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# Preparing Pre-Service Teachers to Use Digital Visual Media for Twenty-First Century Teaching and Learning: Practices and Visions of Teacher Preparation Programs in Saudi Arabia

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PREPARING PRE-SERVICE TEACHERS TO USE DIGITAL VISUAL  
MEDIA FOR TWENTY-FIRST CENTURY TEACHING AND  
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PREPARATION PROGRAMS IN SAUDI ARABIA

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## ABSTRACT

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With the increasing use of modern technological media in various areas of life, it has become necessary to develop teaching methods to deal with this change. One key to modernizing teaching methods is the integration of digital visual media into the educational process. The use of these visual media in programs for future teachers has become essential due to the widespread impact of such content in this digital age. Therefore, this study examines the current experiences and perceptions of five teacher educators on the use of digital visual media in pre-service teachers' preparation programs in Saudi Arabia. The research questions addressed participants' perspectives about the use of and practice for integrating digital visual media in university-level teacher education programs. The researcher used a questionnaire and individual interviews to collect information about the participants' perceptions regarding the use of digital visual media in their educational practices. Data analysis led to the identification of four main themes: (a) societal demand for technology and visual knowledge, (b) increased knowledge of technology, (c) technology and digital visual media practices, and (d) developing a vision requires training and support. Results of the study indicated that overall, participants value and understand the importance of using digital visual media for educational purposes. However, the findings showed the participants' knowledge of

digital visual media was limited. Although the participants emphasized the importance of using digital visual media, they lacked experience in actual practice with how to use visual media to prepare future teachers. This lack of knowledge is interpreted as being due to a lack of required coursework focused on providing background in computer skills and a lack of support and training in the use of all the diverse visual technologies pre-service teachers need to work with and understand. This study has several practical implications to guide school administrators at both university and public education levels in designing professional development for teachers.

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## **CHAPTER I**

### **INTRODUCTION**

In light of the great progress in technology seen in recent years in this new digital age, most developed and developing countries are reviewing their education systems in general, and their teacher preparation programs in particular. To best meet the needs of today's students, pre-service teachers should be trained through high-quality preparation programs that prepare them with important knowledge, skills, experiences, and guidance. Since teacher preparation programs address education and training in the same setting (Kirschner & Selinger, 2003), academic courses included in such programs are ideal for simultaneously instructing future teachers on how to integrate technology effectively into their eventual classrooms. Furthermore, digital technology platforms have become an essential part of our everyday lives because, as noted by Poore (2011), "as we move more and more into cyberspace we have to contemplate how we want to live and how we want to be human" (p. 25). Therefore, pre-service and in-service teachers must improve their digital skills through professional development and training programs to be better able to devise the strategies that can help them create modern curricula that include the innovative use of technology. Educators must ensure that they are aware of the full range of digital tools available and are fully literate in their use to best serve today's students (Poore, 2011). Many educational researchers have found that technology is under-used and attribute this to the following factors: (a) the personal pedagogical beliefs of individual educators; (b) the professional development the teacher has undergone; (c)

institutional policy at the school; and, (d) the accessibility of technology in the teaching environment, which is often related to the economic status of the particular institution (Eristi, Kurt, & Dindar, 2012; Hechter & Vermette, 2013). Although it is understandable that these factors might cause teachers to have issues with the incorporation of technology into the classroom, when introduced appropriately, technology in education can greatly enhance student learning and academic success (Ozel, Yetkiner, & Capraro, 2008; Shin, Sutherland, Norris, & Soloway, 2012). Indeed, how we use technology in education has been changing rapidly (Gilakjani, Leong, & Ismail, 2013), which requires that teacher preparation programs are constantly updated to keep up with changing instructional practices (Davis, 2017). Today, with so many electronic devices readily available to us, including digital cameras with which we can create images and videos as well as easily upload them to social sites for sharing, we live in a true visual environment.

### **Problem Statement**

Students now live in a visually rich environment where they are surrounded by much visual data. Due to this, it is difficult for students in the digital generation to learn through traditional educational approaches that often ignore the peculiarities of their generation's style of cognition and learning. There are many studies that show that the traditional teaching process is no longer suitable for this new group of students, as they are used to receiving and processing a large amount of information digitally; they need to be provided the capabilities that will enable them to understand and interpret all this data. Thus, the contradiction between the cognitive style of learners and the style of information provided in textbooks or from teachers are convincing as a rationale for educational practices that include visual methods. The learning styles and thinking styles

of these students, which are formed by the digital environment they grew up in, is contrary to the teaching methods of traditional education.

There are new methods and techniques available that may increase productivity using different types of educational programs; these are especially important to the training we deliver to pre-service teachers. Teacher classroom practices vary depending upon individual preferences in educational methods. Even though it is relatively common for some level of technology to be present in most schools, obstacles exist to the creation of a universal standard regarding the level of technology that should be available and used in every classroom in the United States and elsewhere. Furthermore, there are discrepancies between the types of technology available and the actual use of that technology in classrooms (Fabry & Higgs, 1997; Gray, Thomas, & Lewis, 2010; Pelgrum, 2001). Additionally, most educational research has found a strong connection between student learning outcomes and effective use of technology (Davis, Preston, & Sahin, 2009; Roschelle, Pea, Hoadley, Gordin, & Means, 2000). Furthermore, the research shows that quantity and quality of pre-service teacher education programs influence the degree to which new teachers adopt technology (Agyei & Voogt, 2011). According to Pope, Hare, and Howard (2002), there is a gap between what pre-service teachers learned through their technology coursework and how successfully they integrate that technology into their actual classrooms. Additionally, it has been recommended that teacher education programs reconsider training approaches to provide appropriate environments that “influence the interrelated set of teacher thoughts (teaching beliefs, self-efficacy, attitudes, etc.) in relation to prospective educational use of technology” (Sang, Valcke, van Braak, & Tondeur, 2010, p. 109). Moreover, preparing

and supporting teachers pre- and post-training to effectively integrate technology is affected by pre-service learning experiences such as teacher educator technology use and the field experiences provided (Tondeur, Pareja Roblin, van Braak, Voogt, and Prestridge, 2017). Thus, the use of technology in future teacher education courses will motivate new teachers to integrate technology into their own teaching in the future. Additionally, Dexter, Doering, and Riedel (2006) noted that faculty's use of technology during pre-service coursework is the best way to motivate students of education as this demonstrates the actual practice of integrating technology into the teaching process. In addition, to increasing the use of technology in education, it is important we prepare teachers to be proficient and interactive users of visual technologies as these are the necessary skills and requirements of this digital age (Özsevgec, Akbulut, & Özsevgec, 2010). Although students seem to be proficient users of digital visual technology, "most are unaware of the principles underlying the tools they so readily adopt and cannot make important connections between types of visual technology and its uses" (Spalter & van Dam, 2008, p. 94). On the other hand, Stokes (2002) reported that the use of visual materials in teaching and learning has positive results, as educational literature in this area suggests.

Moreover, one study clearly showed that pre-service teachers do not receive enough technology modeling to be successful (Banister & Vannatta, 2006). This issue is especially notable in non-Western countries like Saudi Arabia. The Saudi Arabian educational system uses a very traditional approach to teaching that primarily involves the direct transmission of information from teacher to student. This means that students are not typically active participants in the learning process; they are simply recipients of learning (Hamdan, 2014). All Saudi schools practice the same teaching system whereby

the identical curriculum is delivered to students in a gender-segregated setting (institutions are dedicated to one gender or the other). Currently, Saudi Arabia has been investing heavily in educational technology, but due to the nature of educational programs in the country, the practice of using such technology tends to lag behind acquisition (Al-Gahtani, 2004; Al-Gahtani, Hubona, & Wang, 2007; Nassuora, 2012). However, certain efforts are being made to address this problem such as: creating teaching materials that explain how to use technology; and, increasing the amount of teacher technology training available to educators. The fact that issues remain suggests that additional barriers exist that might be related to other factors that influence the motivation of pre-service teachers to use technology in the classroom. Teacher education practices have an important impact on the practices students of education will employ as well as their ability to apply their knowledge in the classroom (Pope et al., 2002; Tondeur et al., 2017). Therefore, it is important that teacher preparation programs examine “how technology is being introduced, integrated, and modeled for preservice teachers” (Davis, 2017, p. 4).

The use of technology in education is not a new area of study. It has been a subject of interest for many researchers in the fields of technology and education (Eristi et al., 2012; Hechter & Vermette, 2013; Keefe, 1987; Koschmann, Myers, Feltovich, & Barrows, 1994; Ozel et al., 2008). During the 1980s, the use of computers by average U.S. citizens at home and work became more common; and, schools began to introduce computers into their programs as well, which is why this is the time from which we date the start of the “digital natives,” the first generation that grew up with personal computer use (Kulik, Kulik, & Cohen, 1980; Stevens, 1980). More recently, researchers have

examined university students' use of different personal technological devices such as computers, smart phones, digital tablets, and how they use these tools for study, social media, and entertainment. For instance, Kvavik and Caruso (2005) conducted a study to investigate the level of technology use at the university level. The study found that younger students are more confident in their technology skills than older ones.

Additionally, the survey results indicated that most of the students participating reported using technology mostly for: e-mail (99.7%), constructing papers for coursework (98.9%), accessing the Internet for coursework (98.4 %), and, other class activities (96.2%; Kvavik & Caruso, 2005). Similarly, the findings of Jones, Ramanau, Cross, and Healing (2010), in their study conducted at five English universities, "confirm[ed] the research that has shown that the conditions in terms of the availability and use of technologies required for a Net generation and the development of Digital Natives exists within the population entering university" (p. 730). Clearly then, Jones et al.'s (2010) study shows that digital natives are more active users of electronic devices and more confident in their technological skills.

These days, we are looking at a whole generation of digital natives that "enter college and choose teacher education programs" (Lei, 2009, p. 87). Thus, this group of students, from whom future teachers will come, have positive beliefs, attitudes, and experiences regarding technology (Lei, 2009). However, Lei (2009) also found that members of the digital native generation in teacher education programs tend to have limited professional technological proficiency due to a lack of experience: (a) using classroom technologies; (b) using Web 2.0 technology; and, (c) using a diversity of advanced technologies. Therefore:

Systematic technology preparation is needed to help them learn more advanced technologies, classroom technologies, and assistive technologies, and more important, to help them make the connections between technology and teaching and to help them make the transition from digital-native students to digital-native teachers. (Lei, 2009, p. 87)

Today's college students live in a visually rich environment. They can understand and create meaningful messages and representations through images and visual media. With the importance of digital visual media in contemporary culture, college students should prepare to engage critically and effectively with visual data in the academic environment. Thus, today's students "must develop the skills needed to find, interpret, evaluate, use, and produce visual materials in a scholarly context" (Hattwig, Bussert, Medaille, & Burgess, 2013, p. 61). There is a diversity of images, codes, signals, and vocabulary that create meaning in the visual culture. Teaching 21st century learners how to visualize and compose visual media is essential and must be supported in higher education curricula (Hattwig et al., 2013).

Moreover, there is a huge amount of digital media, such as pictures, audio files, 3D models, and videos being created and shared over the Internet every day. The increasing variety of visual data on electronic devices requires increasing student knowledge about these types of media. In the 21st century, digital visual technologies have quickly transformed our culture into a very visually-focused world, resulting in such digital visual media becoming a primary way to communicate in a meaningful fashion.

Very few research studies have examined students' use of visual materials in higher education. Similarly, very few studies have explored the impact of teacher training programs (Hattwig et al., 2013; Özsevgeç et al., 2010). The results show that there is a need to improve the future teachers' skills in digital visual literacy because the digital

visual competencies of teachers are as advanced as the everyday practices carried out by students in social networking using images and visual materials. To date, few studies have been conducted regarding how visual content such as infographics and audio-visual aids improve learning outcomes for students (Afify, 2018; Mathew, & Alidmat, 2013). However, a number of studies conducted in Saudi Arabia have focused on teacher preparedness to integrate technology into the curriculum. Additionally, most of the research in this area focuses on pre-service teachers who are enrolled in preparation programs to examine their abilities, beliefs, attitudes, and experiences regarding the effective use of technology; however, with the progress in introducing technology into teacher preparation curricula, certain findings indicate that “many faculty are still in early stages of technology adoption” (Brzycki & Dudt, 2005). To effectively advance digital visual media in pre-service teacher education, educators and policy makers need research that examines the purposes, values, and practices involved in educating pre-service teachers about digital visual media and how to use it in their future classrooms. Therefore, to address this gap in the literature, it is necessary to investigate this topic in a Saudi context to obtain relevant data that can be generalized to the population of Saudi educators as a whole. This study proposed to address this gap by investigating how faculty prepare pre-service teachers to use digital visual media in their future classrooms in Saudi Arabia.

### **Purpose of the Study**

The primary purpose of this research was to understand how teacher educators prepare pre-service teachers to use digital visual media in their future positions, from the perspective of Saudi teacher educators.

### **Research Questions**

- Q1 How do Saudi teacher educators articulate the value of digital visual media to 21st century teaching and learning when preparing pre-service teachers?
- Q2 How do Saudi teacher educators understand and use digital visual media in preparing pre-service teachers?
- Q3 How do Saudi teacher educators prepare pre-service teachers for integrating digital visual media for educational purposes in their future teaching?
- Q4 What is the vision of Saudi teacher educators in regard to pre-service teacher preparation about digital visual media and its integration into teaching and learning in Saudi Arabia?

### **Significance of the Study**

The most fundamental reason for failure in the delivery of education throughout the world is the failure of educators to adapt to the modern students' use and mastery of digital media (Prensky, 2001). The educational system as designed to teach previous generations is no longer an appropriate method for reaching today's students. The idea that as things evolve over time, there is no ability to go back, has been referred to as a "so-called 'singularity,'" which Prensky (2001) defined as "the arrival and rapid dissemination of digital technology in the last decades of the 20th century" (p. 1). The effectiveness of digital tools can no longer be ignored in everyday life. Young people grow up readily using these tools--Vs, computers, cellphones, digital tablets, videogames, digital music players, cameras, etc.--in their daily lives. Additionally, as such digital visual media becomes increasingly integral to functioning in the modern era, people feel they cannot live without it. Furthermore, the different areas in which digital media have become key make technology vital to communication, education, research, recreation, and entertainment. As a result, the mission of teacher educators in pre-service teacher

education programs to educate new teachers should include ensuring they are adept at using digital visual media. In turn, these new teachers will be more successful in teaching digital era students in the classrooms of the future.

This study proposes to be a starting point in terms of confirming the need for useful digital visual literacy in the preparation of teachers. With considerable technological progress, it has become clear that, at least for pre-service teachers, there is a need to improve the visual literacy abilities of future teachers. Therefore, the case of pre-service Saudi teachers appears to be important and needs to be further investigated as these pre-service teachers lag behind those training to work in other job sectors--such as health, business, and industry - in their ability to incorporate digital media into their futures (Al-Zahrani, 2011).

Furthermore, this study made an authentic contribution to the field of research on educational technology in general and that of pre-service teacher preparation in particular. In addition, this study also contributed to the improvement of the Saudi Arabian educational system by contributing real recommendations on how to use digital visual media effectively. Last, the study's findings may be useful to teacher educators, school administrators, and educational policy-makers for improving and transforming teaching and learning by supporting methods of using digital visual literacy for curriculum design, teacher training, and professional development.

### **Definitions of Terms**

*Digital natives.* The younger generation that has grown up with technology (Prensky, 2001).

*Digital visual literacy.* Considered “the ability both to create and to understand certain types of information, in this case visual materials created with a computer”

(Spalter & van Dam, 2008, p. 93).

*Digital visual media.* Visual media created using technology, such as on a computer, laptop, or mobile phone device, etc.

*Pre-service teachers.* Students who are enrolled in teacher preparation programs; teachers that are in training (Davis, 2017).

*Technology integration.*

Creating, using, and managing innovative and appropriate technological processes and resources to enhance learning and performance; the effective implementation of educational technologies to accomplish intended learning outcomes; the practice and art of incorporating technology into educational contexts; the use of informational and educational technology in instructional settings to support learning.” (Spector, Merrill, Elen, & Bishop, 2014, p. 963)

### **Chapter Summary**

This chapter presented an introduction to the study. It also provided the research overview, background, and statement of the research problem. In addition, it examined the importance of the use of technology and digital visual media in teacher education courses to enhance the ability of these future educators to integrate technology into their own teaching in the future. Subsequently, it provided a comprehensive picture of the study context including: an overview of the Saudi education system, technology developments, pre-service teacher education, and related issues. Furthermore, it considered the growing global desire for technology integration into pre-service teacher education due to the generation of digital natives currently in the educational system at all levels who are more active users of electronic devices and more confident in their technological skills.

## **CHAPTER II**

### **LITERATURE REVIEW**

Technology has become an important aspect of education that has changed and modernized traditional teaching approaches. Presently, advanced technology has become the focus of educators at all levels and in all fields of education. The use of technology can broaden students' critical thinking and their understanding of classroom material (Newman, 1996; van Gelder, 2001). Furthermore, for this digital generation, it is very important that teachers integrate various types of educational technology to keep tech-savvy students engaged while at the same time continuing their own development in the use of the newest educational technology available to them. Through the incorporation of current trends, it is possible to create a more diverse and challenging classroom for students through the use of, for example, electronic devices not previously found in traditional classrooms. Furthermore, new (younger) teachers are influenced by their pre-service technology experiences when determining what types of technology to incorporate into their classrooms (Agyei & Voogt, 2011).

#### **Pre-Service Teacher Preparation**

Preparation for the teaching profession must achieve the objectives of the educational process while also addressing the challenges that face today's teachers. Properly preparing students for the teaching profession requires the provision of training that benefits students and the general community. Therefore, it is important to focus on various academic, professional, and cultural aspects within educational institutions to

prepare teachers before service, as well as to provide training and professional development during service. In addition, whether teachers graduate with a diversity of knowledge and skills depends on what they learned during these programs, which means teacher education program faculty play a significant role in preparing pre-service teachers (Borman, Mueninghoff, Cotner, & Frederick, 2009).

