTE NETS-T standards since the overall mean of these items was (*M= 4.25*, *SD= .64*) and the mean of each item was greater than 4 on a 5-point Likert scale (See Table 4.18). The results also showed that the standard deviation values of all items were small (less than one), which indicates that most of the data are grouped around the means.

Table 4.18 *Descriptive Statistics* for *Faculty Members Technology integration ISTE NETS-T*

	Statements of the items	N	Mean	Median	Mode	Std. Deviation	Min	Max
1-	I use technology in teaching to model collaborative knowledge construction by engaging in learning with students, colleagues, and others.	170	4.34	5	5	0.85	2	5
2-	I use technology in teaching to customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities.	170	4.22	4	5	0.93	2	5
3-	I use technology in teaching to engage students in exploring real-world issues and solving authentic problems.	170	4.11	4	5	1	1	5
4-	I use technology in teaching to design relevant learning experiences that incorporate digital tools and resources to promote student creativity and curiosity.	170	4.14	4	4	0.90	2	5
5-	I use technology in teaching to advocate and practice safe, legal, and responsible use of information and technology	170	4.12	4	4	0.91	1	5
6-	I use technology in teaching to help students to select and use technology effectively and productively.	170	4.28	4	5	0.76	2	5
7-	I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues and others.	170	3.92	4	5	1.02	1	5
8-	I use technology in teaching to communicate relevant information and ideas effectively to students.	170	4.55	5	5	0.66	2	5
9-	I use technology in teaching to help students to locate, organize, analyze, synthesize, evaluate, and ethically use information from a variety of sources and media.	170	4.54	5	5	0.64	2	5
10	I use technology in teaching to help students to interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.	170	4.29	4	5	0.82	1	5

Table 4.19 and Figure 4.11 show ISTE NETS-T items' (1-10) frequencies and percentages. Each item was given five choices: "Strongly Agree," "Agree," "Neutral," "Disagree," and "Strongly Disagree." The data results indicated that almost all faculty members integrated technology in their teaching effectively based on ISTE NETS-T standards.

- In Item #1, the majority of the respondents (84%) either strongly agreed or agreed that they use technology in teaching to model collaborative knowledge construction by engaging in learning with students, colleagues, and others.
- In item #2, 82% of participants either strongly agreed or agreed that they use technology in teaching to customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities.

- In item #3, 89% of respondents either strongly agreed or agreed that they use technology in teaching to engage students in exploring real-world issues and solving authentic problems.
- In item #4, 81% of respondents either strongly agreed or agreed that they use technology in teaching to design relevant learning experiences that incorporate digital tools and resources to promote student creativity and curiosity.
- In item #5, almost 81% of respondents either strongly agreed or agreed that they use technology in teaching to advocate and practice safe, legal, and responsible use of information and technology.
- In item #6, most respondents (87%) either strongly agreed or agreed that they use technology in teaching to help students to select and use technology effectively and productively.
- In item #7, 67% of respondents either strongly agreed or agreed that they use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues and others.
- In item #8, almost 93% of respondents either strongly agreed or agreed that they use technology in teaching to communicate relevant information and ideas effectively to students.
- In item #9, almost 95% of respondents either strongly agreed or agreed that they use technology in teaching to help students to locate, organize, analyze, synthesize, evaluate, and ethically use information from a variety of sources and media.
- In item #10, almost 86% of respondents either strongly agreed or agreed that they use technology in teaching to help students interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.

In Table 4.19, findings showed that most of participants (more than 70%) selected "Strongly Agree" or "Agree" as their answer in all items while only six picked "Strongly Disagree." Among all items, the highest mean was item #8 (I use technology in teaching to communicate relevant information and ideas effectively to students) (*M= 4.55, SD= .66*) followed by item #9 (I use technology in teaching to help students to locate, organize, analyze, synthesize, evaluate, and ethically use information from a variety of sources and media (*M= 4.54, SD= .64*). On the other hand, the lowest mean was item #7 (I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues and others) (*M= 3.92, SD= 1.02*).

Table 4.19 *ISTE NETS-T Items Frequencies and Percentages*

	Statements	S. Agree	Agree	Neutral	Disagree	S. Disagree
1.	I use technology in teaching to model collaborative knowledge construction by engaging in learning with students, colleagues, and others	92 54.1%	52 30.6%	18 10.6%	8 4.7%	0 0
2.	I use technology in teaching to customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities.	81 47.6%	59 34.7%	16 9.4%	14 8.2%	0 0
3.	I use technology in teaching to engage students in exploring real-world issues and solving authentic problems	74 43.5%	61 35.9%	16 9.4%	18 10.6%	1 .6%
4.	I use technology in teaching to design relevant learning experiences that incorporate digital tools and resources to promote student creativity and curiosity	68 40.0%	70 41.2%	19 11.2%	13 7.6%	0 0
5.	I use technology in teaching to advocate and practice safe, legal, and responsible use of information and technology	66 38.8%	71 41.8%	24 14.1%	6 3.5%	3 1.8%
6.	I use technology in teaching to help students to select and use technology effectively and productively.	75 44.1%	73 42.9%	17 10.0%	5 2.9%	0
7.	I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues and others.	60 35.3%	58 34.1%	32 18.8%	19 11.2%	1 .6%
8.	I use technology in teaching to communicate relevant information and ideas effectively to students.	108 63.5%	50 29.4%	10 5.9%	2 1.2%	0 0
9.	I use technology in teaching to help students to locate, organize, analyze, synthesize, evaluate, and ethically use information from a variety of sources and media	102 60.0%	59 34.7%	7 4.1%	2 1.2%	0 0
10.	I use technology in teaching to help students to interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.	81 47.6%	65 38.2%	18 10.6%	5 2.9%	1 .6%

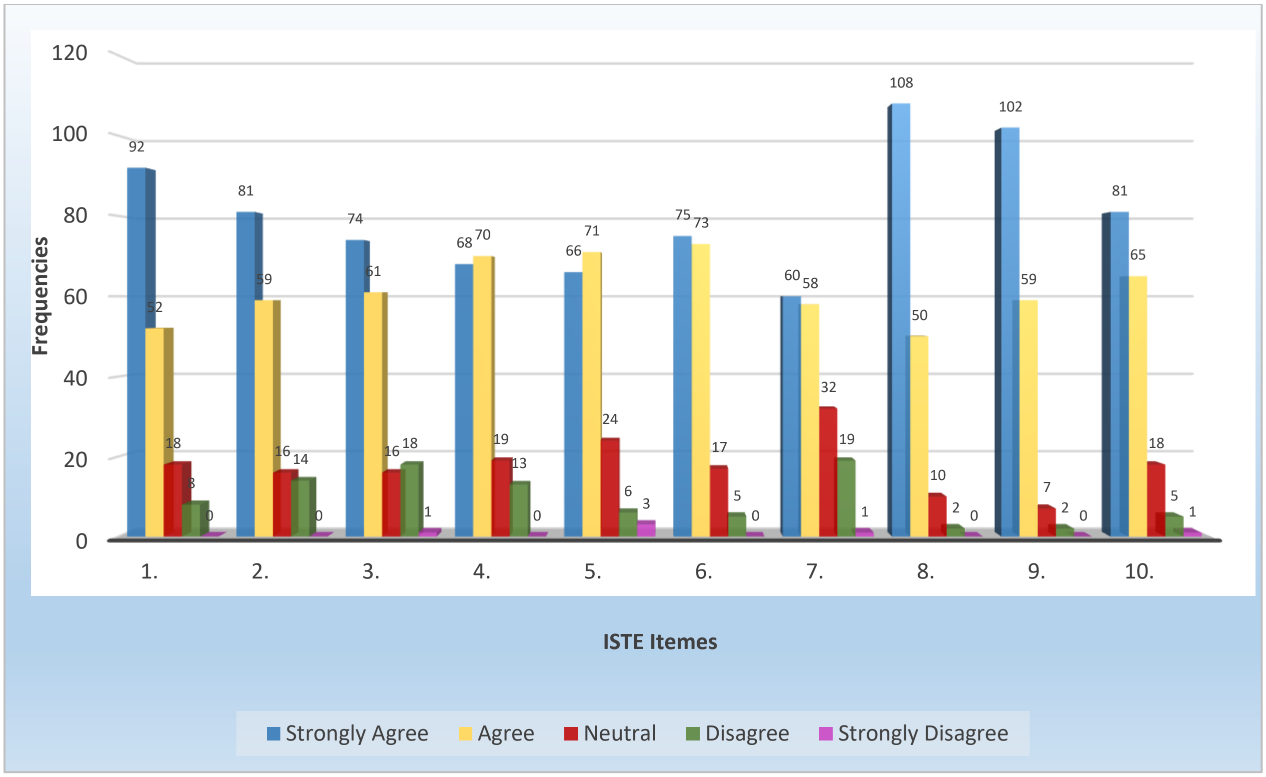

Figure 4.11. ISTE NETS-T Items' frequencies

Research Question #2

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

To answer this question, the study conducted a multiple linear regression analysis for determining the general relationship between the predictor variables and faculty members' instructional technology integration in their teaching and how much each predictor contributes to the relationship (See Table 4.20). A standard, forced entry, multiple linear regression was performed in SPSS to predict participants' instructional technology integration in teaching depending on their mean scores of the independent variables including attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support.

Multiple Linear Regression Results

Table 4.20 *Multiple Regression Model Summary*

Model Summary[b]										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.652[a]	.426	.397	.49618	.426	14.910	8	161	.000	1.955

a. Predictors: (Constant), Administrative Support, Faculty Workload, Technology Attitudes, Technical Support, Technical Skills, Technology Accessibility, Pedagogical Beliefs, Professional Development

b. Dependent Variable: Technology Practices based on ISTE

Table 4.21 *ANOVA Results*

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	29.367	8	3.671	14.910	.000[b]
	Residual	39.638	161	.246		
	Total	69.004	169			

a. Dependent Variable: Technology Practices based on ISTE

b. Predictors: (Constant), Administrative Support, Faculty Workload , Technology Attitudes , Technical Support, Technical Skills, Technology Accessibility, Pedagogical Beliefs, Professional Development

Multiple regression results (Table 4.20) indicated that the overall model was significant [$F(8, 161) = 14.91$, $p < .05$] with $R^2 = .43$. This result indicates that 43% of the variability in faculty members' technology integration practices is explained by the model (predictors). However, only three independent variables (factors) were significantly related to the faculty members' technology integration practices (See Table 4.22).

Table 4.22 *Multiple Regression Coefficients*

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients				
Model		B	Std. Error	Beta	t	Sig.	Zero-Order	VIF
1	(Constant)	1.618	.632		2.558	.011		
	Technology Attitudes	.422	.091	.354	4.655	.000	.527	1.624
	Pedagogical Belief	.123	.102	.096	1.207	.229	.457	1.782
	Technical Skills	.162	.061	.191	2.639	.009	.430	1.468
	Faculty Workload	-.051	.049	-.069	-1.040	.300	-.045	1.252
	Professional Development	.045	.073	.051	.617	.538	.194	1.932
	Technology Accessibility	.047	.092	.037	.511	.610	.202	1.501
	Technical Support	-.068	.062	-.075	-1.087	.279	-.150	1.330
	Administrative Support	-.130	.042	-.233	-3.128	.002	-.348	1.549

a. Dependent Variable: Technology Practices based on ISTE

Null Hypotheses Test Results

H_0 2.1: There is no statistically significant relationship between attitudes towards technology use in teaching and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the first null hypothesis was rejected, as a statistically significant relationship between *attitudes towards technology use in teaching* and faculty members' practices in technology integration in their teaching was found [β=.35, p=.00] (See Table 4.22). Faculty members' *attitudes towards technology* was positively related to their technology integration practices. This factor had the highest significant relationship with technology integration with the beta value equaling .35. This means 35% of the variability in faculty members' technology integration is explained by technology attitudes.

H_0 2.2: There is no statistically significant relationship between pedagogical beliefs and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the second null hypothesis was accepted, as there was no statistically significant relationship found between *pedagogical beliefs* and faculty members' practices in technology integration in their teaching [β=.01, p=.23] (See Table 4.22).

H_0 2.3: There is no statistically significant relationship between technical skills and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the third null hypothesis was rejected, as a statistically significant relationship between *technical skills* and faculty members' practices in technology integration in their teaching was found [β=.19, p=.00] (See Table 4.22). Faculty members' technical skill was positively related to their technology integration practices. This factor had the least significant relationship with technology integration with the beta value equaling .19. This means 19% of the variability in faculty members' technology integration is explained by technical skills.

H_0 2.4: There is no statistically significant relationship between faculty workload and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the fourth null hypothesis was accepted, as there was no statistically significant relationship found between *faculty workload* and faculty members' practices in technology integration in their teaching [β= -.07, p=.30] (See Table 4.22).

