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## Digital Literacy Among Teachers: Identifying Digital Divide Among Interactive Whiteboard Users in Public High Schools

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DIGITAL LITERACY AMONG TEACHERS: IDENTIFYING DIGITAL DIVIDE  
AMONG INTERACTIVE WHITEBOARD USERS IN PUBLIC HIGH SCHOOLS

by

Tammy Rena Oatis

A Dissertation  
Submitted to the Graduate School,  
the College of Arts and Sciences  
and the School of Interdisciplinary Studies and Professional Development  
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in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy

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## ABSTRACT

by Tammy Rena Oatis

December 2019

Since No Child Left Behind Act pressure has been placed on teachers for higher achievements and accountability. Teachers are required to balance learning and integrating new technology into their curriculum, but not all teachers are. In order for teachers' to learn how to successfully integrate new technology, they must be motivated to use new technology. This study examines the roles of digital literacy in high schools in order to identify digital divides among Digital Immigrant and Digital Native teachers who teach grades 9<sup>th</sup> through 12<sup>th</sup> that adopt or choose not to adopt the use IWB. This study investigates why available technology is not being used when it's available, and what causes this type of behavior to occur.

This is a mixed method study. Ninety-four Mississippi high school teachers participated in phase I quantitative online survey, and eight Mississippi high school teachers were interviewed in phase II qualitative. All interviews were recorded, transcribed, and coded. All survey responses were analyzed using SPSS software. Findings in the quantitative phase revealed a statistical significant relationship exist with behavior and motivation to use interactive whiteboards based on geographical area, education, age, gender, and level of experience using technology. No regression model was run for research question 2 because of multiple subscale questions. All responses to question 2 were based on phase II qualitative interview. Findings for phase II qualitative identified age was a strong determinant for behavior differences and motivational effects of using interactive whiteboards. This study identified problems teachers experienced

were due to a lack of resources. Digital divides identified in this study were based on age, lack of resources, lack of training, and the lack of motivation.

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I would like to thank all the Mississippi school districts that supported my research efforts and allowed me to survey and collect data from their high school teachers. Without their assistance I would not have completed my mixed method research study.

## DEDICATION

This work is dedicated to my late parents Mable Rayborn Wesco, Samuel Calvin Vick, my children LaTisha Matthews, Antonio Morgan, Jillian Morgan, my loving husband Patrick Oatis and my sister Carlinda Rashid. They have always believed in me and supported me throughout my educational journey. Without their love, sacrifices and encouragement, the entire educational journey would have been impossible.

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## CHAPTER I – INTRODUCTION

### Overview

The world of technology has evolved at a rapid speed. Teachers are at a continual struggle to balance learning and integrating interactive whiteboards into their curriculum. Interactive whiteboards (IWBs) are a form of Information Communication Technology that is beneficial. Compared with using the chalkboard or whiteboard, the IWB is a digital instructional tool that is connected to a computer and a projector through which images are transferred to the board (Balta & Duran, 2015). IWB are also referred as Smart Boards that work as a computer, and teachers do not need to use a monitor of the desktop computer or laptop to operate the Smart Board (Akçay, Arslan, & Guven, 2015).

IWB have many functions that include dragging objects, clicking, copying and pasting items, taking handwritten notes and transforming those notes into text, highlighting, drawing, and printing (Balta & Duran, 2015). Instefjord (2015) suggests the benefit of using IWB is to increase teachers levels of proficiency, to enhance student centered instruction and to increase teachers positive attitudes about using technology.

Since IWB are used more in schools, they create positive effects for teachers and students. Teck (2013) suggests teaching and learning environments are enjoyable, more creative, and interesting when IWB are used. IWB increases interactions and discussions between teachers and students, and they can be used to introduce new materials by presentation. Teachers using IWB have the ability to integrate multimedia resources into their lessons, such as soundtracks and videos (Jelyani, Janfaza, & Soori, 2014). Korkmaz and Cakil (2013) suggests that using IWB facilitates interactions among students, enables

positive motivations for students, increases variety of instructional materials, and makes lessons taught more captivating.