For roughly the last two decades, education in the United States has emphasized teachers' abilities and skills to meet "the changing needs of students who are both increasingly diverse and polarized with respect to their socioeconomic status" (Borman et al., 2009, p. 123). Thus, today's teachers face enormous pressure to address students' 21st century needs to prepare them for their futures (Borman et al., 2009). In addition, alternative paths are being implemented to prepare teachers academically, and this is reflected in student engagement and achievement. However, such efforts are frequently hampered by economic considerations and the emphasis in the United States on standardized testing. During times of recession, education is often the first area to see funding cuts. In addition, education in the United States has emphasized standardized testing scores and results as a means to gauge institutional success or failure. This emphasis can sometimes conflict with the incorporation of technology into the classroom, as teachers are encouraged to teach using traditional methods that will yield the most positive scores on these tests. Likewise, when educational funding is cut due to economic downturn, technology and related upgrades are no longer affordable. In response, various educational reform movements have emerged that attempt to address these obstacles while supporting and developing the educational process. For instance, in an attempt to address the crisis of the Great Recession of 2007, the U.S. Congress passed the American

Recovery and Reinvestment Act of 2009 (ARRA), which was signed by President Barack Obama on February 17, 2009. The purpose of ARRA was to stimulate the economy, encourage job creation, and invest in critical sectors including education (U.S. Department of Education, 2009). This Act included a competitive grant-funding program named the Race to the Top (R2T) to encourage innovative programs in schools. This fund is administered by the Department of Education and was intended in part as a means by which schools could improve the technology available in classrooms. Earlier legislation, the No Child Left Behind Act of 2001 (NCLB), which possessed the long title of “An act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind,” emphasized standardized testing achievement and linked federal funding to states with the establishment of such assessments.

According to Recalde (2008), NCLB attempted to assist teachers by putting the focus on student-centered learning through the use of technology in the classroom. As observed by Cullen, Brush, Frey, Hinshaw and Warren (2006), it increased student achievement by integrating instructional technologies through the creation of grant resources funded through the NCLB legislation. Additionally, improved funding and emphasis on science, technology, engineering, art, and math (STEAM) education in the new millennium aims to improve students’ critical thinking skills and to develop learning capabilities. STEAM programs are also designed to ensure that populations previously under-served and under-represented in the sciences are provided equal learning opportunities. According to Darling-Hammond (2007), a teacher preparation program must prepare well-qualified teachers capable of addressing the needs of 21st century students. Although such programs are supposed to improve and track the work of new

teachers, “many teachers do not feel that their programs adequately prepared them for certain teaching tasks, such as using technology and teaching English language learners” (Darling-Hammond, Chung, & Frelow, 2002, p. 297).

In general, effective teachers apply the theoretical concepts of teaching and learning during their lessons to allow students to engage in the learning process (Borman et al., 2009). Such theories of teaching and learning are taught in core courses in teacher preparation programs. Since the field of teacher preparation deals with a diversity of students, in terms of gender, ethnicity, race, and socio-economic status, it is also important to provide future teachers access to real-world teaching situations (Borman et al., 2009). Thus, when new teachers begin their pre-service practicum experiences, they are starting to “choose teaching strategies and techniques they observe from their mentors and from which they create their own style” (Borman et al., 2009, p. 130). Moreover, according to Borman et al. (2009), field experiences have high value for pre-service teachers as they provide an opportunity to learn from direct observation of teacher practices in a professional setting.

### **Digital Technology in Pre-Service Teacher Education**

Since the advent of the availability of computers and the Internet in schools, preparing teachers in technology has become a core goal of teacher prep programs. For example, “Computer labs were placed in colleges of education to ensure pre-service teachers had necessary technical skills to use computers in the classroom, but it soon became obvious that technical skill did not automatically translate into classroom integration” (Lambert & Gong, 2010, p. 54). Indeed, pre-service teacher preparation in technology has become a primary focus of many college teacher education programs.

Therefore, universities have begun to create “integration strategies across all education courses hoping that faculty modeling would better prepare pre-service teachers with technological skills and motivate more classroom technology use” (Lambert & Gong, 2010, pp. 54-55).

Another indication of this awareness that the most significant trends currently seen in U.S. education are in the field of technology would be the creation of the International Society for Technology in Education (ISTE), which created a framework of standards for educators, leaders, and students to adapt to the changing technological and global economy (ISTE, 2016). Additionally, these ISTE standards have been used to support educators and students through the integration of technology into education (Polly, Mims, Shepherd, & Inan, 2010). Furthermore, it is important to heed the proposals of the National Education Technology Plan (NETP), which is the leading educational technology policy recommendation for the United States (U.S. Department of Education, Office of Educational Technology, 2017). This plan advocates for the equal provision of effective technology to create transformational learning experiences to align with the language of Every Student Succeeds Act (ESSA) of 2015. Some of the concepts found in ESSA (2015) were initially proposed in 1996, when the U.S. Department of Education published an article on how to prepare students for the new millennium entitled, “Getting America’s Students Ready for the 21st Century: Meeting the Technology Literacy Challenge. A Report to the Nation on Technology and Education” (U.S. Dept. of Education, Office of Educational Technology, 2016, p. 7). Following this publication’s release, U.S. educators began to focus on how to best use technology in the classroom through a previous NETP that came out in 2000. Subsequently, in 2010, a new

plan was presented for transforming U.S. education through the effective use of technology. To remain current, the NETP is updated roughly every five years, including an updating of the proposals on how to best develop teaching and student achievement through the effective use of technology (U.S. Department of Education, Office of Educational Technology, 2017). Overall, the fundamental goals of the original NETP have been maintained over the years. These include: (a) moving away from questioning whether or not technology should be integrated into education and toward the assumption that education is improved by such digital tools, meaning that incorporating technology should be a given in order to best serve students; (b) providing access to technological tools for teachers and students in order to provide students more options regarding what and how they learn; (c) preparing teachers to be proficient in the use of technology to achieve better learning outcomes; (d) ensuring that every classroom is connected to the Internet via a high-speed connection; (e) developing relationships among learners, teachers, peers, and mentors in learning spaces; and, (f) making available high-quality online resources and educational software that can be used to assess the needs and abilities of individual learners (U.S. Department. of Education, Office of Educational Technology, 2016).

According to the U.S. Department of Education, Press Office (2015), the 2016 NETP was designed to ensure that future teachers receive appropriate instruction in their respective teacher preparation programs to meet the needs of 21st century students in U.S. public schools. This plan required that at the least, U.S. universities and teacher preparation programs produce technology-proficient teacher candidates capable of establishing in-class and out-of-class learning environments for their students. Moreover,

the plan established the importance of incorporating various digital educational materials rather than relying on potentially harder to procure, printed textbooks. Finally, this plan urged the implementation of technology-based assessment of student performance in all disciplines.

Preparing today's teachers for tomorrow's future requires that teacher education programs help develop the 21st century skills that workers require to function successfully in the digital age; this need has been studied by many researchers who have specifically focused on the use of digital technologies. For example, Tondeur et al. (2017) focused on beginning teachers and their use of technology. Additionally, their study investigated the relationship between beginning teachers' pre-service educational programs and their actual use of technology in their classrooms. The researchers found that beginning teachers were willing to use technology and were aware of how these technologies are important to improve teaching and learning processes; however, there were misunderstandings about how to integrate technology effectively. On the other hand, the results of Tondeur et al.'s (2017) study found a strong relationship between pre-service learning experiences and the degree to which teachers used technology post-graduation. The researchers used interview questions with three sections of open-ended questions to gather data on: the beginning teachers' characteristics, their technology use, and their pre-service experiences with integrating technology. The participants were 16 beginning teachers and the study used the following criteria:

- (1) reported regular (i.e. daily or weekly) use of technology to support learning and instruction;
- (2) representation of two beginning teachers who had graduated from each TEI (Teacher Education Institution) involved in the previous study;
- (3) diversity in teaching experience, grade level and gender; and
- (4) willingness to participate in the study. (Tondeur et al., 2017, p. 161)

In 2016, Li, Li, and Franklin, explored pre-service teacher intentions examining four factors that influenced their adoption of technology, including: “teachers’ attitudes toward using technology in education, pedagogical beliefs, self-efficacy in teaching and in technology, and barriers of incorporating technology into teaching” (p. 947). The study results showed that three factors -- technology self-efficacy, attitudes toward technology, and perceived ease of use of technology -- were statistically significantly predictive of technology adoption intention. However, a fourth factor, perceived barriers to technology adoption, was not found to be a significant predictor of “technology adoption intentions” (Li et al., 2016). On a related note, other research has found that teachers’ beliefs regarding the use or non-use of technology in the classroom might be influenced by their personal life experiences (Keren-Kolb, 2010). This indicates that future behavior could be predicted by examination of their present beliefs (Pajares, 1992). Keren-Kolb (2010) proposed two hypotheses regarding the study of pre-service teachers’ beliefs about everyday technology tools: (a) technology can be used to cultivate active and independent citizens; and, (b) both teachers and students need to have sufficient training to effectively use technology for it to be useful in the 21st century learning process. Keren-Kolb also found that study participants did not perceive everyday technology tools as necessary to classroom instruction. Additionally, the study indicated that pre-service teachers had misunderstandings about the proper way to integrate everyday technology into the educational process.

Moreover, Kay (2006) evaluated the integration of technology strategies used in pre-service teacher education curriculum. The author found 10 key strategies emerged

from a review of 68 articles in the current literature focused on introducing technology to pre-service teachers. These 10 strategies are:

Delivering a single technology course; offering mini-workshops; integrating technology in all courses; modeling how to use technology; using multimedia; collaboration among preservice teachers, mentor teachers and faculty; practicing technology in the field; focusing on education faculty; focusing on mentor teachers; and improving access to software, hardware, and/or support (Kay, 2006, p. 385).

### **Saudi Arabia and New Trends**

In Saudi Arabia, the government is working to support the role of schools as the most important institutions in society for guiding and supporting students as they progress through their schooling and eventually move on to become valued and contributing members of their societies. Furthermore, under the supervision of the Saudi Ministry of Education, teachers and specialists are encouraged to work together to develop appropriate curricula for students and to provide teacher-training courses for all instructors to improve their ability to deliver information in a way that is simpler for, and more comprehensible to, students. Therefore, the Ministry of Education has attempted to introduce various reforms that aim to improve educational outcomes (Alnahdi, 2014).

Saudi Arabia is also now focusing its attentions on innovative methods of improving the quality of its educational systems. In part, this altered perspective is due to changing issues regarding the country's economy, which was previously heavily reliant on oil and other natural resources. The newly developed goals in education and other sectors of the Saudi economy were inspired by a changing world market and the resulting financial difficulties in the country. Furthermore, recent turbulent market changes have

negatively impacted oil prices and, in turn, have negatively affected the Saudi economy. For this reason, the government has determined that there is a need to pay more attention to the educational sector to diversify the country's economy by producing its own highly qualified professionals in all spheres of the market for the benefit of the entire society. Such changes in educational policy and focus will help these efforts to diversify the country's economy, which in turn will alleviate its dependence on finite natural resources. To produce highly qualified labor, the government has decided it is important to first improve the quality of elementary education in the country, as that is considered a critical educational level for all children.

In April of 2016, "Saudi Crown Prince Mohammed bin Salman announced Saudi Arabia's National Transformation Plan (NTP) in which Vision 2030 maintained a central position" (Khan, 2016, p. 36). This multi-year plan, to be achieved by 2030, acknowledges the critical intersection of the economy, social infrastructure, and political climate of the Kingdom (Khan, 2016). Specifically, Vision 2030 establishes three objectives: "a vibrant society, a thriving economy and an ambitious nation" (Kingdom of Saudi Arabia, Council of Economic and Development Affairs [CEDA], 2016b, p. 13). Each of these themes is highlighted and reflected in the goals the country is striving to achieve in the future. Therefore, "this Vision will be the point of reference for our future decisions, so that all future projects are aligned to its content" (Kingdom of Saudi Arabia, CEDA, 2016b, p. 13). Accordingly, there is a need to restructure certain ministries and institutions to ensure that the requirements of this plan are met on time and to enable educational institutions to successfully accomplish the stated tasks (Kingdom of Saudi Arabia, Council of Economic and Development Affairs [CEDA], 2016a). The critical role

of educational institutions is well recognized in terms of the achievement of these goals through the provision of high-quality programs for professional development in the academic, professional, and cultural spheres for both pre-service and in-service teachers. Clearly, the NTP 2020 was developed to define the challenges faced by the government when working to achieve Saudi Arabia's Vision 2030.

### **Pre-Service Teacher Digital Technology Preparation in Saudi Arabia**

The use of instructional technologies in the 21st century classroom environment has become an urgent necessity in this digital age. Specifically, in those classrooms that promote better student-content interaction, educational technology should be utilized to enable such interaction. In addition, using technology in the classroom is beneficial to students of all ability levels (Schroll, 2007). Despite all the proven evidence on the benefits of using educational technology in the educational process, some countries are still debating the usefulness of such technology. For instance, the use of educational technology in Saudi Arabia still lags behind that in other countries, which can be attributed to the lack of instructional tools and materials as well as a lack of proper training for teachers. Al-Alwani (2005) found four barriers preventing the successful integration of technology into Saudi science classrooms: "Infrastructure and resources, staff development, policy and support and science teachers' personal beliefs regarding technology" (p. 115). Specifically, the author reported that the more the participants used technology, the more positive their view of technology became. In fact, if participants indicated they had not been using technology often, their perception of educational technology was rather negative (Al-Alwani, 2005). The author also linked teachers' beliefs in using technology to their familiarity with the most widely used technological

devices. However, while there are educators who use technology every day, they may not believe in the benefits of such technology as related to their use in instructional practices.

Furthermore, there is a strong common policy to integrate the new technologies into all aspects of Saudi daily life, including the education sector. However, according to Al-Zahrani (2011), “Effective integration of technology in Saudi pre-service teacher education seems to lag behind other developments in the country” (p. 22). Thus, Al Mulhim (2014) recommended the Ministry of Higher Education provide high quality programs that offer technology integration into Saudi pre-service teacher education to improve the curricula, develop standards, and to include requirements for ICT technical and pedagogical skill in teacher qualification requirements. Numerous studies (as cited in Al-Zahrani, 2011) have found that digital technology integration into Saudi teacher preparation has been given little attention. Such barriers that stand in the way of successful technology integration “include ineffective curriculum design, access issues to digital technologies, and the instructors’ inadequate computer literacy” (Al-Asmari, as cited in Al-Zahrani, 2011, p. 22).

Al-Zahrani (2015) conducted a study to investigate the status of technology integration in Saudi pre-service teacher education curriculum. This qualitative study had two stages: (a) to analyze national curriculum policies, and (b) to interview three key policymakers. The findings demonstrated the significance of technology integration to achieve progress in all Saudi sectors, including pre-service teacher preparation. However, the author also found the curriculum policies, structure, and guidelines in Saudi pre-service teacher education are lacking when it comes to considering the most effective means of integrating technology. Additionally, the results from the study’s interviews

showed that key policymakers pay a great deal of attention to the importance of effectively integrating technology. Similarly, Al-Zahrani (2011) reported certain challenges to effectively integrating technology into pre-service teacher education, such as: “[f]irst, the domination of cultural-religious conservatism on Saudi pre-service teacher education curriculum”, “[s]econd, the domination of traditionalism on the current curriculum design and associated pedagogical practices”, and “[t]hird, the continuing centralization in the process of defusing, supporting and operating technology” (p. 212). Although all participants generally had some difficulties with effectively integrating technology, they exhibited high and positive levels of belief, experience, self-efficacy, and awareness.

### **Digital Media**

Preparing the students of today for the global economy requires helping them develop 21st century skills for the digital era workforce; this need has been examined by numerous studies focusing on the use of digital technologies (Kersten, 2012). To develop such vital competencies, educators must first recognize their importance and then also include them in the educational process by adjusting the curriculum. Shelly, Cashman, Gunter, and Gunter (2007) stated, “Today’s K-12 digital students need their learning to be meaningful and relevant to their lives” (p. 15) and noted that such students spend a great deal of their non-school time interacting with electronic devices of all sorts - from televisions to iPads. Therefore, teachers must work hard to successfully integrate digital tools into the classroom to improve student learning outcomes. Shelly et al. (2007) defined digital media as “those technologies that allow users to create new forms of interaction, expression, communication, and entertainment in a digital format” (p. 15).

Similarly, Ng (2012) defined digital technologies as “electronic technologies that include hardware and software used by individuals for educational, social and/or entertainment purposes in schools and at home” (p. 1066). As noted, these digital media tools include computers and mobile devices such as laptops, tablets, ultramobiles, mobile phones, smartphones, PDAs, game consoles” (Ng, 2012, p. 1066). Additionally, digital age Web 2.0 technologies include:

Social networks, such as MySpace, Facebook, and Ning; media sharing, such as YouTube and Flickr; social bookmarking, such as Delicious and CiteULike; collaborative knowledge development through wikis (e.g., Wikipedia); creative works, such as podcasts, videocasts, blogs, and microblogs (e.g., Twitter, Blogger). (Greenhow, Robelia, & Hughes, 2009, p. 247)

Nowadays, the possibilities for changing educational pedagogies and forms are very likely based on adjusting to the existence of digital technologies (Gourlay, Hamilton, & Lea, 2013).

A great deal of emphasis has been placed on digital literacy as an important concept for today’s students. In this digital age, teachers and students need to possess digital literacy, which has been defined as:

The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse 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, 2005, p. 135)

Swan, Lin, and Van’t Hooft (2008) also used the term “digital technologies” to refer to tools used for learning. For example, Kersten (2012) indicated that there is widespread agreement that educating students in how to properly use digital media and creating “digital literacy” are excellent ways to prepare them for life and work in the modern era. Park and Biddix (2008) subdivided digital media education, also called

digital media literacy, into three domains: (a) awareness, (b) hardware/software access, and (c) digital skill. The authors further explored the arena of digital media by noting that its use affords educators with opportunities with their students in such important areas as informal learning, increased participation, and creating awareness about the potential dangers involved in accessing such media (Park & Biddix, 2008). While it is important that young people have access to these digital tools to empower them, it is equally necessary to protect them from accessing illegal content. Developing digital media skills is a critical element to helping young people improve their technological innovation and their awareness of the rules of cyberspace. Park and Biddix (2008) defined digital media skills as: technical literacy (ability to solve technical problems); informational literacy (ability to seek and utilize information in learning); and, communication literacy (ability to interact with others in various contexts).