H_0 2.5: There is no statistically significant relationship between having technology related professional development and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the fifth null hypothesis was accepted, as there was no statistically significant relationship found between *professional development* and faculty members' practices in technology integration in their teaching [β=.05, p=.54] (See Table 4.22).

H_0 2.6: There is no statistically significant relationship between technology access and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the sixth null hypothesis was accepted, as there was no statistically significant relationship found between *technology access* and faculty members' practices in technology integration in their teaching [β=.04, p=.61] (See Table 4.22).

H_0 2.7: There is no statistically significant relationship between technical support and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the seventh null hypothesis was accepted, as there was no statistically significant relationship found between *technical support* and faculty members' practices in technology integration in their teaching [β=-.08, p=.28] (See Table 4.22).

H_0 2.8: There is no statistically significant relationship between leadership support and faculty members' practices in technology integration in their teaching.

Finding

Based upon statistical analysis, the eighth null hypothesis was rejected, as a statistically significant relationship between *leadership support* and faculty members' practices in technology integration in their teaching was found [β=-.23, p=.00] (See Table 4.22). Faculty members' leadership support was negatively related to their technology integration practices. This means that an increase in leadership support decreases faculty members' technology integration. This factor had the second highest significant relationship with technology integration with the beta value equaling -.23. This means 23% of the variability in faculty members' technology integration is explained by leadership support.

***t*-Test**. In order to understand the inverse relationship between leadership support and technology integration practices, a *t*-Test was run to examine the difference in leadership support between faculty members who had high technology integration practices and those who had low technology integration practices, especially since the standard deviation of this variable was greater than one. Faculty members who had technology practices four and above were identified as having "high technology integration practices" while faculty members who had technology practices less than four were identified as having "low technology integration practices." A dummy variable was created ("high technology integration practices" =1, "Low technology integration practices" =0).

Table 4.23 *Leadership Support Means of High and Low Technology Integration Groups*

Group Statistics					
	Technology Integration Practices Groups	N	Mean	Std. Deviation	Std. Error Mean
Leadership Support	High Technology Integration Practices	125	2.9866	1.13072	.10113
	Low Technology Integration Practices	45	3.9111	.87300	.13014

Table 4.24 *High and Low Technology Integration Groups' Difference in Leadership Support*

Independent Samples Test								
		Levene's Test for Equality of variances		**t-test for Equality of Means**			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Leadership Support	Equal variances assumed	1.880	.172	-4.974	168	.000	-.92455
	Equal variances not assumed			-5.610	100.223	.000	-.92455

As Levene's Test was not significant (See Table 4.24), equal variances was assumed [$F(168) = 1.88$, $p = .17$]. *t*-Test results indicated a significant difference between faculty members with high technology integration practices ($M = 2.99$, $SD = 1.13$) (See Table 4.23) and faculty members with low technology integration practices ($M = 3.91$, $SD = .87$) in their rating of the leadership support [$t(168) = 4.97$, $p = .00$] with the mean difference equaling - .92. This means that faculty members who had better technology integration practices based on ISTE NETS-T standards (n= 125) indicated that leadership support was low, which explains the significant inverse relationship between faculty members' technology integration practices and leadership support ($\beta = -.23$, $p = .02$).

Table 4.25 *Null Hypotheses Tests Summary*

RQ2	Multiple linear regression	Action
H_0 2.1	There is no statistically significant relationship between *attitudes towards technology use* in teaching and faculty members' practices in technology integration in their teaching.	Rejected ($p < .05$)
H_0 2.2	There is no statistically significant relationship between *pedagogical beliefs* and faculty members' practices in technology integration in their teaching.	Accepted
H_0 2.3	There is no statistically significant relationship between *technical skill* and faculty members' practices in technology integration in their teaching.	Rejected ($p < .05$)
H_0 2.4	There is no statistically significant relationship between *faculty workload* and faculty members' practices in technology integration in their teaching.	Accepted
H_0 2.5	There is no statistically significant relationship between having *technology related professional development* and faculty members' practices in technology integration in their teaching.	Accepted
H_0 2.6	There is no statistically significant relationship between *technology access* and faculty members' practices in technology integration in their teaching.	Accepted
H_0 2.7	There is no statistically significant relationship between *technical support* and faculty members' practices in technology integration in their teaching.	Accepted
H_0 2.8:	There is no statistically significant relationship between *leadership support* and faculty members' practices in technology integration in their teaching.	Rejected ($p < .05$)

Chapter Summary

The data in this study were derived from 170 faculty members in the College Education at Taibah University with a 66% valid response rate. Scattered missing data were replaced using the mean substitution technique. A web-based survey with 66 closed-ended items was used to collect data. The study aimed to investigate faculty members' technology integration practices based on ISTE-NETS-T standards and the factors that influence their practices. The data were analyzed using descriptive and inferential analysis (multiple linear regression). Survey items were found highly reliable with Cronbach's alpha value equaling .812. All multiple regression analysis assumptions were met.

Descriptive analysis of participants' characteristics, including gender, age, years of teaching, degree, and student population taught was examined. Descriptive statistics of the independent variables were also reported. The highest mean found was *Technology Attitudes* (*M= 4.44*, *SD= .54*) followed by *Pedagogical Beliefs* (*M*= 4.27, *SD*= 0.50) and *Technology Accessibility* (*M*= 4.16, *SD*= 0.51). Variables with mean values less than four included *Faculty Workload* (*M*= 3.90, *SD*= 0.87), *Technical Skills* (*M*= 3.75, *SD*= 0.75), *Professional Development* (*M*= 3.58, *SD*= 0.73) and *Leadership Support* (*M*= 3.23, *SD*= 1.14). The lowest mean value found was *Technical Support* (*M*= 1.63, *SD*= .71). The composite mean of faculty members' technology integration practices based on ISTE NETS-T standards (the dependent variable) was also high (*M*= 4.25, *SD*= .64).

Findings of descriptive analysis related to research question #1. Overall, faculty members' instructional technology practices were highly aligned with ISTE NETS-T standards since the overall mean of these items was (*M*= 4.25, *SD*= .64) and the mean of each item was greater than 4 on a 5-point Likert scale. Findings also showed that most participants (more than

70%) selected "Strongly Agree" or "Agree" in all items while only six respondents selected "Strongly Disagree." Among the ten items, the highest use of technology by educational faculty members was item #8 (I use technology in teaching to communicate relevant information and ideas effectively to students) (*M*= 4.55, *SD*= .66). On the other hand, the lowest use found was item #7 (I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues, and others) (*M*= 3.92, *SD*= 1.02). Based on the standard deviation values, variability in responses was low, which indicates that most of the data are grouped around the means.

Findings of inferential analysis related to research question #2. Based on multiple regression results the overall model was significant [$F(8, 161)= 14.91$, $p < .05$] with $R^2 = .43$. This indicates that 43% of the variability in faculty members' technology integration practices is explained by the model's predictors. Only three independent variables were found significant: Technology Attitudes [β=.35, *p*=.00], Technical Skills [β=.19, *p*=.00], and Leadership Support [β= -.23, *p*=.00]. In order to address the inverse relationship between leadership support and faculty members' technology integration practices, a *t*-test was run to investigate the differences between faculty members who had a high technology integration practices (4 and above mean value) and those who had low technology integration practices (less than 4 mean value). The *t*-test showed that there is a significant difference [$t(168)= 4.97$, *p*= .00] in the rating of the leadership support between faculty members with high technology integration practices (*M* = 2.99, *SD*= 1.13) and faculty members with low technology integration practices (*M*= 3.91, *SD*= .87). This result indicated that faculty members who had better technology integration practices based on ISTE NETS-T standards (n= 125) indicated that they don't have enough leadership support.

Chapter 5 - SUMMARY, DISCUSSION, AND RECOMMENDATIONS

Chapter Overview

This study aimed to investigate the technology integration practices of faculty members in the College of Education at Taibah University, particularly to what extent these practices align with ISTE NETS-T standards. The study also investigated the factors that influence faculty members' technology integration practices. These factors include attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support. The population of the study was all 257 faculty members in the College of Education at Taibah University. The population included male and female faculty members in the eight departments in the College of Education. The study used a web-based survey, prepared by the researcher based on previous studies, to collect data. The survey included 66 closed-ended items and used a 5-point Likert scale (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, Strongly Agree = 5) for participants' responses to rate their level of agreement with the items.

Two research questions guided the study:

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

This chapter presents a summary of the study's findings. The chapter then discusses these findings as they relate to the research questions. Finally, overall conclusions derived from the study are presented in addition to recommendations for the College of Education at Taibah University and for the future studies.

Summary of Findings

Respondents' Characteristics

Ninety-four (55.3%) of the study participants were male while 70 (41.2%) were females. The highest percentage (23.5%) of participants was in the age range of 40-44 years old, followed by the age group of 50 and above (20.6%). The lowest percentage (9.4%) was in the range of less than 30 years old. The highest number of participants was from the Curriculum and Instruction department with 47 responses (27.6%) followed by the Special Education department with 24 responses (14.1%). The lowest number came from the Educational Administration department with 11 responses only (6.5%). Seventeen participants (10%) did not response their departments.

Most of the participants obtained their last academic degree from Arab institutions (71.2%) while 24.7% graduated from non-Arab countries. Seven respondents did not report from where they gained their last degree. The largest group of participants (46.5%) reported that they had 16 or more years of teaching experience, followed by the faculty group with 1-5 years (19%) and the faculty group who taught 6-10 (17%). The faculty with 11-15 years of teaching experience comprised the smallest group (16.5%).

For academic rank results, the highest percentage (37.6%) was Assistant Professor, followed by 22.9% Associate Professor, 18.8% Lecturer, and 13.5% Professor. The smallest group was Graduate Teacher with (5.9%). Only two participants (1.2%) did not indicate their academic rank. More than half of the total participants (54.7%) indicated that they teach both undergraduate and graduate student population while 37.6% teach only undergraduates and 6.5% teach only graduate students. Two participants (1.2%) did not indicate the student population they teach.

Dependent and Independent Variables Descriptive Analysis

The composite mean of the items used to measure each independent variable was calculated to find their relationship with the dependent variable. Three independent variables had high mean values (greater than four): Technology Attitudes (*M*= 4.44, *SD*= .54), Pedagogical Beliefs (*M*= 4.27, *SD*= 0.50), and Technology Accessibility (*M*= 4.16, *SD*= 0.51). Four independent variables showed a mean value of less than four: Faculty Workload (*M*= 3.90, *SD*= 0.87), Technical Skills (*M*= 3.75, *SD*= 0.75), Professional Development (*M*= 3.58, *SD*= 0.73) and Leadership Support (*M*= 3.23, *SD*= 1.14). Technical Support showed a very low mean (*M*= 1.63, *SD*= .71).

For the dependent variable (faculty members' technology integration practices based on ISTE NETS-T standards), the composite mean for its ten items was also calculated (*M*= 4.25, *SD*= .64). Based on the standard deviation values, all independent and dependent variables were low except for leadership support, which had a higher standard deviation value (1.14), indicating higher variation in participants' responses.

Research Question #1 Results

The overall mean of the ten items used to measure faculty members' instructional technology practices was high (*M*= 4.25, *SD*= .64), which indicates that education faculty members' technology integration practices aligned closely with ISTE NETS-T standards. The most frequently selected answers by most of the participants (more than 70%) were "Strongly Agree" or "Agree," whereas "Strongly Disagree" was selected by only six participants. Among the ten items, item #8 was chosen the most frequently (I use technology in teaching to communicate relevant information and ideas effectively to students) (*M*= 4.55, *SD*= .66). Item #7 was chosen least frequently (I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues, and others) (*M*= 3.92, *SD*= 1.02). Variation in participants' responses was low, which indicates that most of the data are grouped around the means.

Research Question #2 Results

Multiple regression assumptions were met through data screening. Multiple regression results showed that the overall model was significant [$F(8, 161) = 14.91$, $p < .05$] with $R^2 = .43$. This indicates that 43% of the variability in faculty members' technology integration practices is explained by the model's predictors. Null hypothesis tests revealed that only three null hypotheses were rejected based on .05 level of significance. The three significant independent variables included Technology Attitudes [β=.35, p=.00], Technical Skills [β=.19, p=.00], and Leadership Support [β= -.23, p=.00]. A *t*-test was run to investigate the difference between faculty members who had high technology integration practices and the ones who had low technology integration practices. Results found a significant difference between the two groups in their rating of leadership support [$t(168) = 4.97$, p= .00]. This result indicated that faculty members who had better technology integration practices based on ISTE NETS-T standards (n= 125) indicated that they don't have enough leadership support. This means that leadership support was an important factor for faculty members' technology integration; however, they found this support still not adequate or appropriate.

Discussion

The following discussion is based on the results of the descriptive statistics and inferential analysis. It is arranged according to the research questions and provides the implications and significance of the obtained results.