### Statement of the Problem

In order for teachers to learn how to successfully integrate new technology, they must be motivated to use new technology. Harbour, Evanovich, Sweigart, and Hughes (2015) suggests that since the No Child Left Behind Act was passed, pressure has been placed on teachers, schools, and students for higher achievement and accountability. Educational institutions' standards and accountability have influence over instruction, teaching, and learning. Hinostgroza, Ibieta, Claro, and Labbe (2016) claims that using Information Communication Technology benefits teaching and learning, but the benefits are not occurring. Education systems are challenged to integrate Information Communication Technology in schools. Teachers are being asked to integrate ICTs in their teaching activities, but not all teachers are doing it. Copriady (2014) suggests that teachers are challenged by both integrating instructional technology, as well as learning new methods that are constantly changing with new technology. Not all teachers will use technology even though it is available at their school.

The term Digital Native and Digital Immigrant began with Prensky. Prensky (2001) defines teachers born in 1980 or later as Digital Natives and teachers born before 1980 as Digital Immigrants. Yong and Gates (2014) says Digital Natives were born digital and speak a digital language, but Digital Immigrants were born in a digital world, intrigued with technology, and they adopted some new technology. However, the divide creates problems on the job for Digital Immigrant teachers that adapt to changes in

technology and education because their language is out dated, but they struggle to teach a population that speaks an entirely different language (Yong & Gates, 2014).

The digital divide is causing many teachers to experience stress, lose motivation, and form different types of behaviors. Researchers have defined the digital divide as the growing gap between those who have access to Information and Communication Technologies (ICT) and those who do not have access (Meneses and Momino, 2010), Shelley, Thrane, & Shulman., (2006), Valdez and Duran, (2007), Hohlfeld, Ritzhaupt, Barron, and Kemker, (2008), Ghobadi and Ghobadi, (2015), Soomro, Kale, Curtis, and Akcaoglu (2017). Radovanovic, Hogan, and Lalic (2016) define the digital divide as “A divide of literacy and skills” (p. 1734) Joo, Lim, and Kim, (2016) state that teachers’ face obstacles that cause stress with using technology. Coklar, Efilti, Sahin, and Akcay (2016) identifies technostress as negative emotions, behaviors, and attitudes experienced when using new technologies (p.74). Yu, Lin, and Liao (2017) found that overload, stress, and complex technology can cause barriers that affect ICT technology adoption.

Rogers’ Diffusion of Innovation Theory suggests that the adoption process of an innovation includes five stages. The stages consist of knowledge, persuasion, decision, implementation, and confirmation of the innovation (Rogers, 2003). Rogers (1995) Diffusion of Innovation Theory suggests that individual attitudes about technology are important for the adoption of technology. Teachers that use positive attitudes of technology become satisfied with technologies. Furthermore, teachers’ attitudes about technology determines their use of technology (Copriady, 2014).

IWB usage in education still has not reached the final stage. Dostal (2011) says “regarding the incorporation of the IWB into instruction it is no longer an issue of



whether or not, but how” (p. 206). Flanagan and Shoffner (2013) express that technology use will occur based upon the how certain technology can improve instruction and give support for students that struggle. When these two occur, technology implementation is possible. This research explores reasons why teachers choose not to use IWB. Most research on instructional technology focuses on the possible causes of digital divide and solutions. However, today little research has focused on how teachers’ age determines behavioral differences and motivational effects for using IWBs to improve educational conditions. Research has not addressed why available technology is not being used when it is available and what causes this type of condition to occur.

#### Purpose of the Study

The purpose of the study is to examine the roles of digital literacy in high schools in order to identify digital divides among Digital Immigrant and Digital Native teachers who teach grades 9<sup>th</sup> through 12<sup>th</sup> that adopt or choose not to adopt the use IWB. This study identifies digital divide teachers in public high schools based upon behavioral differences and motivational effects that serve as barriers for using interactive whiteboards. This study compares behavioral differences and motivational effects of Digital Immigrant and Digital Native teachers that reside in the southern and northern regions of Mississippi. This study is based upon Rogers’ Diffusion of Innovation Theory (2003), Ajzen (1985) Theory of Reasoned Action (TRA), and Ajzen (1991) Theory of Planned Behavior (TPB) and Deci and Ryan (1985) Self-determination Theory. This study divides teachers into two categories including: 1) adopters; and 2) non-adopters. This study compares age groups, gender differences, and geographic areas of adopters, and non-adopters based upon their use of IWB innovation. This study compares teacher’