### **Visual Literacy**

“From petroglyphs on cave walls to pictures posted on Facebook walls, images are a part of our world” (Emanuel & Challons-Lipton, 2013, p. 8). There are many definitions of visual literacy, but it is not difficult to identify how these relate to visual literacy education. According to Hattwig et al. (2013), the earliest definitions of visual literacy “emphasized image interpretation and the skills involved in deriving meaning from the visual” (p. 63). With all the changes in technology of the past decade, the definitions of visual literacy have also been evolving, including the development of new language and meaning, which is appropriate with the growing use of image and visual media in our culture, particularly as communications tools (Hattwig et al., 2013). Moreover, Metros (2008) defined visual literacy as, “the ability to decode and interpret

(make meaning from) visual messages and also to be able to encode and compose meaningful visual communications” (p. 103). According to the North Central Regional Educational Laboratory (NCREL) and the Metiri Group (2003), visual literacy is “the ability to interpret, use, appreciate, and create images and video using both conventional and 21st century media in ways that advance thinking, decision making, communication, and learning” (NCREL & Metiri Group, 2003, p. 24).

On the other hand, in the 21st century, visual literacy has been associated with a broader set of ideas such as multimedia literacy or screen literacy. The interaction among all these different types of literacies has resulted in a “higher order thinking and collaborative knowledge production over skill development” (Hattwig et al., 2013, p. 64). Similarly, Metros (2008) noted, “Educators must include in their lessons visual literacy opportunities for students to express ideas and think in multimodal ways” (p. 106). Pre-service teachers will become the teachers who are responsible for using different types of methods that include visual materials. Thus, the need to learn how to analyze, interpret, and create images, visual communications, and information.

Due to the intersection in education of visual literacy with digital technology, the recent definitions of visual literacy tend to focus more on the individual’s ability to realize and apply visual literacy skills during the creation of digital material. Therefore, with technologies such as image software and digital photography, individuals can develop their technical skills associated with visual literacy (Hattwig et al., 2013).

### **Digital Visual Literacy**

With the easy access and relatively low cost of visual data, digital visual aspects have become a fundamental component in both academics and culture in general. There

is a need for greater efforts in the area of learning more about digital visual literacy due to the transfer of print media and traditional video to digital media, as well as the widespread use of such items. Educational institutions must pay attention to the need to fully assess the importance of digital visual literacy. Digital visual literacy resembles traditional literacies (textual literacy) in that it requires the ability to understand specific types of information. Digital visual literacy (DVL) is defined as “the ability both to create and understand certain types of information, in this case visual information created with a computer” (Spalter & van Dam, 2008, p. 93).

In today’s classroom, students should be familiar with the tools and technologies of media creation to increase their digital visual literacy skills. In the Moving Image Archives course, Mattock (2015) explored an approach to teaching visual and media literacy instruction at the graduate level. This technology-based approach prepared the students to use the tools and technologies of media production based on the visual literacy competency standards of higher education (Mattock, 2015). In this course “the students’ reflections demonstrated that addressing the full range of visual literacy competencies positively impacted their knowledge and understanding of visual media” (Mattock, 2015, p. 248). Moreover, this workshop improved students’ visual literacy skills, enhanced their archival practices, and helped them better understand the diversity of media products available. Additionally, the approach utilized in this course could help students learn to analyze and interpret specific media products in other academic disciplines (Mattock, 2015).

The widespread availability of digital visual media tools, such as multi-visual media players and social network applications, on electronic devices (e.g., mobile

phones) has impacted the education process (Turkoguz, 2012). Due to the ready availability of the Web, and the ease with which anyone can upload a variety of content types to it, students need to be provided with a better digital visual media education. In this digital age where technology is rapidly evolving, visual media are becoming increasingly important tools of the teaching and learning processes. In many courses, faculty are trying to use mobile devices to facilitate learning; to accomplish this, faculty could, for example, provide content in a visual form such as with an infographic. Bradshaw and Porter (2017) found that visual information impacts us on an emotional level, so we react to images more immediately and are more likely to pursue more information based on a simple but affecting image (infographic). Therefore, including digital visual media such as an infographic “is a tickler to spark interest, convey concise information, and lead the audience to a next step or further information seeking” (p. 11).

One of the more important aspects of visual media tools is their potential to readily reach a wide audience, to be easily watched and downloaded, and to be quickly shared in different situations (Turkoguz, 2012). Additionally, Turkoguz (2012) noted, “With visual media tools, providing students with new knowledge is easier, the visualizing of abstract concepts is facilitated and the learning process is accelerated by relating this new knowledge to the student’s existing knowledge (p. 401).” Consequently, there is a need to enhance the ability to use visual media tools to create qualified visual media resources that help students understand the content. Indeed, some research has found positive outcomes connected to students’ academic and social development when visual media tools are used in teaching and training processes (Turkoguz, 2012).

For 21st century teaching and learning, there is little research that includes actual data regarding the integration of digital visual literacy into teacher education programs. On the other hand, there is research that indicates that teacher education and professional development does not include enough training in digital visual literacy. Being able to interpret, analyze, and produce digital visual content are all necessary skills for pre-service teachers to acquire so they can utilize them in their teaching.

### **Constructivism Theory**

The first person to propose a theory of constructivism was 20th century cognitive psychologist Jean Piaget, a Swiss-born pioneer in educational theory. Piaget emphasized the importance of allowing the child/student to construct an educational environment that is relevant to the individual learner; this is opposed to the traditional classroom where a set group of lessons is presented by a teacher to a group of students who do not have a say in directing their learning (Driscoll, 2005). However, Piaget did not necessarily feel that the teacher had no real role in the classroom. On the contrary, he emphasized the importance of the instructor as the individual with the most important role in constructing a learning environment that could meet the learning needs of every individual student by creating a classroom where students could “discover” the exercises or activities that they themselves want to explore (Driscoll, 2005; Fosnot, 2005; Prater, 2001).

Therefore, “Constructivism can be defined as that philosophical position which holds that any so-called reality is, in the most immediate and concrete sense, the mental construction of those who believe they have discovered and investigated it” (Saunders, 1992, p. 136). Unlike traditional theories of learning in which the learning process is structured mainly to deliver an established body of knowledge to all learners of the same

age or grade level, which the learners are expected to retain and then apply as appropriate later in life, constructivism takes the opposite approach and states that the learner should drive the educational process through individual choice. This means the student chooses the learning upon which to focus based on the student's personal interests and likely future work (Reiser & Dempsey, 2012). More simply, constructivism theory supports the construction of knowledge based on the learner's personal experiences and social environment (Driscoll, 2005).

The constructivism theory of learning is mostly associated with Piaget and Vygotsky. Piaget proposed that knowledge acquisition is a process of continuous self-construction and assumes an interaction between the subject (learner) and object (material world; Driscoll, 2005; Gilakjani et al., 2013). Furthermore, Gilakjani et al. (2013) stated the process of effectively educating students requires that the teacher construct an effective learning environment to engage learners successfully. Since the constructivism concept of learning proposes that learners will guide their own process of acquiring knowledge dependent upon their own individual and social experiences, teachers should therefore provide an instructional environment that allows learners to match what they want to learn with appropriate activities/lessons that will build their knowledge of that chosen topic area (Jonassen, 1999). In addition, instructors must address such factors as students' language, culture, and social practices that guide how individual students learn and acquire knowledge (Matsuda & Bommarito, 2015). Vygotsky heavily focused on the impact of socio-cultural factors on learning (Fosnot & Perry, 1996) and, like Piaget, considered learning to be a developmental and constructive

process that is essentially an interaction between individuals and their socio-cultural environment (Driscoll, 2005).

### **Constructivism in Education**

The innovative constructivism approach helps develop students' thinking processes as these environments allow students to guide their own learning rather than simply memorizing and recounting the information they have been taught, as occurs in traditional classrooms (Liu & Chen, 2010). In this setting, instructors must facilitate the learning process by providing appropriate information and activities that allow students to discover their own learning (Liu & Chen, 2010). Numerous educational institutions have used this learning theory in their classrooms in a variety of subject areas. According to Jonassen (1999), in the past, many instructional design and technology projects failed due to poor implementation. He asserted that this was related to the structures of the instructional design and technology education programs and the fact that they failed to incorporate factors such as the social context of the students. In his work, Jonassen (1999) suggested that designers and technology innovators should accommodate the physical environment and cultural aspects as these factors affect implementation. Jonassen's (1999) model of Constructivist Learning Environments (CLEs) proposes that "the problem drives the learning, rather than acting as an example of the concepts and principles previously taught. Students learn domain content in order to solve the problem, rather than solving the problem as an application of learning" (p. 218). However, implementation of CLEs must be appropriate within the social context of the learner (Jonassen, 1999). Additionally, Jonassen and Rohrer-Murphy (1999) described the theory of activity to be used as a framework for describing the components and their mutual

relationships in CLEs. Practically, teachers can incorporate the idea of CLEs into the classroom by allowing students to drive the learning process by giving students the power to choose the activities that support whatever topic is the subject of the day's lesson. Personal autonomy is the essential element of the process of construction (Confrey, 1990). Applying constructivism theory indicates that students' autonomy be increased by allowing them to take responsibility for their thinking and by supporting the development of their self-awareness. Potentially, such changes in the education process support overall student success; however, they cannot occur without a knowledgeable instructor who believes in the program and acts to implement such changes for the good of the students (Gilakjani et al., 2013). Therefore, a teacher who is knowledgeable about CLE concepts can direct students' progress based on the student's previous experiences to build his or her own learning (Gilakjani et al., 2013).

It is notable that the implementation of the constructivist learning approach has been successful in a variety of subject areas. For instance, applying this approach in a science classroom has been shown to be more efficient than traditional science education approaches (Demirci, 2009; Tippins, Tobin, & Nichols, 1995). Likewise, studies have shown it to be equally effective in teaching and learning mathematics (Chiu & Whitebread, 2011; Maher & Alston, 1990; O'Shea & Leavy, 2013). Furthermore, research has also found greater effectiveness outside of the sciences in areas such as art studies where it was determined that, for example, when an art teacher used constructivism-based instruction and utilized interactive technology in the classroom, students were more engaged in the lesson and more productive in their work (Milbrandt, Felts, Richards, & Abghari, 2004; Prater, 2001). Moreover, many studies have suggested

that constructivism is also a useful tool in improving the field of distance education (Gulati, 2004; Huang, 2002; Vrasidas, 2000). As Karagiorgi and Symeou (2005) suggested, there “is a need to draw links between constructivism theory and instructional design practices” (p. 22) to be able to translate the theory of constructivism into practice in a classroom. The application of constructivism has certain advantages when used in instructional design including clear benefits to students as they retain more information when they have control over the direction of their studies. This can result in greater critical thinking ability and improvement in problem solving (Karagiorgi & Symeou, 2005).

Notably, research has suggested that teachers who use constructivist instruction styles are more likely to use technology in their classrooms (Judson, 2006). As reported by Gilakjani et al. (2013), teachers who are more comfortable and committed to student-centered education are more likely to integrate technology into their classrooms. Indeed, the student-centered classroom has become a very important aspect of the evolution of modern learning and is an integral factor in current educational reform movements. For instance, the International Society for Technology in Education (ISTE) focuses on student-centered environments stating that these empower students while also promoting future-ready learning (ISTE, 2016). The application of constructivism is also considered to encourage higher order thinking to facilitate knowledge construction (Reed, 2012).

Thus, CLEs are highly appropriate when institutions are creating technology-enhanced learning environments in the classroom as they best allow for collaborative learning, student-centered programs (Jonassen, Peck, & Wilson, 1999). The following are guidelines for successful constructivist teaching:

- Provide students with a variety of tools for research (websites, digital cameras, books, and maps) so students become the primary research investigators;
- Frame strategies for several large and small group collaborations to foster peer support and interaction; and,
- Develop a flexible classroom climate that encourages student inquiry and discussion. Questioning skills of teachers is a central facilitating strategy to support student problem-solving. Individual problems are not necessarily solved independently or only with teacher input, but are presented to the classroom community, so that everyone takes ownership of problems and the generation of solutions. (Milbrandt et al., 2004, p. 24)

### **Constructivism: A Learning Theory for the Digital Age**

Due to the rise of personal technology and social media, modern students have developed a natural affinity for the use of such things as tablet devices, social media applications, and computer programs and games. Therefore, it is a natural extension of this reality that educators would learn how to use technological tools with students to promote their learning, engage them, and best prepare them for the future. Similarly, constructivist philosophy is ideally suited to this modern era in which technology allows for access to a much greater variety of subject areas and educational programs by students all over the world. Indeed, the nature of how and what people learn has dramatically evolved because of the Internet and all the other technology of this digital age (Foroughi, 2015). According to Park and Biddix (2008), the goal when incorporating digital tools in education should be “two-fold: empowerment and protection” (p. 105). By empowerment, the authors referred to the need to give students control over the process of developing their own learning process; by protection, it remains the responsibility of the educator to ensure that any process involving technology is monitored to ensure that the students are both using the tools responsibly while also being protected from any negative elements that could be encountered from outside the classroom (Park & Biddix,

2008). In addition, with the current trend toward digital learning environments, the field of education is already in the process of moving from traditional teacher-centered classrooms to situations that are student-driven. As the digital age is already well underway, the question now becomes: What is the most effective method of integrating technology into the classroom? Alone, without a structure around how it should be used and limitations on what can be accessed, technology will not promote learning or engage students in ways that achieve desired outcomes. Hence, having a model or appropriate learning theory to use as a framework for teachers to follow allows them to be more innovative and creative in how they incorporate technology into their instruction. Therefore, constructivism is a very useful and appropriate guide to use when engaging technology in the learning process.

Another element that Vygotsky proposed was what is called the Zone of Proximal Development (ZPD; Kivunja, 2014). His early work on this concept described it as “the level of competence on a task in which a learner cannot yet master the task working by himself/herself but can complete the task successfully if given appropriate support by a more capable mentor” (Kivunja, 2014, p. 98). In its evolved form, the ZPD is the area in which a learner can achieve but only with the assistance of someone with more knowledge or capability; that person could be another child, another learning adult or peer, or a parent who recognizes the student’s need for guidance and who is capable of supplying the required level of support (Kivunja, 2014). Clearly, in this era, social networks are among the tools that can facilitate education. Even in the early 20th century when most of his work occurred, Vygotsky noted that the social-cultural-technological environment in which one lives has a profound influence on one’s cognitive

development. These two theoretical perspectives of Vygotsky can significantly inform our modern day understanding of how children of the digital era best learn (Kivunja, 2014).

In an increasingly technology-dependent world, there is a need to focus on how to make learners become more active and participatory in their own learning processes while acknowledging the role of their modern-day social learning environment (McLoughlin & Lee, 2008). According to McLoughlin and Lee (2008), while moving away from traditional teaching approaches, it is important to consider the social-context and maintain community engagement when guiding the educational experience within the modern digital learning landscape. Relatively recently widely available online tools support constructivist and student-centered learning as these items allow for a much more independent learning process for students (McLoughlin & Lee, 2008). McLoughlin and Lee (2008) observed that since young people engage with a diversity of social software tools, there is a related increase in the “gap between the formalized interactions that occur in educational establishments and modes of learning, socialization and communication that occur in the everyday world” (p. 649). Due to the spread of technology-rich learning environments, there is a need to focus on ways of empowering learners that embrace the constructivist learning style. According to Motschnig-Pitrik and Holzinger (2002), constructivism is a vital tool for creating more student-centered teaching programs.

Furthermore, access to knowledge is no longer controlled and limited by teachers or institutions of learning; with the rise of the Internet and web-based programs and sites, information is available and accessible to almost anyone with access to the technology and an Internet connection. Properly presented, technological tools allow certain learners

to create their own curriculum through a diversity of digital resources. Considering how integrated the use of such tools is in the lives of most young people as well as in those of most of the working world, it is vital to incorporate them successfully as they will undoubtedly be a part of the future work of most present-day students in developing and developed countries (McLoughlin & Lee, 2008). Thus, it is important for educators to also possess appropriate digital skills to be able to provide and present appropriate learning opportunities to their students. Additionally, educators should follow the concepts from the constructivism learning theory during lesson preparation, as well. Another area that benefits from reliance upon this theory is classroom design as CLEs can provide very successful structures in a variety of academic settings to appropriately present modern curricula while incorporating innovative technology into the process.

The current educational transformation throughout the world aims to prepare learners for the future with 21st century skills. Therefore, there is a need to embed digital technologies into teaching, learning, assessment, and curricula to create a productive and modern learning environment. Educators must support a connection between learning and the world outside. In other words, what educators teach students should be relevant to the lives of those students outside of school. Kelly, McCain, and Jukes (2008) suggested two significant changes educators must embrace in their practices. First, instruction must relate to life outside the school walls because students need to be able to apply content to the real world; not just be able to echo learning back to teachers in class and on assessments. Second, schools must provide experiential learning to students within their formal programs such as inviting outside, expert speakers or taking students off-site to observe the results and applications of certain types of learning in the outside world.

Additionally, Kelly et al. (2008) asserted that the effective use of technology is a great way to make connections with the real world. Integrating technology into the classroom allows students to acquire real experience as well as communicate with the world outside school. For example, educators can provide students online access to photographs, videos, and audio clips that support the subject content of the school's curriculum while potentially allowing the modern student to learn much more effectively. Following such online research exercises, students can utilize the information they have obtained on their own to construct appropriate learning exercises that better allow them to process the information as the work is dependent upon their personal, real world experiences and their individual goals for post-education work. These so-called "digital natives" (Prensky, 2001) tend to learn more from visual sources of information that is delivered quickly, and often from a multitude of providers; they also tend to be more collaborative learners--meaning rather than work on their own, they prefer to engage with their peers in the learning process (Kelly et al., 2008).

In this digital age, people can acquire significant knowledge on their own. Thus, the role of the teacher in the modern era can be that of a motivator who enables students to acquire knowledge through their own efforts. At the same time, it is important for the instructor to confirm that students are mindful of the importance of utilizing technological resources responsibly while developing new skills and acquiring new learning. Therefore, it is useful for teachers to utilize the constructivism perspective when preparing students for their future lives and work. Indeed, today's workforce has a great need for workers with skills and knowledge that differ from those that were presented to students in the traditional curriculum due to technological change and the development of

a global economy. The teacher's role is to be aware of these changes, events, and developments and to adjust his or her classrooms and the content delivered within them to prepare students who will be successful, after graduation, in the modern world. One example of how a teacher could meet such needs would be to create a blog for the class on which students could share everyday thoughts, opinions, examples, problems, and solutions. Social media applications might also be used to share these ideas with students/people outside the school including: creating a hashtag on Twitter; using online games to teach solving math problems; and, establishing a website for the class for both the experience involved for students in web design as well as for the real-world practical application of enabling better communication with parents. However, when engaging in these exercises, educators must simultaneously support student independence and autonomy while ensuring students use digital tools responsibly. Those who are working in the field of teacher education--for example, professors in education programs in colleges and universities - must emphasize the importance of this to their students (who will be future teachers), and to make sure that they understand the concepts of fostering individual learning styles, enhancing collaborative learning, and developing communication skills in K-12 classrooms.