Research Question One

RQ1: To what extent do education faculty members' practices in instructional technology integration align with ISTE NETS-T standards (2008)?

To understand to what extent faculty members' technology integration practices align with ISTE NETS-T standards, descriptive analysis including mean, median, mode, standard deviation, and frequencies was conducted. The overall mean was high (M= 4.25, SD= .64). This result shows that education faculty members use technology effectively as their integration practices were closely aligned with ISTE NETS-T standards. This result agrees with the previous studies that examined the use of instructional technology based on ISTE NETS-T standards (Alnujaidi, 2008; Easter, 2012; Lewis, 2013; Wetzel & Williams, 2004). In Lewis' (2013) study, five of the six interviewed faculty members indicated that they were familiar with ISTE NETS-T standards. (Lewis 2013). Moreover, other qualitative data sources including analyzing course documents and interviewing students, faculty members, and administrators showed a good level of understanding of the role of ISTE standards in preparing pre-service teachers for integrating technology effectively. In Easter's (2012) study, which was conducted in an exemplary teacher preparation program, qualitative data results found that faculty members work very closely with ISTE NETS-T standards in their instructional technology integration and course design. In addition, 75% of the study participants rated the frequency of technology integration by their faculty members in required courses as "often" or "very often."

The only study conducted in Saudi Arabia that examined faculty members' technology integration based on ISTE NETS-T found a positive relationship between the ISTE NETS-T standards and WBI adoption and integration in English departments in the Saudi higher education institutions (r= .18, p = .002) (Alnujaidi, 2008). The results of Wetzel and Williams (2004) indicated that only 22% of the faculty modeled the use of technology "frequently" or "always" in their instruction. However, the study asserted that using ISTE NETS-T standard as a framework for integrating technology was very important since these standards help in filling the gap between faculty members' technology integration status and the optimal state (Wetzel & Williams, 2004).

The highest mean was item #8 (I use technology in teaching to communicate relevant information and ideas effectively to students) (M= 4.55, SD= .66) followed by item #9 (I use technology in teaching to help students to locate, organize, analyze, synthesize, evaluate, and ethically use information from a variety of sources and media) (M= 4.54, SD= .64). On the other hand, the lowest mean was item #7 (I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues, and others) (M= 3.92, SD= 1.02). This indicates that faculty members used instructional technology with their students more than with their colleagues. This might be attributed to the lack of programs in the College of Education that encourage faculty members to use technology in enhancing a community of learning among faculty members. This was emphasized when participants chose "Strongly Agree" or "Agree" in response to the statement "I would like to collaborate with my colleagues on instructional technology issues" (M= 4.12, SD= .86). Visiting the website of each department showed that it mainly displays general information about the department, department plan and vision, and a list of all faculty members while no professional information was found. Community of learning practices among faculty members might be done face to face (e.g., seminars, workshops) without using technology facilities, such as emails, personal websites, and professional groups in Facebook or Telegram for example.

To review, item #8 focuses on using technology to communicate related information and ideas in an effective way to students. Item #9 focuses on using technology to help students to think critically by organizing ideas, and analyzing and synthesizing information from a range of sources and media and then evaluating results in an ethical way. The answer selections to items #8 and #9 clearly reflect faculty members' awareness of the constructivist nature of ISTE NETS-T standards in using technology effectively to support 21st century skills (Dede, 2014b; Govtrack, 2011; Jonassen et al., 2008; Willis, 2012b). Twenty-first century schools should prepare students to be digitally literate and use technology meaningfully, especially when engaging in online, collaborative, research-driven environments. When doing this, students need to utilize several skills, such as researching, analyzing, critiquing, evaluating, and synthesizing, which leads to modifying current knowledge or creating new knowledge (21st century schools, 2008). In order to prepare students for tomorrow's success, understanding the constructive nature of ISTE NETS-T is especially important, as NCATE adopts ISTE NETS-T standards to prepare pre-service teachers for integrating technology (ISTE Advocacy, 2009; NCATE, 2008). Among the important skills identified by OECD's comparative review in preparing preservice teachers is the use of technology in an effective manner to enhance students' learning through optimizing the use of digital resources and using learning management systems to communicate with them and track their progress (Schleicher, 2012). Such preparation helps students in gaining 21st century skills like communication, critical thinking, and creativity, which are the skills clearly emphasized in item #8 and item #9. Therefore, education faculty members should consider this result critically as they play a very critical role in improving pre-service teachers' competencies in using technology effectively (Grunwald Associates LLC, 2010).

The high level usage of technology by Taibah University education faculty members matches with previous studies conducted by Alshahri (2015) and Omar (2016). Alshahri's study found that Saudi faculty members used social media more often than American faculty members participated in the study and the most frequently used tools for instructional purposes were email (M= 4.14, SD= 1.33), word processing (M= 4.14, SD= 1.17), and social media applications (M= 3.39, SD= 1.62). Omar (2016) also found that faculty members use different technology to communicate with their students as the findings showed that 64% of Saudi faculty members used mobile apps for at least one semester while the second most common tool used by 60% of them was learning management systems, followed by social media, which was used by 47% of the participated education faculty members. Thirty-two percent of the participants used web conferencing applications.

Alshahri (2015) and Omar (2016) indicted an improvement in using technology for instructional purposes when compared with results of previous studies. In Almaraee's (2003) study, preservice teachers rated less than adequate their college's preparation for using the computer and internet for instructional activities (e.g., problem solving, simulations, multimedia report, projects, research using internet, computer applications, correspondence with experts via email, data analysis, and graphical presentation). Al-Sarrani (2010) found that the use of technology was at a low level. The study found that science faculty members at Taibah University used computers in personal communication, document preparation for teaching, classroom management, and student evaluation purposes. B. Kamal's (2012) study found that most of the Art and Humanities faculty members used an online LMS at least once per semester while few of them used mobile technology in communicating with students. Albalwi's (2008) study found that faculty had high expertise in low level technology usage in education and rated their instructional technology integration as "seldom."

The present study's findings of improvement in technology integration might be a result of the Afaq plan that was implemented by the Ministry of Higher Education, which focuses in one of its sections on making e-learning a primary part of the college educational system and a supplement to other educational sectors in order to achieve excellence in teaching and learning (Ministry of Higher Education, 2010). The mission of the Ministry of Higher Education emphasized that "E-Learning does not only provide massive information «vessels», but it also stimulates in the learning mechanisms of information acquisition, its processing, and sharing with others in its construction, and conversion into interactive positive information" (cited in Unnisa, 2014, p. 152). The National Center for e-Learning and Distance Learning (NCeL) aims to support all Saudi universities in technology integration through using information technology effectively at an optimal level to improve communication and meet individual and societal needs (Alebaikan & Troudi, 2010). Moreover, the programs and training offered by NCeL and the Deanship of Distance Learning at Taibah University focus on emerging technologies and instructional design of e-learning materials (NCeL, 2014; Taibah University, 2016c). More obvious reasons for this high technology usage found in the present study are the positive technology attitudes and abundant technical skills faculty members had as indicated by the results in research question #2.

Research Question Two

RQ2: Do selected technology influential factors (attitudes towards technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) predict faculty members' practices in instructional technology integration in their teaching?

In order to determine the general relationship between technology-use factors and faculty members' instructional technology integration practices and how much each predictor contributes to this relationship, multiple linear regression analysis was conducted, which indicated that the overall model was significant [$F(8, 161) = 14.91$, $p < .05$] with $R^2 = .43$. Based on this result, 43% of the variability in faculty members' technology integration practices is explained by the model (predictors). Findings of multiple linear regression revealed a statistically significant relationship between faculty members' technology integration practices and three factors: Faculty Attitudes, Technical Skills, and Leadership Support. Results of data analysis could not support a significant relationship between faculty members' instructional technology integration practices and the other five factors: Pedagogical Beliefs, Professional Development, Faculty Workload, Technology Accessibility, and Technical Support.

Attitudes

There was a statistically significant relationship between attitudes towards technology use in teaching and faculty members' technology integration practices in their teaching [β=.35, p=.00]. This factor had the most significant relationship with technology integration with beta value equaling .35. This means 35% of the variability in faculty members' technology integration practices is explained by their technology attitudes. Based on what is found in the literature, technology attitudes is considered a critical factor since it is one of the intrinsic factors that carries more weight in faculty members' decisions regarding technology use (Ertmer et al., 2006). Attitude is a type of manipulative factor (Afshari et al., 2009), which a person has control of, or, according to Zhao et al., (2002), an innovator factor. Since attitudes represent a person's feeling and tendencies that influence decisions towards liking or disliking something (Hew & Brush, 2007; Schafer & Tait, 1986), faculty members who hold positive attitudes toward technology feel comfortable using it and are more willing to overcome existed obstacles (Ertmer, 2005). Therefore, faculty members' positive attitudes found in the study is a good indication of their high technology integration practices.

This relationship between attitude toward technology and technology integration practices agrees with the previous studies conducted both in the USA and SA. Both qualitative and quantitative results in Salentiny's (2012) study found that faculty members had positive attitudes towards technology integration. Faculty members who hold positive technology attitudes benefit more from attending technology related professional development (Afshari et al., 2009). Samarawickrema and Stacey (2007) found that faculty members with open attitudes to online learning adopted technology more easily. Similar to what is found in the current study, Ertmer et al. (2006) found that participants had a commitment to use technology in their teaching because it improved their ability to facilitate and enhance students' learning and make them successful while engaged. Studies conducted in Saudi Arabia found the same result - that faculty members had positive attitudes towards using technology in education either in an online or blended learning environment (Al Saif, 2005; Alaugab, 2007; Albalawi, 2007; Albalwi, 2008; Alharbi, 2002; Al-Sarrani, 2010; Asiri et al., 2012; B. Kamal, 2013).

This positive attitude among this study's faculty participants towards using technology in education might be attributed to the widespread use of technology throughout Saudi society, especially social media and mobile technology (The State of Social Media in Saudi Arabia, Vol, 3, 2015). YouTube videos are rich with a huge number of successful educational technology integration experiences, which encourage others to use it and improves technology attitudes.

The Ministry of Education through The National Center for e-Learning and Distance Learning (NCeL) continuously encourages universities to adapt technology to enhance the learning process. NCel offers technology related workshops through the year with low fees to encourage faculty members to attend. These workshops are offered onsite and online. In addition, NCeL organizes an international e-learning conference every two years where instructional technology experts are brought from around the world to share best technology practices with attendees (NCeL, 2014). In addition, in each Saudi University there is an e-learning and distance learning deanship, which is responsible for promoting and preparing faculty members for technology integration. All of these factors definitely help in improving faculty members' technology attitudes.

Technical Skills

There was a statistically significant relationship between technical skills and faculty members' practices in technology integration in their teaching [β=.19, p=.00]. Faculty members' technical skills were positively related to their technology integration practices. Even though this factor had the lowest significant relationship with technology integration practices with a beta value equaling .19, it still explains 19% of the variability in faculty members' technology integration practices. In other words, the more technical skills the faculty member has, the more technology will be integrated.

Based on the literature, having technical skills means faculty members are able to select and use various types of technology for a wide range of purposes in addition to designing instructional activities with technology to enhance students' learning (Asiri et al., 2012; Buabeng-Andoh, 2012). Participants showed high means in all technical skills scale items which indicates that they were aware of technical skills aspects. This is important in explaining the relationship between faculty members' technology integration and their technical skills as the absences of the ability to operate a piece of technology tool (e.g., smartboard, digital camera) or failure to use a software application (e.g., LMS, Movie Maker) burdens and worries faculty members, which inhibits them from using technology and overcoming obstacles to get them there. More importantly, faculty members' lack of technology instructional design skills prevents them from using technology effectively to design meaningful learning, which leads to using technology improperly and that focuses on low level uses (e.g., productive and management purposes). This requires preparing faculty members for a new role that includes teaching with technology, as B. Kamal (2013) recommended as well. Details of this new role will be given in the recommendation section.

Data analysis agrees with the previous Saudi studies. Al Saif (2005) found that both computer and internet skills were positively correlated with motivation for WBI use. Also, Alaugab (2007) found that lack of technical skills affects faulty members' decision to adopt online courses. Similarly, Al-Amri, (1993) found lack of technology skills to be a major inhibitor to faculty members using computers.

The result of faculty members having high technical skills (*M*= 3.75, *SD*= 0.75) can be attributed first to their high technology attitudes and then to their efforts to improve their technical skills more than what they gain from the professional development offered by the College of Education. Participants indicated that they have the skills to design their instructions with technology to enhance students' learning (*M*= 3.90, *SD*= .90). However, in the professional development scale, participants indicated that they have immediate need for more training (*M*= 3.89, *SD*= 1.10) in general and more specifically they mentioned their need for more training opportunities with teaching strategies that integrate technology (*M*= 3.92, *SD*= 1.09). They also indicated that they did not get enough support from the instructional design staff in the college (*M*= 2.77, *SD*= 1.22). Accordingly, their high technical skills might be due to their own efforts through attending workshops either conducted by the NCeL, the Distance Learning Deanship at Taibah University, or even through attending technology training workshops offered by the private training centers. Being self-taught is also possible.