use of IWB to education levels, professional development, behaviors and level of experience using technology. This study may be of value because many teachers experience some types of digital divide because they lack motivation to use new technology. Research has revealed that teachers are hesitant to use technology because of their lack of self-efficacy, lack of confidence in using new technology, lack of experience with technology, and lack of communication skills.

### *Research Questions/ Hypotheses*

This research project includes three research questions:

Research question 1:

Is there a relationship between behaviors and motivation to use interactive whiteboards based on geographical area, education, age, and gender among teachers (adopters) those that use interactive whiteboard and (non-adopters) those that do not use interactive whiteboards?

H1: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on geographical area.

H2: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on education.

H3: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on age.

H4: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on gender.

Research question 2:

What is the relationship between teacher adoption and integration of interactive whiteboards into their course curriculum based upon education level and training?

H5: There is a statistically significant difference among teacher's adoption and integration of interactive whiteboards to use in their course curriculum based upon their education levels and training?

Research question 3:

What is the relationship that exists between teacher's behaviors and motivation with the use of interactive whiteboards based upon their level of experience using technology?

H6: There is a statistically significant difference among teacher's behaviors and motivation with the use interactive whiteboards based upon their level of experience using technology.

#### Significance and Justification

Digital divide has been researched multiple times based upon access issues, characteristics of individuals, age, geographic area, and social status. However, since this study is a comparison of the southern and northern part of Mississippi, multiple topics are referenced to provide an understanding of the differences. There are no studies that focus on Digital Immigrant and Digital Native teachers based upon behavioral differences and motivational differences to use interactive whiteboards. Digital divide issues have

reduced over the years from the limitation of physical access and digital technologies. Van Dijk (2005) explains that digital divide issues that focus less on physical access focus more on where the divide occurs.

This study makes a contribution to the scope of research on this topic because many teachers are classified as digitally divided based on their behavioral differences, how they are motivated to use Information Communication Technology, their age, and gender. Research reveals that technology acceptance is based upon teachers attitudes and motivation to use technology as well as their acceptance to integrate technology. Many studies identify that age and gender play a major role in acceptance of technology. This study gives insight into factors that contribute to teachers classification of digital divided that can aid in determining ways how teachers can become digital literate.

#### Delimitations

1. The researcher acknowledges limitations about the study.
2. The population of teachers that teach grades 9 through 12 may be limited due to the fact that this study focuses only on Mississippi teachers that use interactive whiteboards.
3. The population size may be small due to teachers who may not use interactive whiteboards in their classroom.
4. The population size may be small due to K-12 schools that do not have interactive whiteboards.
5. The sample size may limit the results of this study.
6. The population of 9<sup>th</sup> through 12<sup>th</sup> grade teachers may limit the results of the study.

7. Participant responses may be affected due to their teaching preference, strengths and weaknesses.
8. Participants' lack of experience using interactive whiteboards may affect their responses.

#### Assumptions

1. Participants in the study represent a sample of 9<sup>th</sup> through 12<sup>th</sup> grade teachers from the southern and northern region of Mississippi.
2. Participant responses were honest when responding to the survey instrument.
3. Participant interviews were honest when responding to interview questions.
4. Participants in this study use interactive whiteboards.
5. The researcher was unbiased when analyzing data collected.
6. The survey instrument is reliable and valid.

#### Definitions of Key Terms

*Digital divide* is a gap between teachers that have access to ICT tools and those that do not have access to ICT tools in their schools.

*Digital Immigrant* describes teachers born before 1980 in a digital world, intrigued by technology, but speak a different language.

*Digital Native* describes teachers born in 1980 or after that are digital and speak a digital language.

*Information Communication Technology (ICT)* is support for data and information processing, storage, transmission and communication by the use of the Internet.