### **Contributions to the Literature**

From these analyses, it was clear that the topic of effective integration of technology, and specifically digital visual media, into the education of pre-service teachers is a problematic issue globally; however, most of the aforementioned studies do not directly support the idea that teacher preparation programs on technology can impact future teacher educational practices. In addition, most of the analyzed studies tended to

focus only on the one population: students preparing for careers as teachers in university teacher education programs, and the technology perspectives and practices of this one population. This might create certain limitations to the literature because other relevant populations were not included, such as faculty and administrators of teacher education programs. Additionally, most of the studies regarding teacher technology preparation were conducted with limited participant samples from specific demographics that impact generalizability. Therefore, it is necessary to continue the investigation of the issue of effective technology integration in pre-service teacher education in different countries and from a variety of perspectives and faculty types. The current study will investigate two aspects of the problem:

1. First, the need for digital visual technology-qualified teacher educators who can effectively prepare pre-service teachers for their future classrooms.
2. Second, necessary developmental actions to be taken to create the best possible pre-service teacher education programs on integrating digital technology and visual media into education.

This study used qualitative methods and research instruments to better grasp pre-service teacher educators' perceptions of the use of digital technology and visual media based on their own experiences in Saudi Arabia.

### **Chapter Summary**

In this chapter, the relevant and current literature available on the topic of the study was presented. First, the research that has been done on how teacher preparation programs must prepare future teachers to address the needs of 21st century students was examined. Then, how technology integration has become a primary focus in teacher education programs was explored with the hope of thoroughly and effectively preparing

pre-service teachers with appropriate and necessary technological skills. Additionally, a synthesis was provided of the new trends in Saudi Arabia aimed at improving the quality of the country's educational system. Further, this chapter provided background relevant to the effective integration of technology in Saudi pre-service teacher education.

Additionally, the use of digital visual media as a necessary skill for today's students who interact with visual environment was discussed. However, some research indicates that some efforts to integrate digital visual literacy into teacher preparation programs do not include enough attention to keeping up-to-date with improvements in technology.

Furthermore, it is important to ensure that future teachers have the necessary skills required, such as the ability to interpret, analyze, and produce digital visual content, to properly utilize technology in their teaching. Finally, this chapter presented the theoretical background of Constructivism, its most current application in education, and how it is being implemented as a learning theory for the digital age.

## **CHAPTER III**

### **METHODOLOGY**

#### **Epistemology and Theory**

The epistemology perspective utilized for this study was constructivism. This theory derives from the philosophy that human knowledge and the meaning of phenomena are gained from the lived experiences of people and through the process of negotiation of meaning between people. According to this school of thought, each person constructs knowledge through social interaction. Crotty (1998) stated that constructivism is the idea that people do not invent their own understanding of reality, but rather construct such reality within social and situational interactions. Therefore, the constructivist perspective was the best framework for this phenomenological study as it starts from a position that the knowledge that has been previously constructed by the teacher educator participants on the use of digital visual media in education is constructed by them through their experiences with both digital technology and education. Similarly, the theory of constructivism states that human experiences with the phenomena of life are another component of their creating meaning through such phenomena. Since this study focuses on teachers' experiences about using digital visual media in their teaching, a constructivist approach is justified to examine how their understanding or meaning of reality is formed in their particular teaching space with digital technology.

The current study is a qualitative study using an interpretive research design. Interpretive research is the most common type of qualitative research in which

researchers construct knowledge from the specific to the general, building to a conclusion (Merriam, 2009). Additionally, the proposed study aims to describe the common meaning of the individuals' experiences of the phenomenon being studied (Creswell, 2007): the researcher explored the perspectives of university faculty members with prior teaching experience in Saudi Arabia regarding preparing their students for their future jobs in teaching. Therefore, the primary method of gathering data for this study involved interviewing the participants to interpret their perspectives about using digital visual media in pre-service teacher preparation programs.

### **Research Design**

This research employed interpretive qualitative design to discover and evaluate how teacher educators prepare pre-service teachers to integrate digital visual media into their future classrooms. According to Bhattacharjee (n.d.), interpretive research has several unique advantages, including: (a) it is an appropriate method to explore the unknown reasons behind a complex or multifaceted social reality where the research is dealing with unclear evidence (e.g., personal opinions and perceptions) that might be biased, inaccurate, or otherwise difficult to quantify; (b) it is helpful when constructing theory for some fields that lack sufficient existing theory; (c) it is a suitable procedure to study context-specific and unique events or processes; and, (d) it can be used to discover interesting and relevant research questions and issues that will identify follow-up and future research areas. Furthermore, the interpretive approach was also a proper choice for this research as it "aims to understand and interpret participants' experiences, to determine the meaning of the experiences" (Tuohy, Cooney, Dowling, Murphy, & Sixsmith, 2013, p. 20). As noted, the study explored the participants' own experiences to

construct the meaning of those experiences. The following research questions, presented in Chapter 1, guided this study:

- Q1 How do Saudi teacher educators articulate the value of digital visual media to 21st century teaching and learning when preparing pre-service teachers?
- Q2 How do Saudi teacher educators understand and use digital visual media in preparing pre-service teachers?
- Q3 How do Saudi teacher educators prepare pre-service teachers for integrating digital visual media for educational purposes in their future teaching?
- Q4 What is the vision of Saudi teacher educators in regard to pre-service teacher preparation about digital visual media and its integration into teaching and learning in Saudi Arabia?

### **Participants and Setting**

In this study, the accessible population is Saudi teacher educators who are currently teaching at different universities in Saudi Arabia. The sample was selected based on the purpose of the study: to examine and understand how Saudi teacher educators prepare pre-service teachers to use digital visual media in their future classrooms. The sample was also based on convenience engaging participants who responded to the initial call for participation. All the participants possessed set characteristics indicating they met the criteria for the purpose of the study: a doctorate in a technology field, proficient in using digital technology in their teaching, currently have access to digital technology at their universities and teach technology courses to pre-service teachers. The sample for the study was selected by contacting the administration of the universities that had teacher preparation programs. All faculty who met the criteria ( $N = 32$ ) were contacted. Twelve instructors responded and agreed to participate in the study. Each of these ( $N = 12$ ) was sent the questionnaire link with the consent form and asked to determine the best time to conduct an interview. Only five ( $N = 5$ ) instructors

were able to complete the interview after filling out the questionnaire and consent form. The participants who participated in the full study represented 16% of the full population of technology faculty in teacher preparation programs in Saudi Arabia.

Specifically, the research participants ( $N = 5$ ) range in age from 35 years and older and come from different regions of Saudi Arabia. The sample consists of five teacher educators, four female and one male. All the study respondents have at least four years of teaching experience at the university level in Saudi Arabia. Four different universities are represented; the two participants who represent the same university are located in different cities at separate campuses. This wide range of participation represents the full population ( $N = 32$ ) of the participants relevant to this research.

### **Data Collection**

The research questions in this study were designed to investigate how pre-service teachers are prepared to use digital visual literacy in their future classrooms. The specific methods used for collecting the data were interview. Data collection was designed to acquire the views of the teacher educators from Saudi Arabia about pre-service preparation and the effective use of digital visual media. The interviews utilized a semi-structured interview protocol that contained 14 open-ended questions (see Appendix A) designed to solicit data on the level of understanding and level of use of digital visual media by the participants; and, a questionnaire (see Appendix B) that gathered demographic information. This essential demographic information on the participants (e.g., gender, age, etc.) was requested at the beginning of the interview. After completing the questionnaire, a one-on-one interview was conducted using the 14 semi-structured

interview questions to ensure that the participants could elaborate upon the topics in depth. For example, here is a sampling of the questions:

- What do you think about implementing digital visual media (e.g., digital images, digital visual materials, infographics, digital stories, etc.) into your teaching of pre-service teachers?
- What do you expect to be the result(s) of integrating digital visual media into the teaching and learning processes?

The interviews took place via telephone. Interviews, including the demographic questionnaire, took approximately 90 minutes per participant. All the interviews were audio recorded and the researcher kept notes during the interview and analysis process. These notes were used to corroborate information and attend to bias.

### **Procedure**

This research investigated teacher educators' perceptions about how to best prepare pre-service teachers to effectively integrate digital visual media into their future classrooms. An empirical phenomenology study was used to assist in describing the essence of the lived phenomenon from the participants' (the teacher educators') perspectives. To achieve this, five teacher educators from Saudi Arabia who share this experience were interviewed. Emails were sent to administrations of different universities in Saudi Arabia to request the contact information for those instructors who: (a) teach pre-service teacher technology courses; (b) have taught at the university for at least two years; (c) are 25 years or older; and (d) have at least a master's degree. All the provided contact information was collected and emails and messages were sent to 32 faculty at different universities in Saudi Arabia. Those who responded ( $N = 12$ ) were sent the questionnaire and invited to participate in the semi-structured interview. The five

participants who were available for interview were contacted and phone interview times were established. The phone interviews were approximately 60 minutes and were audio recorded.

### **Data Analysis**

Data was obtained from the background questionnaire and individual interviews. The collected data provided adequate information regarding the participants' understanding of their use of digital visual media. The translation processes from Arabic to English was complex. Because the initial recordings were in conversational Arabic, the transcripts were first translated from conversational to formal Arabic by the researcher. The formal Arabic transcriptions was shared with the participant to ensure accuracy of meaning and engage in member checking process for trustworthiness. Two colleagues from a university in Saudi Arabia also reviewed the Arabic transcripts for accuracy and understandability. The formal Arabic transcript was then translated by the researcher to English. To confirm the researcher's translations were accurate, bilingual professionals were asked to review the translation process and confirm the English translation.

Then, the author read and reread the English transcripts many times during analysis. Data coding was utilized to identify open codes from the transcripts and codes were combined through an axial coding process (Merriam, 2009) to identify meaningful themes and patterns. Open coding helped to build a detailed, structured concept of the data. For example, the researcher started with open codes consisting of words that related directly to the research questions (e. g., value, understanding, prepare) and also phrases that were repeated consistently from the participants (e.g., technology updating). To reach saturation, line-by-line coding was done until no new ideas or concepts could be

found, only repetitions of the existing information. Additionally, after the raw data was analyzed, the researcher's peers were again asked to read through the raw data and emerging themes to determine accuracy and confirm the themes previously identified. Moreover, field notes were used to compare findings from the interviews to corroborate the emerging themes to eliminate any potential bias on the researcher's part. The questionnaire data analyzed descriptively to present the characteristics of the participants and their collaborative understanding of "digital visual media."

The researcher stored the recordings and transcripts in a secure location. Specifically, all the transcripts were retained in her home office, in a safe. Access to the safe will be limited to the researcher only. The transcripts will be held at this location for three years, after which the documents will be destroyed. The data will be used for research purposes only and will not be published without the participants' consent. Furthermore, pseudonyms were assigned to each participant to protect identities and maintain confidentiality.

### **Trustworthiness**

To ensure study rigor, the researcher utilized several techniques that have been shown to potentially increase the trustworthiness of the study. First, data triangulation, a strategy that relies upon multiple investigators to maintain trustworthiness, was used to enhance the credibility and validity of the qualitative research (Merriam, 2009). To maintain these critical aspects, the researcher elicited the aid of two colleagues during data analysis. These two secondary investigators read through the raw data (the interview transcripts) and identified the emerging themes, to confirm these closely matched the themes previously identified. In cases where there was any discrepancy in the analysis of

the results/themes, the researcher examined her perspective for personal bias to ensure that the themes the researcher identified were not influenced by her own opinions and beliefs. After her colleagues had reviewed the raw data independently, all three of us discussed our thoughts and impressions of the emerging themes.

Another method for increasing the trustworthiness of a study is member checking, a technique where participants are provided transcripts or summaries of their interviews and allowed to correct any misinterpretations on the part of the researcher. Additionally, this technique is an important method for clarifying what views and comments might be missing from preliminary analysis of data (Creswell, 2007). Therefore, the interview transcripts were sent by email to all participants in order to verify the content.

Additionally, the researcher kept a personal journal on her personal beliefs and assumptions about the study outcomes. All the assumptions she had before, during, and after data collection were documented in the journal. This strategy is called reflexivity. According to Merriam (2009), reflexivity is one of the best strategies for helping researchers become aware of their own biases, which in turn helps eliminate those biases from the data analysis and improves study dependability. During the data analysis, employing the journaling method allowed her to be more aware of her own assumptions and to eliminate any interference such assumptions might cause with emerging themes.

Moreover, study transferability was supported by acquiring (and providing to the reader) sufficient information about study participants, environment, and data collection methods. Transferability is “the extent to which the findings of one study can be applied to other situations” (Merriam, 2009, p. 223). the researcher provided enough detail about the study sample, setting, methods, and findings to allow the audience to conclude

whether the study findings can be transferred to other situations. The researcher also provided some quotes from participants in order to support descriptions.

Confirmability is “the degree to which the results could be confirmed or corroborated by others” (Thomas & Magilvy, 2011, p. 145). The transcription process used multiple translators to ensure accuracy of information and confirmed with participants that the translation represented their intended meaning. Themes were confirmed through the process of reviewing multiple data to the point of saturation. Reflexivity is one of the best strategies for enhancing confirmability. Therefore, the researcher also wrote notes regarding personal feelings, biases, and insights that were used to confirm and challenge thinking during data analysis.

### **Subjectivity Statement**

The researcher’s current position is that of a teacher educator who prepares future teachers at one of the universities in Saudi Arabia. The researcher’s students come from a variety of majors and class levels and her mission is to prepare future teachers to integrate technology into their future classrooms by providing them with techniques and methods to accomplish this. Additionally, the researcher also used to be an elementary school mathematics teacher. Thus, she has broad experience teaching very different populations of students: from elementary school through college. However, the researcher faced problems when she was teaching elementary mathematics in her home country of Saudi Arabia as a beginning teacher who had been graduated from a pre-service teacher program that did not adequately prepare her in the use of technology. She feels that she could have improved her students’ participation and level of interaction in class had she been better trained in this area. In fact, the researcher was not the only

teacher who struggled with how to properly use educational technology in the classroom. Specifically, there are a large number of schools in Saudi Arabia that are not training their teachers to use technology in their classrooms. However, the Saudi Arabian educational system is fast improving to provide pre-service teachers with new methods of promoting teaching methods that more successfully use technology.

The researcher believed that the study participants would generally indicate negative perceptions regarding using technology due to the lack of technology training they themselves experienced during their own educations as well as a lack of reasonable support in how to use technology provided them, such as a lack of training, assessment, and resources at their schools. However, she believed that these teacher educators would still exhibit a positive perception of integrating technology due to fact that technology has become an integral part of their everyday lives. She has these perceptions based on my own experiences as a classroom teacher in Saudi Arabia. Also, her experiences with using technology in the United States during her studies has provided her with positive expectations in regard to the proper use of technology in education as it has increased her awareness of the importance of integrating technology into lesson design. Her understanding of the situation of educational technology in Saudi Arabian schools and teacher preparation programs allowed her to connect with the research participants and interpret the data they provided. However, as a researcher she needed to ensure that her own perceptions and biases about the topic did not influence the data collection or analysis. She did this by applying the techniques described in the trustworthiness section above. Additionally, because she was aware of her perceptions about the research topic, she tried to remain conscious of her ideas to make sure they did not influence the

analysis. One way she kept track of her own thinking during this research was through a research journal in which she reflected upon her own ideas in relation to those of the participants.

### **Chapter Summary**

This chapter provided an overview of the research methodology. In particular, it presented a description of qualitative research. The specific interpretive research design that was adopted for the study was presented and explained. This qualitative study used individual interviews and a questionnaire that gathered demographic information to investigate the views of the teacher educators from Saudi Arabia about pre-service teacher preparation and the effective use of digital visual media. The interviews utilized a semi-structured interview protocol designed to provide in-depth data about the level of use of digital visual media by the participants. Furthermore, the participants were also asked to fill out a questionnaire sent by email to obtain their essential demographic information (e.g., gender, age, etc.). Five teacher educators from Saudi Arabia were interviewed via telephone and all the interviews were audio recorded with relevant notes taken during each. The researcher translated the questionnaire and interview transcripts from Arabic to English. To confirm the researcher's translations were accurate, the researcher used peer reviewers who are bilingual professionals. Additionally, the researcher employed member check and personal journal techniques to increase the trustworthiness of the research.

## **CHAPTER IV**

### **RESULTS**

This qualitative study examined how Saudi teacher educators prepare pre-service teachers to use digital visual media in their future careers. Data were gathered through individual interviews and a questionnaire that collected demographic information. The following research questions were explored by this study:

- Q1 How do Saudi teacher educators articulate the value of digital visual media to 21st century teaching and learning when preparing pre-service teachers?
- Q2 How do Saudi teacher educators understand and use digital visual media in preparing pre-service teachers?
- Q3 How do Saudi teacher educators prepare pre-service teachers for integrating digital visual media for educational purposes in their future teaching?
- Q4 What is the vision of Saudi teacher educators in regard to pre-service teacher preparation about digital visual media and its integration into teaching and learning in Saudi Arabia?

This section reports the results from the interviews with the five participants, who are teacher education faculty at Saudi universities. The subjects were four female and one male faculty who specialize in educational technology. The interview subjects were located by sending an email to the administration of nine universities in Saudi Arabia to request contact information for those instructors who: (a) teach pre-service teacher technology courses; (b) have taught at the university for at least two years; (c) are 25 years and older; and, (d) have at least a master's degree (see Table 1 for the

demographics of the participants). The recordings of the interviews, which were conducted in Arabic, were transcribed verbatim by the researcher.