Leadership Support

There was a statistically significant relationship between leadership support and faculty members' practices in technology integration in their teaching [β=-.23, *p*=.00]. Faculty members' leadership support was negatively related to their technology integration practices. This factor had the second highest relationship with technology integration with a beta value equaling -.23, which indicates that 23% of the variability in faculty members' technology integration is explained by leadership support.

Although the data analysis findings revealed a significant relationship between leadership support and faculty members' technology integration, the negative relationship added a new concern that should be addressed and needs more explanation. Descriptive analysis results through the mean value of this factor was medium (*M*=3.23, *SD*= 1.14) when compared with other factors indicating that participants still need more support. The standard deviation was also a bit high (> 1), which indicates variability in participants' responses. The mode value for all items in leadership support scale was three, which means that most participants were unsure. Therefore, a *t*-Test was run to examine this variability. The *t*-Test results showed a significant difference between faculty members with high technology integration practices and faculty members who had low technology integration practices. It also shows that faculty members who had better technology integration practices based on ISTE NETS-T standards (n= 125) indicated that leadership support was low (*M* = 2.99, *SD*= 1.13) or inadequate whereas those who had a lower technology integration rate ranked leadership support higher (*M*= 3.91, *SD*= .87). This variation in respondents' rating explains the significant inverse relationship between faculty members' technology integration practices and leadership support.

In short, leadership support was one of the most important factors of faculty members' technology integration. The negative relationship indicates that faculty members still feel that they need more leadership support to integrate technology in their teaching properly. This finding is also supported by the results of other external factors that are connected with leadership support: professional development, technology accessibility, and workload. For professional development (*M*= 3.58, *SD*= 0.73), participants indicated that they need more immediate and ongoing professional development in the different technology related aspects mentioned in the scale. Similarly, in technology accessibility (*M*= 4.16, *SD*= 0.51), participants indicated that they and their students need more access to the technologies mentioned. Faculty also indicated that they experienced more workload (*M*= 3.90, *SD*= .87) as a result of them integrating technology in their teaching.

Therefore, based on what is found in the literature (Dexter & Riedel, 2003; Dusick, 1998; Strudler & Wetzel, 1999; Tondeur et al., 2012), leadership support is a critical extrinsic factor not only in reinforcing and promoting faculty members' technology integration in their teaching, but more importantly in strengthening guidance for effective technology use in all aspects in the college including management and instructional purposes. Leadership support of this kind includes having knowledgeable leaders, articulating clear shared vision and goals, giving individualized support, creating school cultures, identifying and facilitating professional development needs, involving educators in the decision-making process, allocating grants for offering innovative technologies, and setting technology plans based on ISTE/NCATE standards. This conclusion was emphasized by Strudler and Wetzel (1999) who investigated the efforts of four exemplary Colleges of Education that were selected for the Office of Technology Assessment (OTA) study (U.S. Congress, 1995). Researchers found that leadership support was the main theme that emerged across the case studies. This is true as other factors including training and support, technology access, pedagogical fit, and personal issues were found to be affected by leadership support (vision and goals), and as a result affected faculty members' technology integration practices in teaching (Strudler & Wetzel, 1999).

Previous studies in Saudi Arabia support the data analysis results of the current study. Al Saif (2005) found the lack of support and encouragement from administrators is the most important inhibitor to using WBI by instructors at Qassim University. Alharbi (2002) found support and encouragement from administrators as a factor that encouraged faculty members and administrators to implement online courses. Alaugab (2007) found that the lack of administrative support, encouragement, and financial support were essential barriers to adopting online courses. Albalwi (2008) found more than one motivational factor related to leadership support that influenced faculty use of e-learning, including funding for materials and expenses and administrative encouragement and support.

Conclusion

This study aimed to investigate the alignment of Taibah University education faculty members' technology practices with the widely accepted ISTE NETS-T standards and what factors predict or influence their technology practices. A self-reported survey containing 66 closed-ended items was used to collect data. Descriptive and multiple linear regression analyses were used to analyze data from the 170 valid respondents.

Results of the first research question indicated that faculty members' technology integration practices were compatible with ISTE NETS-T standards. This indicates faculty members were aware of these standards and used technology effectively to engage students in meaningful learning. This result was not unexpected with the widespread use of technology in Saudi Arabian society and continued efforts of technology adoption by the Ministry of Education.

Multiple regression outputs of the second research question indicated that overall the model was significant as it explains 43% of the variability in faculty members' technology integration practices. Three significant factors statistically predicted faculty members' technology integration practices. Fortunately, these factors included important internal and external factors: technology attitudes (the highest influential factor), leadership support (the second highest influential factor), and technical skills (the least influential factor). Participants rated the only significant external factor found (leadership support) lower than the two significant internal factors. However, their technology integration practices were rated high, which confirms that external factors are easier to be overcome when internal factors such as technology attitudes are rated high, as the literature indicated (Demirci, 2009; Ertmer, 2005). Although most participants indicated that they didn't have enough leadership support, they overcame this obstacle through their positive attitudes toward technology and their technical skills. Other factors including pedagogical beliefs, technical support, technology accessibility, professional development, and faculty workload were not found significant and were not able to explain education faculty members' technology integration practices at Taibah University. Nevertheless, these factors were helpful in discussing the significance factors and understanding technology integration in the College of Education at Taibah University.

College of Education at Taibah University Technology Integration Profile

Looking at the results of the all selected influential factors, the following profile of this teacher educator program emerges:

- Faculty members use technology at a high level to design effective learning in alignment with ISTE NETS-T standards.
- Faculty members possess highly positive technology attitudes and are aware of its importance and benefits for improving their teaching and consequently enhancing their students' learning.
- Faculty members have constructivist pedagogical beliefs and these beliefs are reflected in their practices (learner-centered).
- Faculty members have essential technical skills that allow them to solve the technical problems they face, choose appropriate technologies, and design learning activities that enhance their students' learning even when they do not get enough support from instructional designers in the college.
- Faculty members have a higher workload as a result of integrating technology.
- Faculty members do not get the needed ongoing technology related professional development opportunities.
- Faculty members and their students need more access to computers, reliable internet, and updated software.
- Faculty members have enough technical support from the College of Education.
- Faculty members need more opportunities to use technology facilities to exchange technology integration best practices with colleagues and enhance their community of learning.

- Faculty members do not have enough college leadership support in the form of a clear technology plan, appropriate funds, and understanding the workload that technology adds.

Recommendations for the College of Education at Taibah University

This study was designed to understand the current status of faculty members' technology integration through investigating their practices based on ISTE NETS-T standards and examining the factors that influence these practices. Based on the findings of the study, the following specific recommendations target both faculty members and leaders in the College of Education at Taibah University that might help in improving technology integration practices in the college and better prepare pre-service teachers to integrate technology effectively in their future teaching. These recommendations might also be useful for colleges of education in other Saudi universities seeking to integrate technology in their teaching. These recommendations are categorized into two categories. One focuses on faculty members and the other focuses on college leaders.

Recommendations for Faculty Members

The role of modeling the use of technology

This study focused on effective use of technology by education faculty members. Faculty members as role models play a key factor in preparing teacher candidates to effectively integrate technology into their future teaching through modeling effective use for their students and providing them with opportunities to observe a variety of examples and instructional models that incorporate technology (Salentiny, 2012; Tondeur et al., 2012; Wetzel & Williams, 2004). One of the most influential strategies in helping pre-service teachers gain the necessary knowledge and skills is giving them the opportunity to practice technology in constructivist and authentic instructional hands-on activities. Jonassen et al. (2008) emphasized the idea of learning with technology where technology is used as an intellectual partner in the learning process to support the learner's thinking and meaning making. Therefore, faculty members are encouraged to design technology rich instruction based on ISTE NETS-T. Moreover, faculty members should allow pre-service teachers to practice the use of technology in lesson plan assignments (where each learning activity and assessment is connected to both content standards and technology standards) and group projects where they use technology effectively to communicate, share ideas, critically evaluate data, synthesize information, and present the new findings in attractive media-rich products that reflect their individual learning styles.

The role of technology instructional designer

Successful technology integration that leads to effective technology usage and meaningful learning requires faculty members to prepare themselves for a new role as a technology instructional designers. This is important as effective technology integration should focus on pedagogical technology related issues more than technical ones (Ertmer, 1999; Samarawickrema & Stacey, 2007; Zhao et al., 2002). For faculty members, learning about methods that use technology in a pedagogical context is key in designing technology rich lessons. As the findings of the study indicated that faculty members did not get enough support from the instructional designer specialists in the College of Education, they need to consider several practices in designing technology rich learning activities as summarized by Boettcher and Conrad (2016):

- Develop a set of explicit expectations for students and faculty regarding communication and how much time students should be working on the course each week.

- Use a variety of large group, small group, and individual work experiences.
- Use synchronous and asynchronous activities.
- Prepare discussion posts that invite responses, questions, discussions, and reflections.
- Search for and use content resources that are available in digital format.
- Combine core concept learning with customized and personalized learning (support individualized learning).
- Utilize ongoing assessment by gathering evidences of learning.
- Design experiences to help learners make progress on their novice-to-expert journey. (Boettcher & Conrad, 2016, kindle location, 1534)

Faculty members should focus not only on what technology is being used, but more importantly on what reason it is used and what skills (e.g., critical thinking, creativity, communication, and collaboration) it could help students to gain. In addition, preservice teachers should be given the choice to choose the type of technology that matches their learning styles but should also be encouraged to use various types of technology tools to ensure that they get to practice the use of different technologies and understand their features and their pros and cons.

Developing positive technology attitudes in pre-service teachers

Enhancing education through the use of technology requires developing positive attitudes towards technology, as negative attitudes inhibit acceptance of technology usage in teaching. Therefore, faculty members who show high interest and involvement with technology through understanding its usefulness and being comfortable with using it develop more positive attitudes in pre-service teachers (Afshari et al., 2009). In turn, such attitudes help novice teachers to embrace technology and use it in their classrooms. In addition, faculty members need to discuss with their students (pre-service teachers) the usefulness of technology, especially when used effectively, in engaging students and enhancing their learning. Therefore, faculty members need to understand how to foster both technology fluency and literacy in their students to ensure that they are ready to adopt it in their future teaching.

Developing constructivist learning with a technology vision in preservice teachers

Devolving a constructivist, technology-rich learning vision in preservice teachers starts with their own teachers. Faculty members who use technology purposefully as a means to an end (meaningful learning) select the appropriate technology that reflects their pedagogical beliefs. A high level of technology usage that enhances problem solving, data analysis, and knowledge synthesis and construction is associated with learner-centered, constructivist learning (An & Reigeluth, 2011; Ertmer, 2005). To prepare teaching professionals, during coursework, pre-service teachers should be exposed to knowledge and skills that are related to learners' characteristic and how they learn within the social context, curriculum content and goals, and pedagogy (methods, assessment, multiple intelligences, and classroom managements) (Darling-Hammond & Bransford, 2005). Through linking technology usage practices with theory (Tondeur et al., 2012), faculty members help pre-service teachers envision how technology can be used effectively, as they should be given opportunities to think reflectively on how technology can be used to meet students' needs and help them gain 21st century skills. Within a set of strong, coherent courses where subject-matter is connected with content pedagogy, pre-service teachers create mutually reinforced knowledge and skills on how to use technology effectively to benefit their students (Darling-Hammond & Bransford, 2005). Therefore, to be technologically literate teaching professionals, pre-service teachers should be given the opportunity—across all courses—to (1) learn a variety of technologies in school to become productive workers and citizens in the future; (2) access materials and resources to support inquiry-based work; and (3) collaborate with others on projects outside of their school and community (Darling-Hammond & Bransford, 2005, p. 187). In summary, by the end of their education program, pre-service teachers should be able to "incorporate subject matter goals, knowledge of learning, and an appreciation for learners' development and needs. Connecting what is to be learned to the learners themselves requires curriculum work, even when teachers have access to a range of texts and materials" (Darling-Hammond, 2006, p.303).

Recommendations for College of Education Leaders

Successful technology integration in the education program heavily depends on leadership support. While individual faculty member's efforts could help in integrating technology on a small scale, leadership support works in integrating technology systemically on a large scale to include all faculty members and in becoming the norm in the college's instructional and management practices. The following recommendations were derived from the findings in the study and particularly target the leaders in the College of Education.

Developing an institutional technology integration plan

Education institutions with clear technology plans are more successful in integrating technology as it stimulates faculty members to adopt technology in a systemic way (Buabeng-Andoh, 2012). Technology knowledgeable leaders should have a clear vision and goals that guide effective technology use. Faculty who know that they have supportive leaders feel more comfortable in their technology integration practices as they know they will get the help they need in the face of an obstacle.

College of Education leaders should consider or adopt technology standards, like ISTE NETS-T standards, in their vision as a guide for technology integration in all courses. These standards include rich, practical activities that help faculty members design their instructional activities effectively with technology. Education leaders need to involve all faculty members in the decision-making and planning process and have the vision shared among all departments to create a college-wide technology culture. College of Education leaders need to understand the increased workload that technology integration requires and consider this as a part of faculty members' schedule and tasks.

Supporting intrinsic factors

Education leaders should not only focus their efforts on extrinsic factors, such as technology accessibility and training. More efforts should be given to intrinsic factors, such as beliefs since this will result in better technology adoption by faculty members (Ertmer, 1999; Ertmer, 2005; Ertmer et al., 2006). To promote faculty members' technology integration and help them develop positive technology attitudes, the College of Education can apply different strategies.

- Educate faculty members about the efficacy of technology integration through inviting technology experts to be guest speakers during college or department seminars. Also, faculty members should be encouraged to attend conferences that focus on e-learning and instructional technology. Early technology adopter faculty members could share their successful integration experiences with colleagues, which increases their motivation and gives them opportunities to discuss directly their concerns.
- Although changing beliefs is not easy, giving faculty members who have low technology attitudes more opportunities to practices technology integration in their teaching helps them,

for the long run, to change their attitudes. Ertmer and Ottenbreit-Leftwich (2010) argued that to change educators' beliefs, they need to engage in activities that challenge their beliefs as the more practices they are involved in, the easier it will be for them to advocate new beliefs.

Choosing appropriate schools for pre-service teachers' fieldwork

On-the-job experiences are very important in examining technology effectiveness. Therefore, linking coursework and fieldwork in integrating technology is a fundamental strategy that helps pre-services teachers to authentically apply technology in teaching as they try it in real teaching experiences and examine the knowledge and skill they have gained during the coursework. College of Education leaders are recommended to carefully select schools for pre-service teachers' fieldwork that are equipped with technology as part of their culture.

Resources and Supports

Instructional Designers. Based on the findings of this study, faculty members rated high the need for support from an instructional designer who can help them design technology rich lessons effectively. Therefore, College of Education leaders are asked to offer an instructional technology expert who can help faculty members through a one-on-one approach in creating high level learning activities with technology. This can be either a fulltime instructional technologist or a part-time faculty member who is an expert in using technology (Ertmer, 1999; Strudler & Wetzel, 1999; Zhao et al., 2002).

Technology accessibility. Based on this study's result, the accessibility factor mean score was high (M= 4.16, SD= 0.51), as participants in the study indicated that they need more access to computers, high speed internet, updated software and hardware, and other technology facilities in the classrooms. Although personal mobile technologies among faculty members and students are available, without offering computers and Internet and other technology facilities in the classrooms none of the other factors will be useful. Therefore, College of Education leaders should consider what support structures need to be in place to help faculty members integrate technology in their teaching and allocate grants for offering innovative technologies.

Professional development. Regardless of their high rating of technology integration practices, participants showed high demand for immediate and ongoing technology related professional development. The literature indicates that offering professional development opportunities to provide faculty members with knowledge and skills (pedagogical and technical) needed to integrate technology improves faculty members' attitudes towards technology integration. It also helps them be aware of the potential of technology in students' learning is an important factor (Buabeng-Andoh, 2012; Hew & Brush, 2007; Strudler & Wetzel, 1999; Tondeur et al., 2012; Zhao et al., 2002). Therefore, College of Education leaders need to conduct a needs assessment to identify faculty members' technology related professional development needs and then offer appropriate workshops and other trainings to fulfill these needs. In addition, education leaders need to allocate enough time for practical, pedagogical-oriented professional development programs that introduce new technologies within subject-area-specific contextual activities. This type of hands-on training should end with having faulty members designing instructional materials focused on learning with technology rather than learning from technology. Education leaders need to understand that one-shot technology related professional development is not effective for successful technology integration. Faculty members also need to be updated and familiar with the ever-changing technologies. Therefore, training should be part of the college plan and continuous. Moreover, the College of Education should plan and encourage for more collaboration between faculty members in technology integration through exchanging best practices and experiences in how technology improves students' learning and faculty member's performance. Technology can be used to ease and facilitate such collaboration, such as WhatsApp professional groups, a Facebook department page, personal web pages or blogs, Twitter, and cloud technology (e.g., Google Drive, Dropbox, and Evernote).

In sum, leaders in the College of Education need to closely address all influential factors (intrinsic and extrinsic) through continuously assessing faculty members' technology integration status quo and evaluating to what extent these factors are addressed in order to foster the strengths and work on solving the weaknesses.

Recommendations for Future Studies

Few studies found in the literature investigated education faculty members' effective use of technology based on ISTENETS-T standards and the influential factors that affect their technology integration practices. In particular in Saudi Arabia, no study was found that addressed the same scope of this study's focus on ISTE NETS-T standards. Therefore, more opportunities are still available for researchers to conduct similar studies with some modifications and improvement. Consequently, results would be more generalizable.

1- This study was limited in by its nonexperimental, cross-sectional predictive quantitative design, where data were collected by closed-ended survey items through participant self-reporting, which might indicate answer bias since they might change their perception or attitudes knowing they are part of a research study. Therefore, it is recommended to combine both quantitative and qualitative methods (mixed methods). Utilizing qualitative and quantitative methods in a single study increases the study's strength and produces more "defensible and usable research findings" (R. B. Johnson, Onwuegbuzie, & Turner, 2007, p. 129). Using a mixed methods approach helps to create a more holistic view of the research problem and questions and enhances the validity of the research findings. The findings from the quantitative data could be triangulated through the elaboration of the qualitative findings. Therefore, it is recommended to include open-ended questions and interviews with a group of faculty members, which would help in getting a deeper understanding of their technology integration practices and a better interpretation of the results. Moreover, classroom observation, as a qualitative data collection type, is a better option to confirm the reality of technology integration practices.

2- This study examined faculty members' technology integration in using technology effectively. To better understand the status quo of integrating technology for creating meaningful leaning, it is highly recommended to extend the study population to involve pre-service teachers and college leaders. Pre-service teachers' perception about how their instructors use technology improves the validity of the data and provides a better understanding of to what extent students themselves get chances to use technology purposefully, their attitudes towards technology, and to what extent they feel the program prepares them for using technology effectively in their future classrooms. Comparing students in different years (freshman, sophomore, junior, senior) provides an understanding of how the program gradually improves students' technology related knowledge and skills and how their usage changes over the years. Moreover, pre-service teachers might be also examined for how they use technology in real teaching experiences during their fieldwork and how helpful cooperating teachers are. Administrators' perceptions also improve data validity, but more importantly, the process of collecting that data would allow them to better understand the current status of instructional technology use in the college, especially what factors could affect these practices and consequently determine where to place efforts in improving technology integration practices.

3- This study was limited to eight influential factors to examine which factors could predict faculty members' practices in using technology effectively. It is highly recommended to add other factors, such as demographic data, to investigate differences between participants based on their gender, academic rank, years of teaching experience, and age. Demographic data is not unusual in the research body in Saudi Arabia. However, examining differences between faculty members' demographic data in integrating technology effectively based on ISTE NETS-T standards particularly is still needed and important.

4- While the current study was cross-sectional, further studies could be longitudinal through examining the same group of faculty members' technology integration practices and the influential factors over 4-5 years (depending on the college plan). Such a study would help in examining the changes that occur in faculty members' practices in respect to the changes in the influential factors. Results from each year would help in developing profiles for each participating faculty member, department, and the whole college.

5- The current study focused on faculty members' technology integration practices and the factors that predict their practices. More questions could be added that focus on what type of technology faculty members use, how frequently they use them, and for what purposes they are used (e.g., instructional activities, communications, collaboration, critical thinking, projects, assignments). These types of questions would help in triangulating the findings and confirming faculty members' technology integration practices through comparing ISTE NET-T results with the type of technology they used and to what extent they reflect high technology usage.

6- Another study might dig deeper into the faculty members' roles, especially by asking questions to examine the different roles suggested by this study in the *Recommendations for*

Faculty Members section. This might include examining the details about their roles in modeling the use of technology for preservice teachers, their roles as instructional designers, how they help in developing positive attitudes in pre-service teachers, and how they help in developing a constructivist technology integration vision in pre-service teachers.

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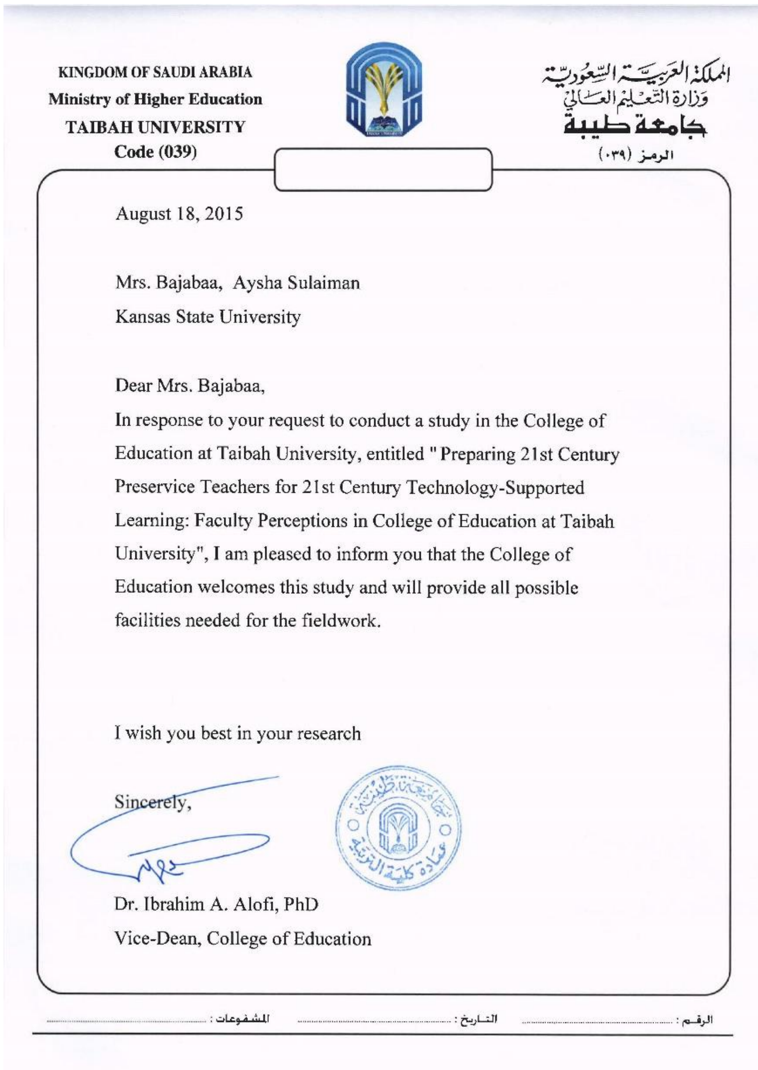
Appendix A - PERMISSION FOR CONDUCTING THE STUDY IN COLLEGE OF EDUCATION AT TIABAH UNIVERSITY



KINGDOM OF SAUDI ARABIA
Ministry of Higher Education
TAIBAH UNIVERSITY
Code (039)

المملكة العربية السعودية
وزارة التعليم العالي
جامعة طيبة
الرمز (٠٣٩)

August 18, 2015

Mrs. Bajabaa, Aysha Sulaiman
Kansas State University

Dear Mrs. Bajabaa,

In response to your request to conduct a study in the College of Education at Taibah University, entitled " Preparing 21st Century Preservice Teachers for 21st Century Technology-Supported Learning: Faculty Perceptions in College of Education at Taibah University", I am pleased to inform you that the College of Education welcomes this study and will provide all possible facilities needed for the fieldwork.

I wish you best in your research

Sincerely,

Dr. Ibrahim A. Alofi, PhD
Vice-Dean, College of Education

الرقم : .... التاريخ : .... المشفوعات : ....

Appendix B - INVITATION LETTER AND CONSENT FORM–ENGLISH VERSION

Kansas State University

Informed Consent Form

Dear Faculty Member in College of Education at Taibah University,

My name is Aysha Bajabaa, a PhD candidate in the Department of Curriculum and Instruction, College of Education, Kansas State University. I am seeking your help through participating in a survey, which is part of research project for my doctoral dissertation titled

Influential Factors and Faculty Members Practices in Technology Integration Using ISTE Standards for Teacher Preparation at Taibah University- Saudi Arabia

SURVEY PURPOSE

The study aims to examine to what extent faculty members' technology integration practices align with ISTE standards for teachers. It also investigates whether technology integration influential factors (attitude toward technology use, pedagogical beliefs, technical skills, workload, professional development, technology access, technical support, and leadership support) can predict College of Education faculty members' practices in using technology in their teaching based on ISTE standards for teachers.