Table 1

*Interviewee Demographic Information*

Participant	Age	Gender	Current Position	Other Title(s)	Years Teaching
Participant 1	45 years or older	F	Associate Professor	Vice or Deputy Dean of College	18
Participant 2	35-39 years	F	Assistant Professor	N/A	4
Participant 3	35-39 years	F	Assistant Professor	N/A	10
Participant 4	40-44 years	F	Assistant Professor	N/A	19
Participant 5	35-39 years	M	Assistant Professor	Vice Dean of Scientific Research	14

Based on the survey results, all five participants use technology in teaching (see Table 2) for different activities (see Table 3). All the interviewees also indicated that the pre-service teaching students at their institutions have access to a computer lab for use in their studies. The five participants variously defined the phrase “technology integration” as: (a) Participant 1: “Implement technology in the educational process to create successful learning.” (b) Participant 2 “The use of technology, if needed, as part of the educational process;” (c) Participant 3: “Using technology to help the teacher transfer information and teach the students how to use and apply technology in education;” (d) Participant 4: “Integrating technology as part of the learning process and not just as a tool;” and, (e) Participant 5: “To employ and use diverse technologies in the teaching and

learning process.” Overall, the participants’ described this concept as how faculty implement diverse technologies in the teaching and learning process to help the teacher transfer information and to teach the students how to use and apply technology in education.

Table 2

*Participant Provided Data on Technology Device Type and Location of Access*

Personal Use	Rate	Available at University	Rate
Desktop Computer	5	Digital Interactive Whiteboard	0
Laptop	5	Television	0
Smartphone	5	Smart Board	5
Camera	1	Digital Projector	4
Tablet	4	Computer (Desktop, Laptop)	5

The participants defined the phrase “digital visual media” as: (a) Participant 1: “Any visual digital technology, such as interactive video;” (b) Participant 2: “Video clips;” (c) Participant 3: “Technical materials and tools that engage one or more of the students’ senses [vision, hearing];” (d) Participant 4: “The standard video interface that is designed to maximize the visual aspect of digital displays;” and, (e) Participant 5: “All technical tools, including static and moving images, video, text, animation, etc., which primarily address the visual sense of users.” In summary, the participants defined digital visual media as technical materials and tools, including static and moving images, video, text, and animation, that engage one or more of the students’ senses.

Table 3

*Participant Provided Data on Activities for Which Technology is Used*

Type of Use	Rate
E-mail	5
Database	3
Games	2
Blogs	1
Social Networking	4
News Sites	3
YouTube	4
University Website	5
Creating Course Materials	1

SmartBoard brand interactive whiteboards was singled out as an item because classrooms at many universities in Saudi Arabia have this technology. Interactive Digital Whiteboard was still included in the survey to capture any data that might be available indicating other tools available to participants. No participants indicated such tools except for the SmartBoard brand.

### **Interview Themes**

The transcripts were translated into English by the researcher. Two researchers unrelated to the study also translated the transcripts into English. This was done to ensure the precision of the translations. Translation was a two-month process. Analysis of qualitative data was completed using the English translations. Data coding was used to identify open codes and patterns in the responses of the participants as collected from the

interview transcripts. After transcribing all the interviews and analyzing the participants' responses, the following themes were identified, each of which is explored below with any noted sub-themes (see Table 4):

1. Theme 1: Societal demand for technology and visual knowledge.
2. Theme 2: Increased knowledge of technology.
3. Theme 3: Technology and digital visual media practices.
4. Theme 4: Developing a vision requires training and support.

### **Theme 1: Societal Demand for Technology and Visual Knowledge**

The majority of the participants indicated positive attitudes toward the use of digital visual media and technology. Only one participant made a negative observation that involved a concern with technology interfering with the important role of the human teacher in the instruction experience. However, despite that one professor's concern, all the professors recognized that technology has a necessary role in teaching in the digital era. As stated by Participant 5:

Studies have proven that such educational visual media are helpful to the process of keeping, recalling, remembering, and consolidating learning. These educational media also have positive impact on the development of different critical thinking skills through the use of images, models, and activities that incorporate digital media.

Additionally, Participant 2 mentioned how important it is that faculty use such tools in education programs because she feels these future teachers are much more knowledgeable about technology than not just her generation but also the generation that she is teaching in the university education program. Furthermore, she recognized that by the time current education students graduate, technology will have improved even further.

Table 4

*Research Question Themes and Sub-themes*

Question	Theme	Sub-theme
Q1. How do Saudi teacher educators articulate the value of digital visual media (DVM) to 21st century teaching and learning when preparing pre-service teachers?	T1. Societal demand for technology and visual knowledge.	ST1a. Technology is an important aspect of the lives of all individuals.
		ST1b. Teaching the “digital generation.”
		ST1c. Lack of familiarity with visual media.
		ST1d. Maintaining students’ attention and ensuring better retention.
Q2. How do Saudi teacher educators understand and use digital visual media in preparing pre-service teachers?	T2. Increased knowledge of technology.	ST2a. Keeping technology updated.
		ST2b. Updating the curriculum.
		ST2c. Professional development for faculty.
		ST1c. Lack of familiarity with visual media.
Q3. How do Saudi teacher educators prepare pre-service teachers for integrating digital visual media for educational purposes in their future teaching?	T3. Technology and digital visual media practices.	ST3a. Standards.
		ST3b. Skills.
		ST3c. The importance of intellectual rights and ethical issues.
		ST3d. Impact of technology access.
		ST3e. Student freedom.
		ST3f. Availability of programs and applications.
Q4. What is the vision of Saudi teacher educators in regard to pre-service teacher preparation about digital visual media and its integration into teaching and learning in Saudi Arabia?	T4. Developing a vision requires training and support.	ST4a. More support and training.
		ST4b. Lack of skills and practice.

Furthermore, Participant 3 stated, “It has a great role to suit the needs of students, by helping them to understand, focus, and attract their attention on the information. [These media] are effective for use in the classroom.” Certain sub- themes emerged regarding this matter, including: (a) technology is an important aspect of the lives of all individuals; (b) teaching the “digital generation;” (c) lack of familiarity with visual media; and, (d) Maintaining students’ attention and ensuring better retention.

**Sub-theme 1a: Technology is an important aspect of the lives of all individuals.** During the interviews, some of the participants made comments about the world outside of the university and how important a role technology plays in people’s daily lives. For example, Participant 1 said:

I support this as well and feel strongly that such digital visual media must be utilized with both learners and even regular adults not currently attending school but who could benefit from understanding how to use technology in their everyday lives. It is much easier to relay information using such images that are easy-to-read regardless of education level. Images communicate information faster and people tend to retain the information longer.

As an example of the importance placed on educating even non-students in the use of technology, Participant 4 noted a volunteer program that she incorporated into a course she taught where she had her students go out into the community to teach technology skills to individuals outside of the university, such as residents at a home for the elderly.

**Sub-theme 1b: Teaching the “digital generation.”** Most of the participants indicated that educators face some challenges when dealing with the digital generation. They noted that because these young people have grown up with technology and are very familiar with it, it is sometimes challenging for professors who are older to keep up with them in terms of their own technology skills. For example, Participant 5 mentioned, “We

are now dealing with a technical generation or a digital generation. This generation has had smart devices such as iPads and iPhones from a very early age.” He added:

If the students enter the university or go to secondary school in the morning, and find a big gap between what they are using in terms of technology during their personal time and what is currently in use in the classroom, they will be frustrated.

Similarly, Participant 4 said:

Of course, this integration is very important because we are in the era of technology. If we introduce the technology, technology materials and technology equipment, at the earliest stage of learning or in the early stages of education, this is better for the student and the teacher. We now notice that often the teacher is far behind the students in the use of technology. For example, we as faculty members in the technology area need to develop and update our skills every semester. There is a need to be aware of every change and update so we can incorporate these into the courses in order to keep pace with the advancement of technology and the advancement of our students. It is also known that younger and younger children are proving to be better adept at using technology than [older people].

**Sub-theme 1c: Lack of familiarity with visual media.** Generally, the individual interviews with the participants indicated they were aware of the importance of using digital technology in teaching and in pre-service teacher preparation. However, the interviews indicated the participants were notably unfamiliar with visual learning skills and what their students would need to achieve meaningful digital visual media knowledge. Participant 3 reported, “Currently we do not focus on [visual learning skills] and pre-service teaching students are not required to learn [these skills].” Additionally, Participant 4 said:

There is a theoretical and practical implementation for each subject that must be accomplished by the students. When the students learn, for example, how to create digital stories, infographics, etc., what I focus on is how the students choose images and how these images are relevant to the objectives of the particular project.

Similarly, Participant 2 reported:

There were not specific skills that were required of the students. But, I try to teach them to choose the appropriate visual materials that achieve the learning goal. So, the images or the videos that they want to use should be related to the main idea and also be effectively used.

#### **Sub-theme 1d: Maintaining students' attention and ensuring better**

**retention.** Participants clearly understood and expressed that using technology and visual media will improve the learning process and better maintain students' attention.

Comments consistently indicated that the participants feel learners will retain information longer when digital visual media is used in education. For example, Participant 1 shared:

I expect it will improve the educational process and, as I mentioned earlier, it allows the student to retain the information learned longer and also keeps students' attention on the learning process, which facilitates the teaching process and the delivery of information from the professor to the students.

Similarly, Participant 2 said, "But without a doubt, it simplifies the concept for the students and maybe better holds their attention." Participant 5 indicated that faculty must stop using traditional teaching methods and integrate digital tools into the learning and teaching process, "Whether to achieve the objectives of the curriculum, to enhance the capabilities of students, to attract their attention, or to give them the necessary skills and knowledge."

#### **Theme 2: Increased Knowledge of Technology**

The Saudi teacher educators agreed that the use of digital visual media is important for all university students, including pre-service teachers. The interviewees identified different types of digital media that are employed in the programs at their institutions by professors and pre-service teaching students. These media included applications such as: Movie Maker, Class Dojo, gamification tools, Aurasma, StoryJumper, PowerPoint, Prezi, and iMovie.

Participant 3 stated that:

I teach to two majors that are Early Childhood Education and Islamic Studies. In our department, some courses teach techniques on production. We try to give them examples of live programs or applications suitable to the age group that they will teach - in both kindergartens or programs in Islamic Studies. This is the role of education techniques and the role of production.

A few sub-themes emerged from this discussion: (a) keeping technology updated; (b) updating the curriculum; and, (c) professional development for faculty.

**Sub-theme 2a: Keeping technology updated.** The majority of the participants (n = 4) remarked upon the need not just to use technology but to make sure that appropriate technology is available to students. A few of the participants noted that they have concerns about whether all their students have access to necessary technology in their homes and that it is important to ensure technology is available at the university in case students do not have access at home. Participant 4 mentioned that she would have students work in groups, making sure that at least one has a laptop that can access the necessary applications or programs. As with the sub-theme noted above, the participants referenced the fact that keeping up-to-date with technology also helps faculty keep up with the needs and experiences of the digital generation, as Participant 5 said:

The digital generation will be sitting in university seats in just a few years. It will be difficult for relatively untrained teachers to deal with this digital generation that has been working with these smart devices since they were very young.

**Sub-theme 2b: Updating the curriculum.** Three participants made reference to the curriculum during their interviews; two of these interviewees indicated that the educational technology curricula at their universities are updated every semester in order to keep current with updated technology. For example, Participant 4 mentioned:

There is considerable emphasis and progress in the current curriculum regarding the use of technology and digital media, as well as an updating of the curriculum at the beginning of each semester. We try to introduce new topics into the curriculum that support the use of modern technology. We are still working [to accomplish this] because currently we cannot say that we have achieved the latest thing in technology. We also try as much as possible to update and improve in the area of the diversity of technology we present on.

Participant 5 said, “The curriculum is still in the developmental stage and lags behind in implementing advanced technology that meets the needs of present-day learning.”

Additionally, the faculty members were committed to efforts to develop the curriculum to meet the needs of all students. As Participant 4 said:

There are many advanced topics that support the use of these digital media. There are also some efforts by faculty members regarding the development of curricula so that some topics are added to meet the needs of all students. For example, when I teach special education students, I try to teach them technical subjects that serve people with special needs.

Furthermore, Participant 1 reported that there is a need for collaborate between specialized teams that include individuals with specialization in computer technology and/or specialization in educational design or technology in order for “the teams [to] work together to develop and design the content itself.”

**Sub-theme 2c: Professional development for faculty.** This sub-theme relates to comments the participants made regarding the need for professors to keep pace with their pre-service teaching students. But this also refers to how they felt that it was important that their students understand that staying up-to-date with their skills will be important once they start teaching themselves. As Participant 2 stated:

In my department, I see the offerings as good, but the important thing to remember is the development of ourselves. For example, Movie Maker is very old--there are modern programs that a person could attend workshops on to develop herself or himself, to become familiar with what is new and learn how to use it.

Participant 3 noted that she had concerns about the need for professional development for faculty members on new programs through short workshops or by having universities:

Publish this knowledge in another way, for example on Twitter or WhatsApp in the form of small videos or small amounts of information that would allow us to disseminate awareness to faculty in a way they understand and are excited about. It is also necessary to give faculty the opportunity to seek out professional development and learning on their own.

### **Theme 3: Technology and Digital Visual Media Practices**

Another essential theme that appeared across the data was regarding educators' experiences using digital visual media in their teaching. The participants of this study shared some examples of how they use these media to prepare pre-service teachers.

Participants' comments throughout the interviews highlighted how they integrate technology and visual materials in their classrooms. For example, Participant 3 stated:

This past year we had students design digital stories: some students printed them out and some created electronic posters, but also printed them. In other words, we have a poster and a digital story, in which all participated as a community service for the kindergartens school.

In addition, Participant 4 indicated that:

The students worked on digital stories according to their [field of study], for example, early childhood education. As well as stories on digital awareness and the stories were very beautiful and enjoyable. The students also did infographics for some courses. In these, the students summarized the assigned content in one page in the form of an infographic.

However, there were some issues regarding the extent of integration of digital visual media in the classroom, with participants noting that it is often limited to use only for presentation purposes. Participant 5 said, "Honestly, the projects were presentations and the students were using different programs to create the presentations." The following sub-themes emerged from this theme: (a) standards; (b) skills; (c) the

importance of intellectual rights and ethical issues; (d) impact of technology access; (e) student freedom; and, (f) availability of programs and applications.

**Sub-theme 3a: Standards.** All five participants stated that they focus on different standards for different projects. These standards or concepts include such things as: (a) defining the project objectives; (b) understanding the needs of the target group; (c) determining the best media to use for the subject; (d) maintaining the interest of the target audience (not being boring); and, (e) making sure that certain standards of media design are maintained, such as clarity in line and color. As an example of this, Participant 5 mentioned, “Special criteria on the use of these media must be included in the course description; these criteria are agreed upon by the members of the department and then are modified in accordance with the evolving digital media.” According to Participant 1, “Every project has several criteria. Like, how do the students assess the goal first and the needs of the target group, which is in one way or another an educational implementation?”

**Sub-theme 3b: Skills.** Moreover, the teacher educators prepare pre-service teachers for integrating digital visual media by instructing the students in certain teaching skills, such as learning how to design effective presentations and visual materials for educational purposes for use in their future teaching careers. According to Participant 4:

The first thing the students learn is how to create effective presentations and how to use photos and videos. Every project is always focused on how to create an effective presentation. So, the criteria [for successfully completing the project] are presented first, whether educational, or technical, as well as what things can be included in the presentation, such as video clips, images, and animation. We also focus on the size of the font, the colors, the clarity of the pictures, and their relevance to the subject, all of which are presented in terms of the objectives of the assignment.

Additionally, all five participants discussed how to use digital media, applications, and programs to prepare pre-service teachers. All of them used different types of technological devices and apps during their teaching experiences. However, the participants expressed that some pre-service program teaching students and undergraduates lack basic skills in programs that are necessary to possess to be successful. Participant 3 remarked upon this issue, stating:

As for preparation skills, unfortunately, we only cover simple things. I wish we were covering how to design pages online. If they are taught these simple skills during their undergraduate years, then it is possible that once they enter the Education college (of course, we have other fields of study that we offer), . . . they already will have had coursework in educational technology and educational materials. The students will then be qualified to design web pages and design applications. I mean, these are things that help them to create educational media such as infographics and others visual media that will help them in their teaching careers.

Participant 5 expressed concern with the focus on digital media and some digital educational images. He said, “frankly, we focus on just providing theoretical information rather than giving them practical opportunities to use what they learned in lecture on computers and technological media.”

**Sub-theme 3c: The importance of intellectual rights and ethical issues.** All five participants confirmed that they are focused on intellectual rights and teaching students how to work with citation. Participant 1 stated, “Of course, I focus on it. In fact, I tell the students that if they use anyone else’s work or images, they should mention this in the references.” Participant 3 mentioned:

If we ask them to do assignments, we include attention to ethical issues within the criteria. Even if they have had workshops and presented scientific material, we still ask them to always end the presentation by either showing or providing a list of references. Even if they quoted from regular [non-academic/non-educational] sites, . . . we tell them to mention all references. We encourage respect for intellectual property rights.

However, some participants stated that there was failure in the area of teaching students how to work with citation and copyrights. For example, Participant 2 said, “The students did not have any background on this issue and it is not mentioned in the curriculum.” In addition, Participant 5 expressed that only a few courses cover copyrights, intellectual property issues, and plagiarism. Participant 5 also mentioned that he feels it is very important to provide pre-service teachers with information on how to deal with these issues and that doing so is part of the mission of all faculty.

**Sub-theme 3d: Impact of technology access.** Four of the participants shared how access issues and problems at particular locations affect their ability to integrate technological media. For example, Participant 4 referred to issues in the technology labs at her institution, stating that the technology was not “properly configured” and that the Internet connection was not reliable. Furthermore, Participant 2 indicated that:

Also, the university provides a lot of labs and the students are given time to work in these. Unfortunately, sometimes there may be a student who does not have the ability to access the Internet. So, I give them lectures on the work. Sometimes there is not enough time for me to clearly relate the subject matter or they do not have the time to access the university’s lab, which is only open from 8 a.m. to 2 p.m.

Participant 3 mentioned that her university experiences access issues related to where a person is on the campus, meaning some buildings have a strong connection than others. She noted that this means that students must rely on their own access that they have through their smart phones. Furthermore, Participant 3 stated that there is an issue with the very limited hours during which students have time to access the school’s technology labs, noting that “the students generally have three hours of access to the lab.”