PARTICIPATION AND CONFIDENTIALITY

This survey is given to College of Education faculty members at Taibah University who are voluntarily willing to share their opinion in the study's scope. Participation in responding to this survey is totally voluntarily, and you may withdraw any time for any reason without penalty or loss of benefits to which you are otherwise entitled. You may also skip any question you do not like to answer. By agreeing to complete the survey, I will assume your agreement to participate in this study. The confidentiality of your responses is an ethical issue; therefore, participation is anonymous and responses will only be used for the research purposes of this study and the data in this study will be confidential to the researcher.

SURVEY PROCEDURES AND LENGTH OF STUDY

The survey items mainly include closed-ended items related to the scope of the study. The survey is a paper-pencil version that will be sent to the Dean's Office at the College of Education at Taibah University and then will be distributed to the different departments in the college and collected back. Your response to this survey is appreciated; completing the survey will require less than 15 minutes response time.

RISKS

There are no risks expected for participating in this survey.

BENEFITS

Participation in the study will expose participants to some ideas about integrating technology in their teaching based on widely accepted ISTE standards in addition to several beneficial tools they use to support students' learning. Beside the addition to the research body related to technology integration in higher education in Saudi Arabia, findings of the study will also help the University and more specifically the College of Education administrators in offering the factors that support successful technology integration and improving the learning environment to be more appropriate for integrating technology.

CONTACT

If you have any question or concern regarding this survey, please contact the study supervisors:
Dr. Allen: dallen@ksu.edu
Dr. Kang: hjkang@ksu.edu
OR the researcher: abajabaa@ksu.edu , Cell: 1-785-317-7473
OR Rick Scheidt, Chair, Committee on Research Involving Human: comply@ksu.edu, Phone: 1-785-532-3224

Thank you for taking time to complete this task and assistance,

Sincerely,

Aysha Bajabaa

PhD candidate
Curriculum and Instruction Department
Educational Computing, Design, and Online Learning
Kansas State University

Appendix C - SURVEY USED IN THE STUDY -ENGLISH VERSION

Section I: Faculty technology integration using ISTE-NETS-T Standards

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	I use technology in teaching to model collaborative knowledge construction by engaging in learning with students, colleagues, and others	5	4	3	2	1
2.	I use technology in teaching to customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities	5	4	3	2	1
3.	I use technology in teaching to engage students in exploring real-world issues and solving authentic problems	5	4	3	2	1
4.	I use technology in teaching to design relevant learning experiences that incorporate digital tools and resources to promote student creativity and curiosity	5	4	3	2	1
5.	I use technology in teaching to advocate and practice safe, legal, and responsible use of information and technology	5	4	3	2	1
6.	I use technology in teaching to help students to select and use technology effectively and productively	5	4	3	2	1
7.	I use technology in teaching to share best practice uses of technology in inquiry-based learning with colleagues, and others	5	4	3	2	1
8.	I use technology in teaching to communicate relevant information and ideas effectively to students.	5	4	3	2	1
9.	I use technology in teaching to help students to locate, organize, analyze,	5	4	3	2	1

	synthesize, evaluate, and ethically use information from a variety of sources and media					
10.	I use technology in teaching to help students to interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media	5	4	3	2	1

Section II: Factors influence faculty members in technology integration

Subsection II-A: Faculty Attitudes towards Technology Integration

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
11.	I enjoy preparing class activities that integrate technology in instructional activities	5	4	3	2	1
12.	I believe that technology-based classroom teaching would enhance preservice teacher preparation and improve their teaching methods.	5	4	3	2	1
13.	I believe technology provides an instructional methodology that appeal to a variety of student learning styles	5	4	3	2	1
14.	I believe using technology would significantly improve the overall quality of my students' education (e.g., acquire, critical thinking skills).	5	4	3	2	1
15.	I believe that all faculty should know how to use technology	5	4	3	2	1
16.	I believe technology integration would encourage students to work with each other	5	4	3	2	1
17.	I believe integrating technology would help me organize my work and increase my productivity.	5	4	3	2	1

Subsection II-B: Faculty Pedagogical Beliefs

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18.	Faculty members should be facilitators who mediate the environment for students.	5	4	3	2	1
19.	Students should work collaboratively when learning, not individually.	5	4	3	2	1
20.	There are better alternatives to testing when assessing students learning (i.e. open-ended problems, group projects, hands-on demonstrations, exhibitions or oral presentations, essay test, portfolios).	5	4	3	2	1
21.	In my teaching there is an emphasis on skills beyond academics (e.g., critical thinking, presentation or other "21st century skills)	5	4	3	2	1
22.	I belief that students should have more responsibility about their learning	5	4	3	2	1
23.	In my teaching students are required to evaluate and defend their ideas or views and reflect on their learning	5	4	3	2	1
24.	The learning environment at my college allows students to participate in community- or work-based projects or internships	5	4	3	2	1

Subsection II-C: Faculty Technical Skills

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
25.	I know how to solve my own technical problems.	5	4	3	2	1
26.	I have had sufficient opportunities to work with different technologies.	5	4	3	2	1
27.	I select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.	5	4	3	2	1
28.	I can train faculty members to develop lessons that appropriately combine content, technologies and teaching approaches.	5	4	3	2	1

29.	I prepare my students to become leaders in the use of content, technologies and teaching approaches at their school and/ or district.	5	4	3	2	1
30.	I have the skills to design my instructions with technology to enhance students learning.	5	4	3	2	1

Subsection II-D: Faculty Workload

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

Statements		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
31.	Integrating technology in my teaching puts more workload and needs more time	5	4	3	2	1
32.	I need more time to change the curriculum to incorporate technology	5	4	3	2	1
33.	Integrating technology in my teaching requires me more time to gain needed knowledge and skills (e.g., professional development)	5	4	3	2	1
34.	Integrating technology in my teaching requires me more time to keep up with updated tools	5	4	3	2	1
35.	Integrating technology in my teaching needs more work and time to update course material, reply to students email, comment on students works, …	5	4	3	2	1

Subsection II-E: Faculty Technology Professional Development

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

Statements		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
36.	I have an immediate need for more training with curriculum that integrates technology	5	4	3	2	1
37.	I need more resources that illustrate how to integrate technology into the curriculum.	5	4	3	2	1

38.	I need more training opportunities with teaching strategies that integrate technology.	5	4	3	2	1
39.	I need more compelling reasons why I should incorporate technology into teaching.	5	4	3	2	1
40.	I need more regular (ongoing) instructional technology Seminars /workshops.	5	4	3	2	1
41.	I would like to collaborate with my colleagues on instructional technology issues.	5	4	3	2	1
42.	My university's faculty technology professional development plan meets my technology needs.	5	4	3	2	1
43.	I get enough support from the instructional designer staff in my College/University or Department.	5	4	3	2	1

Subsection II-F: Faculty Technology Accessibility

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
44.	I need adequate access to computers	5	4	3	2	1
45.	I need convenient access to more computers for my students	5	4	3	2	1
46.	I need more reliable access to the Internet at office and classroom.	5	4	3	2	1
47.	My students need more reliable access to the Internet in campus.	5	4	3	2	1
48.	I need more licensed software that is subject/curricular-based	5	4	3	2	1
49.	My classroom has adequate technology facilities and Infrastructure (i.e. computer, internet, projector, smartboard, clickers…)	5	4	3	2	1
50.	I need updated software and hardware	5	4	3	2	1

Subsection II-J**: Faculty Technical Support**

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
51.	I need immediate technical support to keep the computers and other tools working during instruction	5	4	3	2	1
52.	I need 24/7 support from the Information Technology (IT) staff at my institution to teach with technology	5	4	3	2	1
53.	My students need 24/7 support from the Information Technology (IT) staff at my institution to perform technology-based leaning tasks	5	4	3	2	1

Subsection II-H: Faculty Leadership Support

Please indicate your level of agreement with the following statements. Rating Scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
54.	My college has a clear vision and plan for integrating technology in the learning process	5	4	3	2	1
55.	My college offers the needed funds for integrating technology in the learning process (materials, training,.)	5	4	3	2	1
56.	My college adopts integrating technology across all courses	5	4	3	2	1
57.	Administrators in my college/department are supportive of faculty members who teach blended/online classes.	5	4	3	2	1
58.	Administrators in my college/department recognize the additional workload required to integrate technology in teaching.	5	4	3	2	1
59.	Administrators in my college/department communicate with faculty about the value of teaching blended/online classes.	5	4	3	2	1

Section III: Demographic Information

60.	**Age**	☐ **less than 30** ☐ **30-34** ☐ **35-39** ☐ **40 -44** ☐ **45-49** ☐ **50 and above**
61.	Gender	☐ Male ☐ Female
62.	Department	
63.	Country of Graduation	☐ Arab country ☐ Non-Arab country (*Please identify country*) *Country:…………………..
64.	Years of Teaching Experience	☐ 1- 5 years ☐ 6-10 years ☐ 11- 15 years ☐ 16 years and more
65.	Academic Rank	☐ Professor ☐ Associate Professor ☐ Assistant Professor ☐ Lecturer ☐ Graduate Teacher Assistant (Bachelor degree holders)
66.	Students population you teach	☐ Undergraduate ☐ Graduate ☐ Both (Undergraduate and Graduate)

Appendix D - CONSENT FORM –ARABIC VERSION

بسم الله الرحمن الرحيم

دعوة للمشاركة في الاجابة على أسئلة دراسة بحثية لنيل درجة الدكتوراه

عزيزي عضو/ عضوة هيئة التدريس بكلية التربية بجامعة طيبة بالمدينة المنورة

السلام عليكم ورحمة الله وبركاته وبعد،،،،

أنا الباحثة عائشة سليمان باجبع أكمل دراستي حاليا بالولايات المتحدة الأمريكية لنيل درجة الدكتوراه بإذن الله قسم مناهج وطرق تدريس – تخصص (حوسبة وتصميم التعليم والتعلم عن بعد)- بجامعة ولاية كانساس الحكومية.

أرجو مشاركتكم في تعبئة الاستبانة المرفقة واالتي تختص بدراستي بعنوان (العوامل المؤثرة و ممارسات أعضاء هيئة التدريس في إ ستخدام التقنيات التعليمية لإعداد طلاب كلية التربية استناداً الى معايير تقنيات التعليم الوطنية المعدة من قبل المجتمع الدولي لاستخدام التقنية في التعليم (ISTE NETS-T) بجامعة طيبة-المملكة العربية السعودية)

INFLUENTIAL FACTORS AND FACULTY MEMBERS PRACTICES IN TECHNOLOGY INTEGRATION USING ISTE STANDARDS FOR TEACHER PREPARATION AT TAIBAH UNIVERSITY- SAUDI ARABIA

والتي هي متطلب للحصول على درجة الدكتوراه.

إن الدراسة تهدف إلى استكشاف مدى استخدام اعضاء هيئة التدريس في جامعة طيبة للتقنيات الحديثة في التدريس وفقا للمعايير الموضوعة من قبل الجمعية الدولية لاستخدام التقنية في التعليم (ISTE). وكذلك معرفة العوامل التى تساعد اعضاء هيئة التدريس في دمج تقنيات التعليم في تدريسهم بشكل فعال .

إن نتائج هذه الدراسة سوف تساعد بإذن الله في معرفة مدى تطبيق كليات التربية للتعليم المدعوم بالتقنيات التعليمية بشكل فعال لاعداد معلمي المستقبل الدارسين بالكلية والعوامل التى تساعد اعضاء هيئة التدريس في تطبيق هذا النوع من التعليم . وباالتالي تعطي تصور أوضح يساعد ادارة الجامعة وعمادة كلية التربية على توفير هذه العوامل وتهيئة الظروف المناسبة لتطبيق التعلم المدعوم بالتقنية. كذلك تساعد الدراسة في معرفة مدى تطبيق التقنية في وفق المعايير الدولية مثل (ISTE) مما يساعد في وضع تصور عن الحاجات التدريبية لاعضاء هيئة التدريس للتطبيق الأمثل للتقنية الحديثة في كلية التربية بحيث يزيد من فاعلية استخدامها لدعم الاستراتيجيات الحديثة للتعلم.

مشاركتكم في تعبئة هذ الاستبانة مشكورة سلفا، علما بأنها تطوعية، ويمكنكم التوقف عن المشاركة بدون أي قيد أو شرط.
الاجابة على الاستبانة سوف تأخذ حوالي (15) دقيقة وتعبئة الاستبانة تعني الموافقة على المشاركة في هذه الدراسة.
الاجابة على الاستبانة لا تتطلب تصريحا باسم المشارك أو ما يدل عليه، ومع ذلك فإن المعلومات الشخصية سوف تظل سرية وتستخدم لأغراض البحث العلمي فقط.