**Sub-theme 3e: Student freedom.** Most participants stated that they allow the students to choose from the apps or programs available to them to complete assignments.

Participant 4 remarked:

There are a lot of programs and devices that we use in teaching. For example, to create storyboards we use free applications available on computers. The students also have the freedom to choose to download programs to their own devices to create stories and pictures.

Participant 1 similarly stated, “For the project, the students have free choice on the type of program they use to design the video, even Snapchat.”

**Sub-theme 3f: Availability of programs and applications.** Many applications and sites that provide access to advanced technology are readily available. Participant 3 mentioned that using programs that are easier to access makes design easier, saying “For example, using the Cloud is better than downloading a program and loading it to a personal PC or a PC in the lab, which requires the approval of the administrator in the lab.” Participant 4 shared, “I have also had them use some sites available from Google, such as StoryJumper and others.” Additionally, Participant 2 said, “I remember that I used the free programs such as Movie Maker simply because it is free and can be loaded onto all devices.” Furthermore, the interviewees expressed an understanding that future teachers have to learn how to deliver a particular message or specific content through digital visual media. For instance, Participant 2 remarked upon the availability of applications and software that are simple and straightforward to use and that allow students to practice their technology skills using mobile devices, such as phones or iPads.

#### **Theme 4: Developing a Vision Requires Training and Support**

The participants' responses indicated their feeling that the use of digital visual media is very important and essential for the future of teaching and learning in Saudi Arabia. According to Participant 1, "I think it will become a leading aspect in the development of education. It is now just starting to be incorporated into the educational process, but I think it will eventually become a necessity." Similarly, Participant 2 mentioned, "What I see is that their use is very important and essential. It is necessary that these pre-service teaching students have the skills and understand that they need to have these skills." Participant 4 also commented on how visual content delivered through technology is in common use in our daily lives, with the proliferation of electronic devices such as smart phones and tablets. Participant 4 said that particularly with this digital revolution, our society needs to implement these digital visual media correctly by spreading awareness and creating useful programs to educate people. The two sub-themes that emerged here were: (a) more support and training; and, (b) the lack of skills and experience.

**Sub-theme 4a: More support and training.** In addition, all the teacher educators emphasized that there is a need for more support and training of university education school faculty in the use of digital visual media. As Participant 4 indicated:

Frankly, there is nothing that does not require support and training, especially technology. As I said earlier, technology develops and constantly changes, for example, digital stories created a year ago do not look like the digital stories of now. We lack support and training in the use of this advanced technology. We should be constantly updating our courses on the use of technology by providing the latest hardware and software to schools and universities.

Furthermore, as Participant 1 stated, “Sometimes we have to coach ourselves through the update and then we have to train the students on the update as well.”

**Sub-theme 4b: Lack of skills and experience.** The participants did exhibit awareness regarding the lack of required skills for using technology on the part of faculty and, as some noted, older returning students entering pre-service teaching programs. For instance, Participant 3 stated, “Therefore, we find that we have students in the preparatory year, without the basics of computer use, who do not know what they are doing or how to use Windows.” They emphasized the importance of acquiring certain skills to be able to successfully utilize educational technology. As Participant 5 noted, “The implementation of digital media is very weak and instead of teaching the students how to actually use the technology, the faculty merely use it to display content, such as for presentations.” Similarly, Participant 4 said, “Because I think that what is being taught now is not comparable with the development and progress of other countries. Also, each person must update his or her own technology skills to keep up with the changes.”

### **Chapter Summary**

This study used a questionnaire and interviews to collect qualitative data about the perceptions of Saudi teachers related to the preparation of pre-service teachers in the use of digital visual media. The data analysis found four main themes: (a) societal demand for technology and visual knowledge; (b) increased knowledge of technology; (c) technology and digital visual media practices; and, (d) developing a vision requires training and support. These themes and related sub-themes explain how Saudi teacher educators prepare pre-service teachers to use digital visual media.

Overall, participants' responses indicated that there are positive attitudes and increasing technological awareness, skills, and knowledge regarding the use of digital technology in teaching and in pre-service teacher preparation. Also, the participants emphasized the importance of preparing pre-service teachers for integrating digital visual media in their future careers. Participants' statements illustrated the lack of understanding of digital visual media knowledge and skills. The results of this study have recognized specific areas of need for improving digital visual media use in the future, such as providing training and support.

## **CHAPTER V**

### **DISCUSSION**

This qualitative study examined the perspectives of Saudi teacher educators regarding how such faculty prepare pre-service teachers to use digital visual media in their future positions. The analysis of the interview data yielded certain themes and sub-themes regarding participants' perspectives about using digital visual media in pre-service teacher preparation. This chapter contains a discussion of the research results and a description of how the findings are related to each research question. Furthermore, this section will explore the limitations of the study and provide recommendations for future research.

#### **Research Questions**

- Q1 How do Saudi teacher educators articulate the value of digital visual media to 21st century teaching and learning when preparing pre-service teachers?

Research Question 1 focused specifically on the participants' thoughts and attitudes about the potential value of the integration of digital visual media into courses to prepare pre-service teachers in Saudi Arabia. Participants in this study clearly perceived that technology has a necessary role in teaching in the digital era and is helpful to consolidating learning. The current results highlight that technology is an important aspect of the lives of all individuals; the participants also expressed that they believed technology and digital visual media are in demand throughout Saudi society and an important aspect of the lives of all citizens (ST1a). In addition, one participant

mentioned how this area, the importance of educating the community in the use of technology, can be addressed through such things as volunteer programs that allow students to teach technology skills to people out in their communities. These results implied that teacher educators were aware of the importance of technology integration in the Saudi community, which is one of the requirements of education policy in the Kingdom and also one of the goals that Saudi Arabia aspires to implement through Vision 2030 (Kingdom of Saudi Arabia, CEDA, 2016b). Efforts of educational institutions are ongoing to achieve Saudi Arabia's Vision 2030 goals through the provision of high-quality programs for professional development in the academic, professional, and cultural spheres for both pre-service and in-service teachers. To support Saudi Vision 2030, the ministries and institutions should work together to ensure that the objectives of this plan are met on time and also that educational institutions focus on tasks that improve the educational system (Kingdom of Saudi Arabia, CEDA, 2016b).

As the participants stressed, it is important to acknowledge the characteristics of this digital generation, which has grown up with technology and is very familiar with it (ST1b). They noted that this requires educators to integrate technology and visual material into coursework. Technology is accessible to almost everyone in the country and there are very few people who do not interact with it every day, especially amongst the younger generation that spends so much time with different types of technology. The results showed that teaching the digital generation is one of the difficulties faced by educators, who tend to lag behind their students in understanding and using these media. Teachers therefore need to integrate digital visual media into their teaching of this generation, one that has greater experience with how to use technology. This shift in

teaching methods will help the teachers better educate the students in ways that align with their typical learning behaviors outside a formal learning environment. However, there is a concern that the participants are lacking in familiarity with visual media (ST1c). The participants consistently mentioned technology integration, even when answering the question about visual skills. Further, their answers focused only on how these visual media should be appropriate and related to the objectives of the particular project. Most of the responses were limited to examples of the actual practices of using digital visual media for video, digital stories, and presentations. Moreover, the definitions utilized by the participants also indicated their limited knowledge about visual content.

As reflected in the other themes and sub-themes, the participants in the study indicated they saw a positive effect from the use of digital visual media, particularly in how it maintains students' attention and helps them retain the information they are learning for longer (ST1d). The participants stated that integrating such digital visual materials facilitates the teaching process and more easily delivers information to the audience (ST1d). This finding is closely related to that of another study that found that use of technology creates more engagement in lesson activities and enhances the level of comprehension, which facilitates and supports student participation (Shin et al., 2012).

**Q2 How do Saudi teacher educators understand and use digital visual media in preparing pre-service teachers?**

Research Question 2 targeted participants' understanding and use of digital visual media to prepare pre-service teachers for future careers in Saudi Arabia. Most of the themes and sub-themes identified in the study clarify the different types of digital visual media that are employed in pre-service teaching programs. Also, the participants mentioned using different applications and digital media to prepare future teachers, such

as: Movie Maker, Class Dojo, gamification tools, Aurasma, StoryJumper, PowerPoint, Prezi, and iMovie. The faculty must be kept up-to-date with technology to help them meet students' needs (ST2a). However, the participants expressed concerns about whether all their students are able to access digital media, both in their homes and at the university (ST2a). With so many apps and electronic devices readily available today, there is a need to update the technology used in teacher preparation programs to keep up with the development of instructional practices and the quickly changing use of technology in educational processes (Davis, 2017; Gilakjani et al., 2013).

The study findings showed that interviewees also emphasized the importance of updating the curriculum every semester to keep up with changes in technology and to meet students' needs (ST 2b). Another view is confirmed in Sub-theme 2c, regarding the need for professional development for faculty; in support of this sub sub-theme, participants made references to the need for professional development for faculty members to develop their technology skills so that they can keep pace with their students. Participants also noted concerns with how to offer such professional development, deciding what types of settings (e.g., workshops or coursework) work best for such training focused on learning new apps and programs that improve teaching skills (ST2c). These findings are similar to those of Swan et al. (2008), Furthermore, Kopcha (2012) found that professional development in the area of technology integration improved teachers' skills and instructional practices. Professional development activities for faculty can play a key role in encouraging them to integrate technology for instructional purposes.

Although participants expressed a strong desire to keep updating technology, technology skills, and curricula, they seemed unfamiliar with the importance of visual knowledge (ST1c). It was obvious from the participants' responses that there is a lack of understanding of digital visual media knowledge and skills.

Q 3 How do Saudi teacher educators prepare pre-service teachers for integrating digital visual media for educational purposes in their future teaching?

Research Question 3 focused specifically on the participants' practices to prepare pre-service teachers to use digital visual media in their future classrooms in Saudi Arabia. The participants shared their experiences using technology and digital visual media practices by providing examples of how they use digital visual media in their classrooms. For example, they described how students create and design different projects, such as digital stories, electronic posters, and infographics using digital applications and sites. A fundamental issue raised by the participants is that in most of their courses, the main use of technology is solely for presentations. This reflects the lack of digital visual knowledge and how these media lack visual content.

Furthermore, the participants stated that they focus on different standards for different projects (ST3a). They defined a number of such standards, including: (a) defining the project objectives; (b) understanding the needs of the target group; (c) determining the best media to use for the subject; (d) maintaining the interest of the target audience (not being boring); and, (e) making sure that certain standards of media design are maintained, such as clarity in line and color. Furthermore, the participants mentioned that these criteria are set by the members of the department in order to meet the students' needs and are updated regularly to match changes in technology; clearly, by regularly

revisiting the criteria, the department staff indicate their awareness of how important it is to keep current with evolving technology.

These standards showed what kind of educational criteria were considered and used by teacher education programs. However, these standards lack focus on visual media to support educators and students through the integration of technology in education. Additionally, these pre-service teachers need more technological skills to enhance their ability to use different types of teaching methods that include visual media, not only digital technology. Due to the widespread use of the visual with digital technology, there is a need to focus more on the individual's ability to realize and apply visual literacy skills during the creation of digital material, such as learning how to analyze, interpret, and create images, visual communications, and information (Hattwig et al., 2013).

In addition, as the participants explained, is how they prepare pre-service teachers to integrate digital visual media. According to the study results, the teacher educators focused on different teaching skills that prepare their students for futures in teaching (ST3b). For example, the students learn how to create a teaching lesson by using effective presentations that include visual materials. Overall, interviewees indicated that the skills recognized by their programs as the most important are basic computer skills, meaning how students personally use different programs on the computer. Given those results, participants were initially interviewed about digital technology without mentioning the importance of visual skills to 21st century students. Digital visual media, such as electronic devices with social network applications that facilitate the learning process, are becoming increasingly important tools (Turkoguz, 2012).

A follow up question specifically asking about digital visual media in teacher preparation was asked in order to focus participants' attention on this important topic. However, participants' answers avoided specifics about digital visual media; however, they spoke more about technology integration. This lack of response indicates a lack of knowledge regarding how to integrate digital visual media into their teaching. Pre-service teachers need to be provided with better digital visual skills to interpret, analyze, and produce digital visual content for 21st century teaching and learning. The lack of this topic should be addressed. It is important to parse out if the lack of attention to digital visual media is related to the curriculum and/or lack of experience with the topic on the part of the professors. As other researchers have stated, "Viewers today need to be both more appreciative and more critical of visual material than in the past" (Spalter & van Dam, 2008, p. 95). Spalter and van Dam (2008) stated that visual material and methods of relaying visual material need to focus more on research and practice. Today's students already have different technology skills than previous generations, such as having the ability to edit photographs and to access "powerful design tools," however, they need more visual skills to learn about this visual culture that is still underdeveloped (Spalter & van Dam, 2008). Therefore, the faculty need to teach digital visual media so pre-service teaching students can understand and use it, so they can teach it to their students whose lives are even more technology/digital media driven.

Furthermore, the participants confirmed that intellectual rights and ethical issues are covered in some courses (ST3c). Although these matters are important to all the interviewees, they noted concern with the lack of preparation pre-service teachers receive regarding these issues, such as how to work with citation and copyright. In addition, the

study demonstrated that participants feel a responsibility to take it upon themselves to direct their students in how to deal with intellectual rights and ethical issues (ST3c). In pre-service teachers' programs at Saudi Arabian universities, the students only have one course on these matters in relation to the use of technology in teaching. Therefore, it is likely that there is a failure to provide enough information about intellectual rights and ethical issues in the one course because there are too many things to cover and just the limited class in which to present them. So, the faculty take on this responsibility and try to ensure their students understand they are required to meet these standards.

Of particular concern to this research question was the perceptions of the participants regarding the impact of technology access (ST3d). A fundamental issue raised by the participants is that their ability to integrate technology during their lectures is affected by access issues. As viewed by the participants, factors such as the configuration of university labs, time limitations (limited hours of the labs), and Internet access issues, all impact both instructor and student performance. Comments that support this sub-theme were ones that mentioned that the Internet connection was not consistently available in all university buildings, meaning students have to rely on their own access through their smart phones. The participants also indicated that they would like to have more support from their administrators regarding access to useful and modern classroom technology. This finding mirrors the ideas found in Ozel et al. (2008), which found that equal access to technology for students and teachers as well as the proper use of technology during lessons based on adequate training for teachers, is essential and that programs must also have technical support available to address any emerging problems.

Moreover, the matter of student freedom was explored (ST3e). The participants clearly indicated that they give their students the freedom to choose from a variety of different technology applications and programs to support the success of their projects. Additionally, the students are encouraged to download programs to their own devices to create digital visual media. Similarly, the participants supported their students in using free programs and apps that are easily available to load onto many devices (ST3f). Movie Maker and StoryJumper, which are free and available from Google, are the applications that participants mentioned most frequently. Students of the digital generation have sufficient experience with the software and applications now available for use. Therefore, these digital students can acquire knowledge on their own under the guidance of the teacher. McLoughlin and Lee (2008) indicated that there was a need to move away from traditional teaching methods and to focus on ways to empower students to allow them to be independent. The integration of digital visual media as a learning tool helps address the concerns about integrating it into pre-service teacher programs.

Q4     What is the vision of Saudi teacher educators in regard to pre-service teacher preparation about digital visual media and its integration into teaching and learning in Saudi Arabia?

The results of this study show how the participants see the importance of the integration of digital visual media. The participants were found to emphasize that the use of digital visual media is improving the future of education in Saudi Arabia. Additionally, the results of this study clearly imply that pre-service teaching students need certain skills to learn how to use these media in their future careers. Participants expressed that with the spread in the use of digital media in daily lives, Saudis must learn to use these media in useful ways, including for educational purposes. The increasing use of these visuals in

everyday life is happening because they are easily accessible to the largest number of viewers and can transfer information easily in order for it to be shared quickly (Turkoguz, 2012). Obviously, digital visual literacy has become an important element in the teaching and learning process.

As clearly noted by the participants, there is a need for more support and training in the use of all the diverse technologies pre-service teachers need to work with and understand (ST4a). The participants highlighted the importance of constantly updating their technology skills and courses to keep up with technological changes. Participants expressed similar concerns related to faculty's technological skills and practical experiences with integrating technology effectively (ST4b). However, the study results showed that the participants' knowledge of digital visual media was limited. They lacked understanding of how to integrate digital visual media into teacher preparation programs in meaningful ways even though they know that this is important. They feel this is in part due to a lack of required coursework focused on providing computer skills and due to a lack of practical experience in teaching digital visual media.

Saudi Arabian teachers tend to have positive attitudes about using technology in their classrooms. They use technology in their everyday lives and try to use it for educational purposes, as well. In addition, the Saudi Ministry of Education established educational reforms to facilitate the shift from the traditional educational model to a modernized, 21st century one. Moreover, the government is working to facilitate accessibility to technology in every classroom. However, due to the ever-evolving types of technology, teachers have to learn how to use such new tools quickly and effectively to properly incorporate them into the curriculum. Educating teachers in these tools is best

accomplished through technological professional development. Such workshops and training programs can effectively help teachers develop their abilities in the use of technology. Training and support that specifically strengthens teacher's knowledge and skills about digital visual media and how to integrate it in meaningful ways is critical to promote a vision that meets the needs of learners in today's visually dominated world. Therefore, it is important to investigate what professional development resources are available for Saudi educators in regard to the use of technology and digital visual media and its integration into lesson preparation and delivery.

### **Constraints**

This study possesses certain limitations in terms of generalizability because the design was to explore a specific population of educators in a specific location. In order to explore the details of a specific teacher preparation program in Saudi Arabia, the study utilized a small sample size focusing on obtaining a depth of understanding. This limits the findings to the specific characteristics of the study participants. Second, this study involved substantial amounts of translation from Arabic to English. While every precaution was made through the translation process, it is a challenge to accurately convey meaning from one language to another. Participants spoke Arabic slang instead of formal Arabic, which made the process of obtaining fully accurate translations difficult and time-consuming.