إذا كان لديكم أي استفسار أو تساؤل حول الدراسة الرجاء الاتصال بمشرفي الدراسة :

Dr. David Allen : dallen@ksu.edu
Dr. Haijun Kang: hjkang@ksu.edu

أو الاتصال بالباحثة من خلال بيانات التواصل الموضحة بالأسفل.
سائلة المولى عز وجل أن يجعل الوقت الذي تستقطعونه لتعبئة الاستبانة في موارزين حسناتكم.
ولكم خالص التحية ووافر التقدير،،،،

الباحثة

عائشة سليمان علي باجبع

كلية التربية- قسم المناهج وطرق التدريس- جامعة كانساس الحكومية

الولايات المتحدة الأمريكية

الهاتف 0017853177473- البريد الالكتروني:abajabaa@KSU.edu

Appendix E - SURVEY USED IN THE STUDY -ARABIC VERSION

أداة الدراسة

المحور الاول : استخدام أعضاء هيئة التدريس لتقنيات التعليم اعتمادا على معايير ISTE NETS-T

يرجى الإشارة إلى الخيار الأفضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا اوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
1. أستخدم التقنية في التدريس لتصميم أنشطة تساعد على بناء المعرفة بشكل تعاوني وجماعي بين الزملاء والطلاب	5	4	3	2	1
2. أستخدم التقنية في التدريس لتفريد (differentiate) التعلم ولتخصيص أنشطة تعلم تراعي قدرات الطلاب وتنوع أساليب تعلمهم (الذكاءات المتعددة: سمعي، بصري، حركي، منطقي، اجتماعي، ذاتي)	5	4	3	2	1
3. أستخدم التقنية في التدريس لتمكين الطلاب من استكشاف والتعامل مع مشكلات واقعية تمس حياتهم لحلها	5	4	3	2	1
4. أستخدم التقنية في التدريس لتصميم خبرات تعليمية ترتبط بالطالب من خلال دمج الأدوات الرقمية (digital tools) والمصادر الأخرى لتشجيع الطلاب على الإبداع وزيادة فضولهم العلمي	5	4	3	2	1
5. أستخدم التقنية في التدريس لمساعدة الطلاب على تبني وممارسة الإستخدام الآمن والمسؤول الذي يراعي القوانين والحقوق في استخدام المعلومات والتقنية	5	4	3	2	1
6. أستخدم التقنية في التدريس لمساعدة الطلاب على اختيار واستخدام التقنية بشكل فاعل ومنتج	5	4	3	2	1
7. أستخدم التقنية في التدريس لتبادل أفضل الممارسات في تفعيل التقنية لدعم التعلم الاستقصائي مع الزملاء من أعضاء هيئة التدريس الأخرين	5	4	3	2	1
8. أستخدم التقنية في التدريس لتوصيل المعلومات والافكار للطلاب بشكل فعال.	5	4	3	2	1
9. أستخدم التقنية في التدريس لمساعدة الطلاب على البحث عن المعلومات من مصادر متعددة وتنظيمها وتحليلها وتقييمها وفق الضوابط الاخلاقية	5	4	3	2	1
10. أستخدم التقنية في التدريس لمساعدة الطلاب على التفاعل والتعاون والنشر مع الأقران والخبراء وغيرهم باستخدام مجموعة متنوعة من الوسائط والبيئات الرقمية	5	4	3	2	1

المحور الثاني: العوامل التي تؤثر في قرار أعضاء هيئة التدريس في استخدام ودمج تقنيات التعليم اثناء تدريسهم

القسم الاول : اتجاهات اعضاء هيئة التدريس حول دمج تقنيات التعليم في التدريس

يرجى الإشارة إلى الخيار الأفضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا اوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
11. أستمتع بإعداد الأنشطة الصفية التي تعتمد على دمج تقنيات التعليم في الأنشطة التعليمية	5	4	3	2	1
12. أعتقد بأن التدريس المعتمد على دمج واستخدام التقنية من شأنه أن يعزز ويحسن برنامج إعداد المعلمين ويطورطرق التدريس الخاصة بهم	5	4	3	2	1
13. أعتقد بأن تقنيات التعليم توفر طرق تدريسية تتناسب مع شريحة واسعة من الطلاب ذوي الانماط المختلفة في التعلم	5	4	3	2	1
14. أعتقد بان استخدام تقنيات التعليم من شأنه أن يحسن بشكل ملحوظ من نوعية التعليم لطلابي بشكل عام (مثل مساعدتهم على اكتساب مهارات التفكير الناقد)	5	4	3	2	1
15. أعتقد أن جميع أعضاء هيئة التدريس يجب أن يلموا بكيفية استخدام تقنيات التعليم في التدريس.	5	4	3	2	1
16. أعتقد بأن دمج التقنية في التعليم يشجع الطلاب على العمل مع بعضهم البعض	5	4	3	2	1
17. أعتقد أن استخدام تقنيات التعليم يساعدني على تنظيم عملي وزيادة انتاجيتي.	5	4	3	2	1

القسم الثاني: تصور أعضاء هيئة التدريس عن التطبيقات والممارسات التدريسية

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
18. يجب أن يكون دور عضو هيئة التدريس ميسرا لعملية التعلم من خلال تهيئة بيئة تعلم مناسبة للطلاب.	5	4	3	2	1
19. يجب أن يتعلم الطلاب من خلال العمل التعاوني، وليس كلا على حدة أو منفردين.	5	4	3	2	1
20. أستخدم بدائل أفضل من الاختبارعند تقييم الطلاب (مثل: حل مشكلات ذات نهايات مفتوحة، المشاريع الجماعية، العروض العملية، العروض الشفوية، الاختبارات المقالية، ملفات الأداء).	5	4	3	2	1
21. أركز اثناء تدريسي على المهارات التي تتجاوز المحتوى العلمي (مثل: التفكير الناقد، مهارة العرض والتقديم أو غيرها من مهارات القرن الحادي والعشرين)	5	4	3	2	1
22. يجب أن يعطى الطلاب قدراً أكبر من المسؤولية عن تعلمهم ويشاركوا في اتخاذ القرارت المتعلقة به.	5	4	3	2	1

العبارات					
23. ألزم الطلاب خلال تدريسي بتقييم أفكارهم والدفاع عن وجهات نظرهم وكذلك التفكير العميق فيما تعلموه.	5	4	3	2	1
24. تسمح البيئة التعليمية في الكلية للطلاب بالمشاركة في المشاريع المجتمعية أو التربية العملية.	5	4	3	2	1

القسم الثالث: المهارات التقنية التي يمتلكها أعضاء هيئة التدريس

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
25. أستطيع حل المشاكل التقنية التي تقابلني.	5	4	3	2	1
26. حظيت بفرص كافية وجيدة لاستخدام تقنيات تعليم متنوعة.	5	4	3	2	1
27. أحدد تقنيات التعليم لاستخدامها في الفصول الدراسية والتي تساعد في تعزيز ما أقوم بتدريسه وكيفية تدريسه وماذا يتعلم الطلاب.	5	4	3	2	1
28. استطيع تدريب زملائي أعضاء هيئة التدريس على تطوير الدروس بطريقة مناسبة تجمع بين المحتوى وتقنيات التعليم وطريقة التدريس المناسبة.	5	4	3	2	1
29. أعدّ طلابي ليصبحوا قادرين على التدريس عن طريق دمج المحتوى العلمي مع تقنيات التعليم وطرق التدريس المناسبة في مدارسهم أو منطقتهم التعليمية مستقبلا.	5	4	3	2	1
30. امتلك المهارات اللازمة لتصميم التدريس باستخدام تقنيات التعليم لتعزيز تعلم الطلاب.	5	4	3	2	1

القسم الرابع : عبئ ومتطلبات عملية التدريس على أعضاء هيئة التدريس

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
31. دمج التقنية في عملية التدريس يزيد أكثرمن أعباء العمل علي ويحتاج إلى مزيد من الوقت.	5	4	3	2	1
32. أحتاج إلى مزيد من الوقت لتغيير المنهج لأجل دمج التقنية في التدريس.	5	4	3	2	1
33. دمج التقنية في عملية التدريس يتطلب مني المزيد من الوقت لاكتساب المعرفة والمهارات اللازمة (مثل التنمية المهنية)	5	4	3	2	1
34. دمج التقدية في تدريسي يتطلب مني المزيد من الوقت لمتابعة ومواكبة التطورات التي تحدث في مجال تقنيات التعليم.	5	4	3	2	1

35. دمج التقنية في تدريسي يتطلب مني المزيد من العمل والوقت لتحديث المواد الدراسية، والرد على البريد الإلكتروني للطلاب والتعليق على واجبات وأعمال الطلاب .	5	4	3	2	1

القسم الخامس: الإحتياجات التدريبية لأعضاء هيئة التدريس لاستخدام تقنيات التعليم

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
36. أنا بحاجة ماسة لتدريب أكثر على دمج تقنيات التعليم في المنهج الدراسي	5	4	3	2	1
37. أحتاج إلى المزيد من المصادر التي توضح كيفية دمج التقنية في المنهج الدراسي.	5	4	3	2	1
38. أحتاج إلى فرص تدريبية أكثر فيما يتعلق بطرق التدريس التى تدعم دمج تقنيات التعليم.	5	4	3	2	1
39. أحتاج إلى أسباب أكثر إقناعاً لوجوب دمج تقنيات التعليم في التدريس.	5	4	3	2	1
40. أحتاج الى ورش عمل وحلقات نقاش دورية ومستمرة تتعلق باستخدام التقنية في التدريس.	5	4	3	2	1
41. أرغب في التعاون مع زملائي في القضايا المتعلقة باستخدام التقنية في التدريس.	5	4	3	2	1
42. تتوافق خطة الجامعة في مجال التطوير المهني لأعضاء هيئة التدريس مع إحتياجاتي التدريبية في مجال تقنيات التعليم.	5	4	3	2	1
43. احصل على الدعم الكافي والمطلوب من قبل مختصي الدعم في مجال التصميم التعليمي في الكلية أوالجامعة.	5	4	3	2	1

القسم السادس: توفر وإمكانية وصول أعضاء هيئة التدريس للاجهزة والبرامج المتعلقة بتقنيات التعليم

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
44. أحتاج إلى فرص كافية لاستخدام أجهزة الكمبيوترفي بيئة العمل	5	4	3	2	1
45. أحتاج إلى عدد أكبر ومناسب من أجهزة االكمبيوتر لطلابي للاستخدام في بيئة التدريس.	5	4	3	2	1
46. أحتاج إلى اتصال دائم وموثوق به بالإنترنت في المكاتب والفصول الدراسية.	5	4	3	2	1
47. يحتاج طلابي الى اتصال دائم وموثوق به بالإنترنت في الحرم الجامعي .	5	4	3	2	1

48. أحتاج إلى شـــراء رخصـــة للبرامج المرتبطة بالمناهج الدراسية.	5	4	3	2	1
49. تحوي الفصول التى اقوم بالتدريس فيها على البنية التحتية والتجهيزات التقنيـة اللازمـة (مثـل: كمبيوتر، إنترنـت، البروجكتور، الســبورة الذكية، نظام الاســتجابة الفورية "الكلكر Clicker...)	5	4	3	2	1
50. أحتاج إلى أجهزة وبرامج محدثة (ليســت قديمة أو منتهية الصلاحية)	5	4	3	2	1

القسم السابع : الدعم الفني لاعضاء هيئة التدريس في استخدام تقنيات التعليم

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
51. أحتاج لتوفر الدعم التقني الكافي والمباشــر لضــمان اســتمرارية عمل أجهزة الكمبيوتر وغيرها من الأدوات التقنية أثناء التدريس.	5	4	3	2	1
52. أحتاج إلى دعم فني على مدار الساعة (7/24) من جهاز الدعم الفني (IT) بالجامعة لضـمان اسـتمرار عملية التعلم المعتمدة على التقنية.	5	4	3	2	1
53. يحتاج طلابي إلى دعم فني على مدار الســاعة (7/24) من جهاز الدعم الفني (IT) بالجامعة لضــمان اســتمرار عملية التعلم وأداء المهام المعتمدة على التقنية.	5	4	3	2	1

القسم الثامن:مستوى دعم المسئولين لاستخدام تقنيات التعليم في التدريس

يرجى الإشارة إلى الخيار الافضل الذي يتفق مع درجة موافقتك او عدم موافقتك مع العبارات التالية. وذلك بناءً على المقياس التالي: أوافق بشدة (5)، أوافق (4)، محايد (3)، لا أوافق (2)، لا أوافق بشدة (1)

العبارات	أوافق بشدة	أوافق	محايد	لا أوافق	لا أوافق بشدة
54. يوجد لدى كلية التربية بالجامعة رؤية واضـــحة وخطة لدمج التقنية في عملية التدريس.	5	4	3	2	1
55. توفر كلية التربية في الجامعة الدعم المادي اللازم لدمج التقنية في عملية التدريس (المواد، تدريب، ...)	5	4	3	2	1
56. تتبنى كلية التربية في الجامعة عملية دمج التقنية في جميع المواد.	5	4	3	2	1
57. تدعم الهيئة الادارية في كلية التربية أعضاء هيئة التدريس الذين يقومون بالتدريس باســتخدام تقنيات التعليم ســواءا باسلوب الدمج (blended) أو التعلم عن بعد.	5	4	3	2	1
58. تدرك الهيئة الادارية في كلية التربية العبئ الإضـــافي في العمل الذي يتطلبه دمج التقنية في عملية التدريس.	5	4	3	2	1

59. تتواصل الهيئة الادارية في كلية التربية مع أعضاء هيئة التدريس حول أهمية و فائدة التدريس باستخدام تقنيات التعليم سواءا باسلوب الدمج (blended) أو التعلم عن بعد.	5	4	3	2	1

المحور الثالث: بيانات ديموغرافية (تعريفية)

.60	السن	☐ أقل من 30 ☐ 30-34 ☐ 35-39 ☐ 40-45 ☐ 46-49 ☐ 50 وأكثر
.61	الجنس	☐ ذكر ☐ أنثى
.62	القسم /التخصص	
.63	حصلت على مؤهل علمي من	☐ بلد عربي ☐ بلد غير عربي من فضلك أذكر اسم الدولة : ....
.64	عدد سنوات الخبرة في التدريس:	☐1-5 ☐6-10 ☐ 11-15 ☐ أكثر من 16
.65	الرتبة الاكاديمية	☐ استاذ ☐ استاذ مشارك ☐ استاذ مساعد ☐ محاضر ☐ معيد
.66	أقوم بتدريس الطلاب في مرحلة:	☐ البكالوريوس فقط ☐ الدراسات العليا فقط ☐ الاثنين معاً (البكالوريوس و الدراسات العليا)

شاكرة لكم كريم تعاونكم ,,,,,

Appendix F - A. KAMAL'S PERMISSION

Re: Permission Request on using Dissertation Survey

Dr. Abdulrahman kamal <akamal21@gmail.com>

Mon 2/22/2016 11:50 AM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Sure Aysha, you can use it with proper citation.

Wish you the best in your study

Abdulrahman A Kamal, PhD
Educational Computing, Design, and Online Learning
Science Consultant
Jeddah Education
Saudi Arabia

On Sat, Feb 20, 2016 at 3:45 PM, Aysha Bajabaa <abajabaa@ksu.edu> wrote:

> Dear Dr. Kamal,
>
> My name is Aysha Bajabaa, a doctoral candidate student in Curriculum & Instruction at Kansas State University. I would like to ask your permission to use part of your survey in my dissertation
>
> I will add proper citation, and include your permission in my dissertation.
>
> Appreciate you cooperation.
>
> Aysha Bajabaa
>
> PhD Candidate
>
> Department of Curriculum and Instruction
>
> Kansas State University

Appendix G - KNEZEK's PERMISSION

3/2/2016 Re: Fw: Permission on using Dissertation Survey - Aysha Bajabaa

Re: Fw: Permission on using Dissertation Survey

Gerald Knezek <gknezek@gmail.com>

Tue 3/1/2016 9:59 PM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Cc: Rhonda Christensen <rhonda.christensen@gmail.com>;

Greetings Aysha,

You have permission to use the "Teachers Attitudes Toward Information Technology (TAT)" and "Faculty Attitudes toward Information Technology" (FAIT) instruments in your dissertation study. We ask only two things:

1. Cite the authors on the instruments as they are administered, and

2. Let us know the findings of your study (a copy of the abstract of your dissertation would be adequate).

I was one of the supervisors of Dr. Gilmore's work so I am confident in granting this permission for the FAIT.

I am first author of the TAT so permission is granted. I am CCing Co-Author Rhonda Christensen.

Good luck on your study.

Regards,
Gerald Knezek

On Tue, Mar 1, 2016 at 12:45 PM, Aysha Bajabaa <abajabaa@ksu.edu> wrote:

> Dear Dr. Gerald Knezek,
> Dr. Rhonda Christensen adviced me to contact you as a first author.
> I ask your permission to use part of TAT and FAIT survey instrument in my dissertation and I will add

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Appendix H - HAKIM'S PERMISSION

Re: Permission Request on using Dissertation Survey

Hakim, Sharmin <sah2028@tc.columbia.edu>

Fri 2/26/2016 1:17 PM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Hello Aysha,

You have my permission to use those items. In terms of validity, it is best for you to pilot/test the items with your population as it appears you are studying higher ed faculty and I was studying pre-service teachers. Good luck with your dissertation!

Best,
Sharmin

On Wed, Feb 24, 2016 at 12:00 PM, Aysha Bajabaa <abajabaa@ksu.edu> wrote:

Thank you for your replay

these questions from section 7. as follow

Faculty members should be facilitators who mediate the environment for students.
Students should work collaboratively when learning, not individually.
There are better alternatives to testing when assessing students learning (i.e. open-ended problems, group projects, hands-on demonstrations, exhibitions or oral presentations, essay test, portfolios).

I will use it to examine my population in their constructivist pedagogical believe (in addition to other 4 items i found in another study) Do think the three items I used from your survey are valid to examine faculty members in a collegae of education constructvist pedagogical believe?
Thank you for your cooperation,
Aysha,

From: Hakim, Sharmin <sah2028@tc.columbia.edu>
Sent: Wednesday, February 24, 2016 10:01 AM

Appendix I - RICK VOITHOFER'S PERMISSION

3/2/2016 Re: Permission Request on Using Dissertation Survey - Aysha Bajabaa

Re: Permission Request on Using Dissertation Survey

Voithofer, Richard <voithofer.2@osu.edu>

Tue 3/1/2016 1:08 PM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Yep. Those are fine to use.

rick

On Feb 29, 2016, at 5:34 PM, Aysha Bajabaa <abajabaa@ksu.edu> wrote:

Dear Dr. Rick Voithofer,
It was nice talking to you Today, based on our discussion, I attached the items I am planing to use from you survey with indication to the specific part which each statement belong to.
I look forward for your response.

Aysha Bajabaa
PhD Student
Department of Curriculum and Instruction
Kansas State University
abajabaa@ksu.edu

From: Aysha Bajabaa
Sent: Monday, February 29, 2016 12:54 PM
To: voithofer.2@osu.edu
Subject: Permission Request on Using Dissertation Survey

Dear Dr. Rick Voithofer,
My name is Aysha Bajabaa, a doctoral candidate student in Curriculum & Instruction at Kansas State University.
I would like to ask your permission to use part of your survey titled "National Survey of Teacher Education Programs" .
I will add proper citation, and include your permission in my dissertation.
Appreciate your cooperation.

Aysha Bajabaa
PhD Student
Department of Curriculum and Instruction
Kansas State University
abajabaa@ksu.edu

From: Aysha Bajabaa
Sent: Thursday, February 25, 2016 12:19 PM
To: voithofer.2@osu.edu
Subject: Fw: Permission Request on Using Dissertation Survey

Dear Dr. Rick Voithofer,
My name is Aysha Bajabaa, a doctoral candidate student in Curriculum & Instruction at Kansas State University.
I would like to ask your permission to use part of your survey titled "National Survey of Teacher Education Programs" found at:

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Appendix J - YIDANA'S PERMISSION

Re: Permission Request on using Dissertation Survey

Issifu Yidana <iyidana@uew.edu.gh>

Wed 3/2/2016 3:29 AM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Hi Aysha,
Permission granted. I wish you success in your study.
Regards
Issifu Yidana

On 2016-02-20 20:30, Aysha Bajabaa wrote:
> Dear Dr. Issifu Yidana
>
> My name is Aysha Bajabaa, a doctoral candidate student in Curriculum
> & Instruction at Kansas State University.
>
> I would like to ask your permission to use part of your survey in my
> dissertation
>
> I will add proper citation, and include your permission in my
> dissertation.
>
> Appreciate you cooperation.
>
> Aysha Bajabaa
>
> PhD Candidate
>
> Department of Curriculum and Instruction
>
> Kansas State University abajabaa@ksu.edu

Appendix K - PETHERBRIDGE'S PERMISSION

2/21/2016 Re: Permission Request on using Dissertation Survey - Aysha Bajabaa

Re: Permission Request on using Dissertation Survey

Donna Petherbridge <pether@ncsu.edu>

Sat 2/20/2016 5:21 PM

To: Aysha Bajabaa <abajabaa@ksu.edu>;

Hi Aysha,
Yes, please feel free to use whatever is helpful to you,
Donna :-)

On Sat, Feb 20, 2016 at 3:42 PM, Aysha Bajabaa <abajabaa@ksu.edu> wrote:

> Dear Dr. Donna Petherbridge
>
> My name is Aysha Bajabaa, a doctoral candidate student in Curriculum & Instruction at Kansas State University.
>
> I would like to ask your permission to use part of your survey in my dissertation
>
> I will add proper citation, and include your permission in my dissertation.
>
> Appreciate you cooperation.
>
> Aysha Bajabaa
>
> PhD Candidate
>
> Department of Curriculum and Instruction
>
> Kansas State University
>
> abajabaa@ksu.edu

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Appendix L - CONNECTION BETWEEN SURVEY ITEMS AND SOURCES

Section	#Items		The author
Section I: Faculty technology integration using ISTE-NETS-T Standards	10 (1-10)	1,2,3,4,5,6,7,8,9,10	Kamal 2012
Section II: Factors influence faculty members in technology integration			
Sub-Section II-A: Faculty Attitudes towards Technology Integration	7 (11-17)	11,12,13, 14, 15, 16, 17	Dr. Gerald Knezek
Subsection II-B: Pedagogical Beliefs	7 (18-24)	18,19,20 21,22,23,24	Sharmin Hakim, 2015 Kamal -2012
Sub-Section II-B: Technical Skills	6 (25-30)	25,26,27,28,29, 30	Dr. Rick Voithofer The researcher
Sub-Section II-C: Workload	5 (31-35)	31,32,33,34,35	The researcher
Sub-Section II-D: Faculty Technology Professional Development Needs	8 (36-43)	36,37,38,39,40,41,42. 43	Issifu Yidana (2007) The researcher
Sub-Section II-E: Faculty Technology Accessibility	7 (44-50)	45,46,48 44,47,49,50	Issifu Yidana (2007) The researcher
Sub-Section II-F: Faculty Technical Support	3 (51-52-53)	51 52,53	Issifu Yidana (2007) Dr. Rick Voithofer
Sub-Section II-J: Leadership Support	6 (54-59)	54-55 56-57 58-59	The researcher Dr. Rick Voithofer Donna Petherbridge 2007

Items	Author
1,2,3,4,5,6,7,8,9,10, 21,22,23,24	Kamal -2012
11,12,13,14,15,16,17	Dr. Gerald Knezek
18,19,20	Sharmin Hakim, 2015
25,26,27,28,29,52,53, 56,57	Dr. Rick Voithofer
36,37,38,39,40,41,42,45,46,48,51	Yidana (2007)
58,59.	Donna Petherbridge 2007
30,31,32,33,34,35,43,44,47,49,50,54,55	The researcher

Appendix M - INVITATION TO PARTICIPATE IN IN THE PILOT STUDY

Dear Faculty member in college of education at Taif University,

I am conducting a research for studying faculty members' practices in integrating technology in their teaching based on international Society for Technology in Education ISTE standard for teacher.

Thank you in advance for your participation in supporting the development of the instrument for this study; this is an important part of my doctoral research that will allow me to move forward in the dissertation process.

To complete the survey, please read through each part of the survey and respond to the questions. The survey has three parts, and can be completed in approximately 15 minutes. The online survey is located at: https://www.surveymonkey.com/r/366DWPL . Your participation is anonymous and responses will only be used for the research purposes of this study and the data in this study will be confidential to the researcher.

If you have any question or concern regarding this survey, please contact the study supervisors:
Dr. Allen: dallen@ksu.edu
Dr. Kang: hjkang@ksu.edu
OR the researcher: abajabaa@ksu.edu , Cell: 1-785-317-7473

Thank you for taking time to complete this task and assistance,

Researcher: Aysha Bajabaa

Appendix N - IRB APPROVED FORM

KANSAS STATE UNIVERSITY | University Research Compliance Office

TO: David Allen
Curriculum and Instruction
Bluemont Hall

Proposal Number: 8597

FROM: Rick Scheidt, Chair
Committee on Research Involving Human Subjects

DATE: 01/13/2017

RE: Proposal Entitled, "INFLUENTIAL FACTORS AND FACULTY MEMBERS PRACTICES IN TECHNOLOGY INTEGRATION USING ISTE STANDARDS FOR TEACHERPREPARATION AT TAIBAH UNIVERSITY- SAUDI ARABIA"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written – and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §46.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier St., Manhattan, KS 66506-1103 | 785-532-3224 | fax: 785-532-3278 | comply@ksu.edu | k-state.edu/research/comply