### **Implications**

Given the tremendous improvements in technology as well as how digital tools have become an integral part of every aspect of modern life, all nations wishing to provide their students with appropriate educations must embrace the incorporation of

such tools into education plans. Saudi Arabia is currently working actively to achieve the established objectives of Vision 2030. The Saudi Arabia Vision 2030 objectives also include the item: “Provide citizens with knowledge and skills to meet the future needs of the labor market” (Kingdom of Saudi Arabia, CEDA, 2016b, p. 61). Thus, pre-service teachers should be exposed to new ways to improve their learning through the use of the technologies in which they already engage. Additionally, visual content is becoming increasingly popular because of the proliferation of mobile devices that can access social media, including the ability to create and upload photos and videos. There is a need to integrate visual learning into education, especially higher education, which is the perfect place to integrate this learning. Preparing pre-service teachers in advanced teaching methods that enrich the educational process is one of the tasks of faculty members. There are many university disciplines that require teaching visual literacy to help students access useful information.

The following are implications of the study based on the results that would be useful to teacher educators, educational policymakers, and school administrators. These implications may improve and transform teaching and learning processes in Saudi Arabia through the use of technology for teacher training and curriculum design. This study has several practical implications to guide school administrators at both university and public education levels in designing professional development for teachers.

1. Provide more education to faculty regarding visual literacy by providing courses at universities throughout Saudi Arabia to train educators in how to integrate visual content into their teaching practices. Learning for faculty can be formal and informal and support the development of knowledge and pedagogy so that they can shift their approach to teaching and

learning using the constructivist framework. If faculty develop learning activities grounded on constructivist principles, they can co-create knowledge with their students to strengthen visual literacy skills.

2. Develop collaboration between different educational institutions. Faculty are not the only ones who teach visual literacy for certain disciplines, co-creation of knowledge in learning communities can support teachers' development. There are also librarians who need these visual skills to assist students with accessing, finding, and evaluating visual information.

3. The educational policymakers who work to improve the Saudi educational system can include visual literacy in teachers' professional development as a component of an information-literacy course to increase teachers' knowledge. Explicitly including it in curriculum will also legitimize the expectation to develop visual literacy among teachers and students.

4. Raise awareness among community members about the immersion in visual culture that is becoming increasingly important due to the use of social media to capture and store images through mobile devices.

5. Make efforts to support the development of future teachers' programs. The faculty need more training to improve their ability to learn and use continually emerging applications.

### **Future Research**

In pursuit of the goals of Vision 2030, the Kingdom is working hard to move forward and join the ranks of developed countries. Therefore, the efforts exerted in Saudi educational reform must be moved on from the old traditional system that is still being used despite all attempts to abolish it. This study examined the views of faculty members on the integration of visual content in pre-service teacher preparation programs in Saudi universities. Preparing future teachers to use modern teaching techniques, including visual learning to improve student learning, is one of the challenges facing teacher

training programs in Saudi Arabia. This study did not examine the views of future teachers regarding the use of these media. Future studies that assess the perspectives of pre-service teachers on the use of these media may help identify the requirements for effective integration of technology.

Further research is needed to investigate the possibilities of accommodating the need to utilize digital visual media in Saudi classrooms. Specifically, the question regarding the necessary reforms in Saudi education must be researched and addressed to facilitate the shift from a traditional educational model to a 21st century one. Additionally, it could be useful to investigate what professional development resources are available to Saudi educators in regard to the use of visual content in lesson preparation and delivery.

### **Conclusion**

The integration of visual learning has become an urgent necessity because of the spread of visual content in all societies. People rely on digital visual media to deliver information to the recipient. For example, ads have become mere visual collections of images, videos, or graphics about goods, replacing text descriptions. With the spread of social media, people are offering digital video content to communicate through these networks by using photos or videos. In addition, there has been an increase in the use of visual content to speed the transmission of news by publishing live video of events or images as well as maps and data to convey and describe events clearly and quickly. People's reliance on visual data has become more prevalent because of the diversity of technology involved in the transmission of information. It is essential that this digital

visual content is integrated into the curriculum and applied in schools by teaching students the skills on how to use digital visual content to support the learning process.

With the rapid and noticeable progress in Saudi Arabia, there are still some obstacles to integrating technology in schools and universities. There are large numbers of teachers who are willing to use technology; however, they need constant support with integrating technology. The existence of these barriers, including “access, time, lack of resources, training, budget constraints, and inadequate teacher support processes” (Hechter & Vermette, 2013, p. 87) impedes technology integration in classrooms.

However, the government is working hard to provide technology in every classroom. Educators need to know how they can use this advanced technology and integrate it effectively into lessons. There is a need to provide training courses and workshops on the importance and use of visual content in promoting the educational process in different educational institutions. Professional technological development programs for university educators, school teachers, administrators, and librarians need to support, develop, and review what is presented to use visual literacy in order for the integration to be effective.

## REFERENCES

- Afify, M. K. (2018). The effect of the difference between infographic designing types (static vs animated) on developing visual learning designing skills and recognition of its elements and principles. *International Journal of Emerging Technologies in Learning (iJET)*, 13(9), 204-223. doi:10.3991/ijet.v13i09.8541
- Agyei, D. D., & Voogt, J. (2011). ICT use in the teaching of mathematics: Implications for professional development of pre-service teachers in Ghana. *Education and Information Technologies*, 16(4), 423-439. doi:10.1007/s10639-010-9141-9
- Al-Alwani, A. E. S. (2005). *Barriers to integrating information technology in Saudi Arabia science education* (Doctoral dissertation). Available from ProQuest Dissertations and Theses (Pub. No. AAI3185124).
- Al-Gahtani, S. S. (2004). Computer technology acceptance success factors in Saudi Arabia: An exploratory study. *Journal of Global Information Technology Management*, 7(1), 5-29. doi:10.1080/1097198X.2004.10856364
- Al-Gahtani, S. S., Hubona, G. S., & Wang, J. (2007). Information technology (IT) in Saudi Arabia: Culture and the acceptance and use of IT. *Information & Management*, 44(8), 681-691. doi:10.1016/j.im.2007.09.002
- Al Mulhim, E. (2014). The barriers to the use of ICT in teaching in Saudi Arabia: A review of literature. *Universal Journal of Educational Research*, 2(6), 487-493. doi:10.13189/ ujer.2014.020606

- Al-Zahrani, A. R. M. (2011). *Preparing pre-service teachers for the effective use of educational technology in Saudi Arabia* (Doctoral dissertation, La Trobe University, Bundoora, Australia). Retrieved from [http://www.academia.edu/12353743/Preparing\\_Pre-service\\_Teachers\\_for\\_the\\_Effective\\_Use\\_of\\_Educational\\_Technology\\_in\\_Saudi\\_Arabia\\_PhD\\_Thesis\\_](http://www.academia.edu/12353743/Preparing_Pre-service_Teachers_for_the_Effective_Use_of_Educational_Technology_in_Saudi_Arabia_PhD_Thesis_)
- Al-Zahrani, A. (2015). The place of technology integration in Saudi pre-service teacher education: Matching policy with practice. *The Turkish Online Journal of Educational Technology*, 14(1), 151-162. Retrieved from <http://www.tojet.net/articles/v14i1/14116.pdf>
- Alnahdi, G. H. (2014). Educational change in Saudi Arabia. *Journal of International Education Research (JIER)*, 10(1), 1-6. doi:10.19030/jier.v10i1.8342
- Banister, S., & Vannatta, R. (2006). Beginning with a baseline: Insuring productive technology integration in teacher education. *Journal of Technology and Teacher Education*, 14(1), 209-235. Retrieved from <https://www.learntechlib.org/p/5382/>
- Bhattacharjee, A. (n.d.). Social science research: Principles, methods, and practices. In B. Pelz (Curator) *Research methods for the social sciences: A heutagogical approach to the science of social science inquiry* (pp. 103-111). Tampa, FL: University of South Florida. Retrieved from <https://courses.lumenlearning.com/suny-hccc-research-methods/chapter/chapter-12-interpretive-research/>
- Borman K. M., Mueninghoff, E., Cotner, B. A., & Frederick, P. B. (2009). Teacher preparation programs. In L. J. Saha & A. G. Dworkin. (Eds.), *Springer international handbooks of education: International handbook of research on teachers and teaching* (Vol. 21). Boston, MA: Springer.

- Bradshaw, M. J., & Porter, S. (2017). Infographics: A new tool for the nursing classroom. *Nurse Educator, 42*(2), 57-59. doi:10.1097/NNE.0000000000000316
- Brzycki, D., & Dudt, K. (2005). Overcoming barriers to technology use in teacher preparation programs. *Journal of Technology and Teacher Education, 13*(4), 619-641. Retrieved from <https://www.learntechlib.org/p/5167/>
- Chiu, M., & Whitebread, D. (2011). Taiwanese teachers' implementation of a new 'constructivist mathematics curriculum': How cognitive and affective issues are addressed. *International Journal of Educational Development, 31*(2), 196-206. doi:10.1016/j.ijedudev.2010.06.014
- Confrey, J. (1990). Chapter 8: What constructivism implies for teaching. *Journal for Research in Mathematics Education. Monograph, 4*, 107-122, 195-210. doi:10.2307/749916
- Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA/London, UK: Sage.
- Cullen, T. A., Brush, T. A., Frey, T. J., Hinshaw, R. S., & Warren, S. J. (2006). NCLB technology and a rural school: A case study. *The Rural Educator, 28*(1), 9-16. Retrieved from <http://epubs.library.msstate.edu/index.php/ruraleducator/article/view/200/0>
- Darling-Hammond, L. (2007, May 2). Evaluating 'No Child Left Behind': The problems and promises of Bush's education policy *The Nation*. Retrieved from <https://www.thenation.com/article/evaluating-no-child-left-behind/>

- Darling-Hammond, L., Chung, R., & Frelow, F. (2002). Variation in teacher preparation: How well do different pathways prepare teachers to teach? *Journal of Teacher Education*, 53(4), 286-302. doi:10.1177/0022487102053004002
- Davis, E. B. (2017). *A mixed-methods study of a teacher preparation program: Preservice teachers' perceived preparedness to integrate technology effectively* (Doctoral dissertation). Available from ProQuest Dissertations and Theses Global database. (UMI No. 10278387)
- Davis, N., Preston, C., & Sahin, I. (2009). Training teachers to use new technologies impacts multiple ecologies: Evidence from a national initiative. *British Journal of Educational Technology*, 40(5), 861-878. doi:10.1111/j.1467-8535.2008.00875.x
- Demirci, C. (2009). Constructivist learning approach in science teaching. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi (H.U. Journal of Education)*, 37, 24-35. Retrieved from <http://www.efdergi.hacettepe.edu.tr/yonetim/icerik/makaleler/489-published.pdf>
- Dexter, S., Doering, A. H., & Riedel, E. S. (2006). Content area specific technology integration: A model for educating teachers. *Journal of Technology and Teacher Education*, 14(2), 325-346. Retrieved from <https://www.learntechlib.org/p/5676/>
- Driscoll, M. P. (2005). *Psychology of learning for instruction* (3rd ed.). Boston, MA: Allyn and Bacon.
- Emanuel, R., & Challons-Lipton, S. (2013). Visual literacy and the digital native: Another look. *Journal of Visual Literacy*, 32(1), 7-26. doi:10.1080/23796529.2013.11674703

- Eristi, S. D., Kurt, A. A., & Dindar, M. (2012). Teachers' views about effective use of technology in classrooms. *Turkish Online Journal of Qualitative Inquiry*, 3(2), 30-41. Retrieved from <http://files.eric.ed.gov/fulltext/ED537802.pdf>
- Fabry, D. L., & Higgs, J. R. (1997). Barriers to the effective use of technology in education: Current status. *Journal of Educational Computing Research*, 17(4), 385-395. doi:10.2190/C770-AWA1-CMQR-YTYV
- Foroughi, A. (2015). The theory of connectivism: Can it explain and guide learning in the digital age? *Journal of Higher Education Theory and Practice*, 15(5), 11-26.
- Fosnot, C. T. (2005). *Constructivism: Theory, perspectives and practice* (2nd ed.). New York, NY: Teachers College Press.
- Fosnot, C. T., & Perry, R. S. (1996). Constructivism: A psychological theory of learning. *Constructivism: Theory, Perspectives, and Practice*, 2, 8-33.
- Gilakjani, A. P., Leong, L-M., & Ismail, H. N. (2013). Teachers' use of technology and constructivism. *International Journal of Modern Education and Computer Science*, 5(4), 49-63. doi:10.5815/ijmecs.2013.04.07
- Gourlay, L., Hamilton, M., & Lea, M. R. (2013). Textual practices in the new media digital landscape: Messing with digital literacies. *Research in Learning Technology*, 21(1), 1-13. doi:10.3402/rlt.v21.21438
- Gray, L., Thomas, N., & Lewis, L. (2010). *Teachers' use of educational technology in US public schools: 2009*. (NCES 2010-040: Institute of Education Sciences). Washington, DC: U.S. Department of Education, National Center for Education Statistics, Institute of Education Sciences. Retrieved from <https://nces.ed.gov/pubs2010/2010040.pdf>

- Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Learning, teaching, and scholarship in a digital age: Web 2.0 and classroom research: What path should we take now? *Educational Researcher*, 38(4), 246-259. doi:10.3102/0013189X09336671
- Gulati, S. (2004, April). Constructivism and emerging online learning pedagogy: A discussion for formal to acknowledge and promote the informal. In *Regional Futures: Formal and Informal Learning Perspective*. Symposium conducted at the Annual Conference of the Universities Association for Continuing Education, Pontypridd, Wales. Retrieved from <http://www.leeds.ac.uk/educol/documents/00003562.htm>
- Hamdan, A. K. (2014). The reciprocal and correlative relationship between learning culture and online education: A case from Saudi Arabia. *The International Review of Research in Open and Distributed Learning*, 15(1). doi:10.19173/irrodl.v15i1.1408.
- Hattwig, D., Bussert, K., Medaille, A., & Burgess, J. (2013). Visual literacy standards in higher education: New opportunities for libraries and student learning. *Libraries and the Academy*, 13(1), 61-89. doi:10.1353/pla.2013.0008
- Hechter, R. P., & Vermette, L. A. (2013). Technology integration in K-12 science classrooms: An analysis of barriers and implications. *Themes in Science and Technology Education*, 6(2), 73-90. Retrieved from <https://www.learntechlib.org/p/148638/>
- Huang, H.-M. (2002). Toward constructivism for adult learners in online learning environments. *British Journal of Educational Technology*, 33(1), 27-37. doi:10.1111/1467-8535.00236

- International Society for Technology in Education (ISTE). (2016). *2016 ISTE standards: For students*. Retrieved [http://www.iste.org/docs/Standards-Resources/iste-standards\\_students-2016\\_one-sheet\\_final.pdf?sfvrsn=0.23432948779836327](http://www.iste.org/docs/Standards-Resources/iste-standards_students-2016_one-sheet_final.pdf?sfvrsn=0.23432948779836327)
- Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory, Volume II* (pp. 215-239). Mahwah, NJ: Lawrence Erlbaum Associates.
- Jonassen, D. H., Peck, K. L., & Wilson, B. G. (1999). *Learning with technology: A constructivist perspective*. New York, NY: Merrill/Prentice-Hall.
- Jonassen, D. H., & Rohrer-Murphy, L. (1999). Activity theory as a framework for designing constructivist learning environments. *Educational Technology Research and Development*, 47(1), 61-79. doi:10.1007/BF02299477
- Jones, C., Ramanau, R., Cross, S., & Healing, G. (2010). Net generation or digital natives: Is there a distinct new generation entering university? *Computers & Education*, 54(3), 722-732. doi:10.1016/j.compedu.2009.09.022
- Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, 14(3), 581-597. Retrieved from <http://www.teachade.com/resources/support/5035b24fe0ead.pdf>
- Karagiorgi, Y., & Symeou, L. (2005). Translating constructivism into instructional design: Potential and limitations. *Journal of Educational Technology & Society*, 8(1), 17-27. Retrieved from [http://www.ifets.info/journals/8\\_1/5.pdf](http://www.ifets.info/journals/8_1/5.pdf)

- Kay, R. H. (2006). Evaluating strategies used to incorporate technology into preservice education: A review of the literature. *Journal of Research on Technology in Education*, 38(4), 383-408. doi:10.1080/15391523.2006.10782466
- Keefe, T. J. (1987). Using technology to enhance a course: The importance of interaction. *American Journal of Distance Education*, 1(1), 47-57.
- Kelly, F. S., McCain, T., & Jukes, I. (Eds.). (2008). *Teaching the digital generation: No more cookie-cutter high schools*. Thousand Oaks, CA: Corwin Press.
- Keren-Kolb, E. F. (2010). *Stimulating preservice teachers' beliefs about the benefits of everyday technology in their teaching* (Doctoral dissertation, University of Michigan). Retrieved from <https://unco.idm.oclc.org/login?url=https://search-proquest-com.unco.idm.oclc.org/docview/276475024?accountid=12832>
- Kersten, C. E. (2012). *"Classic with a twist or a twist with some classic": Defining and teaching digital literacy in a secondary English classroom through the use of social network sites* (Master's thesis). Retrieved from ProQuest Dissertations and Theses database. (UMI No. 1519928).
- Khan, M. (2016). Saudi Arabia's vision 2030. *Defence Journal*, 19(11), 36.
- Kingdom of Saudi Arabia, Council of Economic and Development Affairs (CEDA). (2016a). *National transformation program 2020*. Riyadh, KSA: Author. Retrieved from [http://vision2030.gov.sa/sites/default/files/NTP\\_En.pdf](http://vision2030.gov.sa/sites/default/files/NTP_En.pdf)
- Kingdom of Saudi Arabia, Council of Economic and Development Affairs (CEDA). (2016b). *Saudi Arabia's vision 2030*. Riyadh, KSA: Author. Retrieved from <http://vision2030.gov.sa/en>

- Kirschner, P., & Selinger, M. (2003). The state of affairs of teacher education with respect to information and communications technology. *Technology, Pedagogy and Education, 12*(1), 5-17. doi:10.1080/14759390300200143
- Kivunja, C. (2014). Theoretical perspectives of how digital natives learn. *International Journal of Higher Education, 3*(1), 94-109. doi:10.5430/ijhe.v3n1p94
- Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education, 59*(4), 1109-1121. doi:10.1016/j.compedu.2012.05.014
- Koschmann, T. D., Myers, A. C., Feltovich, P. J., & Barrows, H. S. (1994). Using technology to assist in realizing effective learning and instruction: A principled approach to the use of computers in collaborative learning. *Journal of the Learning Sciences, 3*(3), 227-264. doi:10.1207/s15327809jls0303\_2
- Kulik, J. A., Kulik, C-L. C., & Cohen, P. A. (1980). Effectiveness of computer-based college teaching: A meta-analysis of findings. *Review of Educational Research, 50*(4), 525-544. doi:10.3102/00346543050004525
- Kvavik, R., & Caruso, J. B. (2005). *ECAR study of students and information technology 2005: Convenience, connection, control, and learning* (EDUCAUSE Center for Applied Research, vol. 6). Boulder, CO: EDUCAUSE. Retrieved from <https://www.educause.edu/ir/library/pdf/ers0506/rs/ers0506w.pdf>
- Lambert, J., & Gong, Y. (2010). 21st century paradigms for pre-service teacher technology preparation. *Computers in the Schools, 27*(1), 54-70. doi:10.1080/07380560903536272

- Lei, J. (2009). Digital natives as preservice teachers: What technology preparation is needed? *Journal of Computing in Teacher Education*, 25(3), 87-97.  
doi:10.1080/10402454.2009.10784615
- Li, K., Li, Y., & Franklin, T. (2016). Preservice teachers' intention to adopt technology in their future classrooms. *Journal of Educational Computing Research*, 54(7), 946-966. doi:10.1177/0735633116641694
- Liu, C. C., & Chen, I. J. (2010). Evolution of constructivism. *Contemporary Issues in Education Research (CIER)*, 3(4), 63. doi:10.19030/cier.v3i4.199
- Maher, C. A., & Alston, A. (1990). Chapter 10: Teacher development in mathematics in a constructivist framework. *Journal for Research in Mathematics Education. Monograph*, 4, 147-165, 195-210. doi:10.2307/749918
- Martin, A. (2005). DigEuLit-a European framework for digital literacy: A progress report. *Journal of eLiteracy*, 2(2), 130-136.
- Mathew, N. G., & Alidmat, A. O. H. (2013). A study on the usefulness of audio-visual aids in efl classroom: Implications for effective instruction. *International Journal of Higher Education*, 2(2), 86-92. doi:10.5430/ijhe.v2n2p86
- Matsuda, P. K., & Bommarito, D. (2015). Constructivism. In J. M Bennett (Ed.), *The SAGE encyclopedia of intercultural competence* (pp. 116-119). Los Angeles, CA: SAGE.
- Mattock, L. K. (2015). Teaching visual and media literacy skills through media production technology. In D. Baylen & A. D'Alba (Eds.), *Essentials of teaching and integrating visual and media literacy* (pp. 237-249). Heidelberg, Germany: Springer Cham.

- McLoughlin, C., & Lee, M. J. W. (2008). Mapping the digital terrain: New media and social software as catalysts for pedagogical change. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*. Retrieved from <http://www.ascilite.org.au/conferences/melbourne08/procs/mcloughlin.html>
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Metros, S. E. (2008). The educator's role in preparing visually literate learners. *Theory into Practice*, 47(2), 102-109. doi:10.1080/00405840801992264
- Milbrandt, M. K., Felts, J., Richards, B., & Abghari, N. (2004). Teaching-to-learn: A constructivist approach to shared responsibility. *Art Education*, 57(5), 19-24.
- Motschnig-Pitrik, R., & Holzinger, A. (2002). Student-centered teaching meets new media: Concept and case study. *Educational Technology & Society*, 5(4), 160-172. Retrieved from [http://www.ifets.info/journals/5\\_4/renate.html](http://www.ifets.info/journals/5_4/renate.html)
- Nassuora, A. B. (2012). Students acceptance of mobile learning for higher education in Saudi Arabia. *American Academic & Scholarly Research Journal*, 4(2), 1-6. Retrieved from <http://naturalspublishing.com/files/published/5z8b9f97ju9k98.pdf>
- Newman, D. R. (1996). An experiment in group learning technology: Evaluating critical thinking in face-to-face and computer-supported seminars. *Interpersonal Computing and Technology Journal*, 4(1), 57-74.
- Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education*, 59(3), 1065-1078. doi:10.1016/j.compedu.212.04.016

- North Central Regional Educational Laboratory (NCREL), & the Metiri Group. (2003). *enGauge 21st century skills: Literacy in the digital age*. Retrieved from <https://pict.sdsu.edu/engauge21st.pdf>
- O'Shea, J., & Leavy, A. M. (2013). Teaching mathematical problem-solving from an emergent constructivist perspective: The experiences of Irish primary teachers. *Journal of Mathematics Teacher Education*, 16(4), 293-318. doi:10.1007/s10857-013-9235-6
- Ozel, S., Yetkiner, Z. E., & Capraro, R. M. (2008). Technology in K-12 mathematics classrooms. *School Science and Mathematics*, 108(2), 80-85. doi:10.1111/j.1949-8594.2008.tb17807.x
- Özsevgec, T., Akbulut, H., & Özsevgec, L. C. (2010). Determination of visual literacy of preservice teachers. *Journal of Turkish Science Education*, 7(3), 29. Abstract available at <http://www.tused.org/internet/tused/sayilar/defaultarchive.asp?islem=detaylar&id=203>
- Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332. doi:10.3102/00346543062003307
- Park, H. W., & Biddix, J. P. (2008). Digital media education for Korean youth. *International Information and Library Review*, 40(2), 104-111. doi:10.1016/j.iilr.2007.12.003
- Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education*, 37(2), 163-178. doi:10.1016/S0360-1315(01)00045-8

- Polly, D., Mims, C., Shepherd, C. E., & Inan, F. (2010). Evidence of impact: Transforming teacher education with preparing tomorrow's teachers to teach with technology (PT3) grants. *Teaching and Teacher Education, 26*(4), 863-870. doi:10.1016/j.tate.2009.10.024.
- Poore, M. (2011). Digital literacy: Human flourishing and collective intelligence in a knowledge society. *Literacy Learning: The Middle Years, 19*(2), 20-26. Retrieved from <http://www.freepatentsonline.com/article/Literacy-Learning-Middle-Years/259959923.html>
- Pope, M., Hare, D., & Howard, E. (2002). Technology integration: Closing the gap between what preservice teachers are taught to do and what they can do. *Journal of Technology and Teacher Education, 10*(2), 191-203.
- Prater, M. (2001). Constructivism and technology in art education. *Art Education, 54*(6), 43-48. doi:10.2307/3193914
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon, 9*(5), 1-6. doi:10.1108/10748120110424816
- Recalde, X. D. (2008). *Teachers' educational technology practices: Understanding teachers' critical thinking skills and teachers' cognitive demand practices in the classroom* (Doctoral dissertation, Northern Illinois University). (Retrieved from <https://unco.idm.oclc.org/login?url=https://search-proquest-com.unco.idm.oclc.org/docview/304556526?accountid=12832>

- Reed, C. S. (2012). *Learning theories applied to teaching technology: Constructivism versus behavioral theory for instructing multimedia software programs* (Doctoral dissertation). Capella University. Retrieved from <https://eric.ed.gov/?id=ED551457>
- Reiser, R. A., & Dempsey, J. V. (2012). *Trends and issues in instructional design and technology* (3rd ed.). Boston, MA: Allyn and Bacon.
- Roschelle, J. M., Pea, R. D., Hoadley, C. M., Gordin, D. N., & Means, B. M. (2000). Changing how and what children learn in school with computer-based technologies. *The Future of Children, 10*(2), 76-101. doi:org/10.2307/1602690
- Sang, G., Valcke, M., van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education, 54*(1), 103-112. doi:10.1016/j.compedu.2009.07.010
- Saunders, W. L. (1992). The constructivist perspective: Implications and teaching strategies for science. *School Science and Mathematics, 92*(3), 136-141. doi:10.1111/j.1949-8594.1992.tb12159.x
- Schroll, D. (2007). *Examining what influences a teacher's choice to adopt technology and constructivist principles in the classroom learning environment* (Doctoral dissertation, Walden University). Retrieved from <https://unco.idm.oclc.org/login?url=https://search-proquest-com.unco.idm.oclc.org/docview/304768353?accountid=12832>

- Shelly, G., Cashman, T. J., Gunter, G., & Gunter, R. (2007). *Teachers discovering computers: Integrating technology and digital media in the classroom*. Boston, MA: Cengage Learning.
- Shin, N., Sutherland, L. M., Norris, C. A., & Soloway, E. (2012). Effects of game technology on elementary student learning in mathematics. *British Journal of Educational Technology*, 43(4), 540-560. doi:10.1111/j.1467-8535.2011.01197.x
- Spalter, A. M., & van Dam, A. (2008). Digital visual literacy. *Theory into Practice*, 47(2), 93-101. doi:10.1080/00405840801992256
- Spector, J. M., Merrill, M. D., Elen, J., & Bishop, M. J. (Eds.) (2014). *Handbook of research on educational communications and technology* (4th ed.). New York, NY: Springer.
- Stevens, D. J. (1980). How educators perceive computers in the classroom. *AEDS Journal*, 13(3), 221-232. doi:10.1080/00011037.1980.11008276
- Stokes, S. (2002). Visual literacy in teaching and learning: A literature perspective. *Electronic Journal for the Integration of technology in Education*, 1(1), 10-19. Retrieved from [http://www.k12photoed.org/wp-content/uploads/2014/03/Visual\\_Literacy\\_stokes.pdf](http://www.k12photoed.org/wp-content/uploads/2014/03/Visual_Literacy_stokes.pdf)
- Swan, K., Lin, L., & Van't Hooft, M. (2008). Teaching with (digital) technology. In C. A. Lassonde, R. J. Michael, & J. Rivera-Wilson (Eds.), *Current issues in teacher education: History, perspectives and implications* (pp. 171-188). Springfield, IL: Charles C. Thomas.

- Thomas, E., & Magilvy, J. K. (2011). Qualitative rigor or research validity in qualitative research. *Journal for Specialists in Pediatric Nursing*, 16(2), 151-155.  
doi:10.1111/j.1744-6155.2011.00283.x
- Tippins, D., Tobin, K., & Nichols, S. (1995). A constructivist approach to change in elementary science teaching and learning. *Research in Science Education*, 25(2), 135-149. doi:10.1007/BF02356448
- Tondeur, J., Pareja Roblin, N., van Braak, J., Voogt, J., & Prestridge, S. (2017). Preparing beginning teachers for technology integration in education: Ready for take-off? *Technology, Pedagogy and Education*, 26(2), 157-177. doi:10.1080/1475939X.2016.1193556
- Tuohy, D., Cooney, A., Dowling, M., Murphy, K., & Sixsmith, J. (2013). An overview of interpretive phenomenology as a research methodology. *Nurse Researcher*, 20(6). doi:10.7748/nr2013.07.20.6.17.e315
- Turkoguz, S. (2012). Learn to teach chemistry using visual media tools. *Chemistry Education Research and Practice*, 13(4), 41-49. doi:10.1039/c2rp20046e
- U.S. Department of Education. (2009) The American Recovery and Reinvestment Act of 2009: Education Jobs and Reform. (2009, March 09). Retrieved from <https://www2.ed.gov/policy/gen/leg/recovery/factsheet/overview.html>
- U.S. Department of Education, Office of Educational Technology. (2016). *Future ready learning: Reimagining the role of technology in education*. Retrieved from: <https://tech.ed.gov/files/2015/12/NETP16.pdf>

- U.S. Department of Education, Press Office. (2015, December 10). U.S. department of education releases 2016 national education technology plan. Retrieved from <https://www.ed.gov/news/press-releases/us-department-education-releases-2016-national-education-technology-plan>
- van Gelder, T. J. (2001, December). How to improve critical thinking using educational technology. In G. Kennedy, M. Keppell, C. McNaught, & T. Petrovic (Eds.), *Meeting at the crossroads: Proceedings of the 18th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education* (pp. 539-548). Melbourne, Australia: University of Melbourne.
- Vrasidas, C. (2000). Constructivism versus objectivism: Implications for interaction, course design, and evaluation in distance education. *International Journal of Educational Telecommunications*, 6(4), 339-362. Retrieved from <http://www.vrasidas.com/wp-content/uploads/2007/07/continuum.pdf>

**APPENDIX A**  
**INTERVIEW QUESTIONS**

## INTERVIEW QUESTIONS

1. What do you think about implementing digital technologies tools and materials (i.e., computers, the Internet, and electronic books) into your teaching of preservice teachers?
2. What do you think about implementing digital visual media (e.g., digital images, digital visual materials, infographic, digital stories, etc.) into your teaching of preservice teachers?
3. What do you expect to be the result(s) of integrating digital visual media into the teaching and learning processes?
4. How do the subjects/current curriculum that being taught at the university prepare and train pre-service teachers to integrate digital visual media into their teaching in the future?
5. Regarding the curriculum, what are the most important subjects you think best prepare future teachers for the use of digital visual media?
6. When teaching these materials and using these digital visual media, what are the skills required for visual learning?
7. Can you describe your experiences with integrating technology and digital media into pre-service teacher training? For example, in the curriculum, what standards do you follow?
8. Are there specific skills you think pre-service teachers need to achieve meaningful digital visual media knowledge?
9. Do you focus on legal and ethical issues regarding the use of digital media?
10. How does access to technology, electronic devices, and the Internet affect your ability to integrate and use digital visual media?
11. What tools, programs, or devices do you use to teach these digital visual media to students? Can you list some examples?

12. Can you discuss some of the tasks and projects completed by your students?
13. What is your vision about using digital visual media in education?
14. Do you think there is a need for more support and training for using these digital visual media?

**APPENDIX B**  
**QUESTIONNAIRE**

**QUESTIONNAIRE**

(Please mark to the left of the appropriate item.)

1. What is your gender?
  - Male
  - Female
  
2. What is your age range?
  - 25-29 years old
  - 30-34 years old
  - 35-39 years old
  - 40-44 years old
  - 45 years or older
  
3. Current position:
  - Teaching Assistant
  - Lecturer
  - Assistant Professor
  - Associate Professor
  - Full Professor
  - Others: \_\_\_\_\_
  
4. Current activities:
  - Chair of Department
  - Deputy Chair of Department
  - Vice or Deputy Dean of College
  - N/A
  - Other: \_\_\_\_\_
  
5. What subject areas do you teach? (Please mark all that apply.)
  - Arabic Language
  - Art
  - Computer Science
  - Early Childhood
  - English Language
  - Educational Technology
  - Health
  - History
  - Islamic Studies
  - Leadership

- Mathematics
  - Physical Education (P.E.)
  - Psychology
  - Science (Chemistry, Biology, Physics, etc.)
  - Social Studies
  - Special Education
  - Statistics
  - Other, please specify: \_\_\_\_\_
6. How many years have you been teaching? \_\_\_\_\_
7. How many classes do you teach each semester: \_\_\_\_\_
8. Name of your school: \_\_\_\_\_
9. What digital devices do you own?
- Desktop Computer
  - Laptop
  - Cell Phone
  - Camera
  - Tablet
  - Other: \_\_\_\_\_
10. What digital technology devices are available at your university?
- Interactive Digital Whiteboard
  - TV
  - Smart Board
  - Digital Projector
  - Computers
  - Other: \_\_\_\_\_
11. What activities do you use a computer for? (Select all that are relevant.)
- E-mail
  - Databases
  - Games
  - Blogs
  - Social Networks
  - News
  - YouTube
  - University Website
  - Creating Course Materials
  - Other, please specify: \_\_\_\_\_

12. Do you use technology in teaching preservice teachers?
- Yes
  - No
13. Does the university make a technology lab available to students in which to practice their skills and work on coursework?
- Yes
  - No
14. In your opinion, what does the phrase “technology integration” mean?
15. In your opinion, what does the phrase “digital visual media” mean?

**APPENDIX C**

**INSTITUTIONAL REVIEW BOARD APPROVAL**



*Institutional Review Board*

DATE: April 2, 2018

TO: Haya Albaqami, Ph.D  
FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [1209656-2] Preparing Preservice Teachers to Use Digital Visual Media for 21st Century Teaching and Learning: Practices and Vision of Teacher Preparation Programs

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVAL/VERIFICATION OF EXEMPT STATUS

DECISION DATE: March 30, 2018

EXPIRATION DATE: March 30, 2022

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or [Sherry.May@unco.edu](mailto:Sherry.May@unco.edu). Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

**APPENDIX D**

**CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH**

**CONSENT FORM FOR HUMAN PARTICIPANTS RESEARCH UNIVERSITY OF NORTHERN  
COLORADO**



**Project Title:** Preparing Preservice Teachers to Use Digital Visual Media for 21st Century Teaching and Learning: Practices and Vision of Teacher Preparation Programs.

**Researcher:** Haya Albaqami (Department of Educational Technology, UNC)

**Phone Number:** (970) 714-9619      **E-mail:** [alba9491@bears.unco.edu](mailto:alba9491@bears.unco.edu)

**Research Advisor:** Mia Williams, Ph.D. (Department of Educational Technology, UNC)

**Phone number:** (602) 677-7199      **E-mail:** [mia.williams@unco.edu](mailto:mia.williams@unco.edu)

The purpose of this study is to understand the perspective of Saudi Arabian teacher educators regarding how to prepare pre-service teachers to use digital visual media in their future positions. If you agree to volunteer for this research study, at the beginning of the interview I will ask you to spend 5 minutes completing a questionnaire that requests certain demographic information. You will be answering questions similar to these: (a) How many years have you been teaching? and, (b) What activities do you use a computer for? You will also be asked to participate in a 60-minute audio-recorded interview. For this interview, you will not be asked to provide your name but will be asked to provide the following information: the grade level you teach, gender, age range, and teaching experience.

I will securely maintain the data obtained during the study to the greatest extent possible to ensure confidentiality. No email correspondence will be shared with others. You will have the right to receive the final results of the study. Any personal information, such as your email address, will be kept confidential and will not be used in any way that is unrelated to the research. All personal information will be kept confidential and protected by password. I will retain all the data and reports for a period of three years after which they will be destroyed. There are no foreseeable risks to participating in this study. The benefits you may obtain from participating include having an opportunity to share your personal experiences and instructional practices, as well as to develop more insight into this topic.

Participation is voluntary. You may decide not to participate in this study and, should you start participating but then decide to stop, you may stop and withdraw at any time. Answering the questions should not have a negative effect upon any of the participants. However, if you experience any discomfort, please discuss your concerns with the researcher.

Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. By signing this consent form you also consent to having the interview audio-recorded. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection for or treatment during this research, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

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Participant Signature

Date

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Haya Albaqami (Researcher) Signature

Date