*Interactive Whiteboards* are digital instructional tool that connects to a computer and a projector in which images are transferred to the board.

*Self-efficacy* is when teachers believe they can perform a task to achieve a goal.

*Technostress* is when teachers experience negative emotions, behaviors, and attitudes when using new technologies.

### Summary

Today's digital technology is increasing rapidly. Educational institutions' standards and accountability have influence over instruction, teaching, and learning. Since the No Child Left Behind Act (NCLB), teachers are pressured to increase student achievements and accountability (Harbour, Evanovich, Sweigart, & Hughes, 2015). Teachers are challenged to integrate and learn new instructional technology (Copriady, 2014). Due to a digital divide occurring, teachers are experiencing stress, loss of motivation, and they are forming different behaviors.

The purpose of the study is to examine the roles of digital literacy in high schools in order to identify digital divides among Digital Immigrant and Digital Native teachers' that teach grades 9<sup>th</sup> through 12<sup>th</sup> that choose not to use IWB. This study identifies digitally divided teachers in public high schools based upon behavioral differences and motivational effects that serve as barriers for using IWB. This study compares behavioral differences and motivational effects of Digital Immigrant and Digital Native teachers' that reside in the southern to those of teachers in northern regions of Mississippi.

Research questions and hypotheses were designed for the research purpose that include: 1) How do behaviors and motivations (geographical area, education, age, gender) differ among teachers (adopters and (non-adopters) those that do not use IWB, 2) What is the relationship between age groups, gender differences, and geographical area toward the use of IWB, and 3) Does a relationship exist between Digital Native and

Digital Immigrant teacher' behavioral effects to use IWB and their level of experience while using technology?

Chapter one provides the purpose statement of the problem, purpose of the study, research questions, hypothesis, significance and justification, delimitations, assumptions of the study, and definition of key terms. Chapter two contains a review of literature relevant to research topic that includes: 1) Theoretical framework, 2) History of digital divide, 3) Factors that affect technology integration, 4) Factors that affect how teachers are motivated, 5) Interactive Whiteboards, 6) Professional development, and 7) Summary. Chapter three discusses the research methodology.

## CHAPTER II – REVIEW OF LITERATURE

### Introduction

This literature review examines teacher' roles and digital literacy in high schools to identify digital divide. Digital divide individuals are teachers that limit technology access, as well as factors that motivate the use of interactive whiteboards (IWB) for instructional purposes. The purpose of this literature review is to give a clear insight into why teachers choose not to use technology when it is available and to determine what motivators can change this type of behavior. Theoretical framework provides an understanding of human behavior and motivation that affect the adoption of using interactive whiteboards. This literature review gives insight on the meaning of digital divide and provides a brief history of digital divide. This literature review gives insight about Digital Native and Digital Immigrant teachers behavioral and motivational effects, and ICT adoption of the use of interactive whiteboards.

### Theoretical Framework

This research is based on multiple theories that include Rogers' Diffusion of Innovation Theory (2003), Theory of Reasonable Action (TRA) & Theory of Planned Behavior (TPB) and Self Determination Theory.

#### *Diffusion of Innovation Theory*

Rogers (2002) identifies four elements of diffusion of new ideas that include innovation, communication channels, time, and social system. Rogers (2003) identifies an innovation as “an idea, practice, or project that is perceived as new by an individual or other unit of adoption” (p. 12). Sahin (2006) found that obstacles can create uncertainty when adopting an innovation. Uncertainty can be reduced by informing individuals of



the pros and cons of adopting an innovation. Sahin (2006) describes communication channel as individuals sharing information between sources to gain an understanding. Time refers to the rate an adoption takes place. Rogers (2003) defines the social system “a set of interrelated units engaged in joint problem solving to accomplish a common goal” (p. 230).

Rogers’ (2003) five adopters include: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards. According to Rogers (2003) innovators desire to use new ideas. Innovators must have technical knowledge. Early adopters’ boundaries are limited with a social system. The attitudes of early adopters of innovations are important. Rogers (2003) continues to say an early majority do not have a leadership role, but that early majority will adopt an innovation before their peers adopt an innovation. Late majority wait until after their peers adopt an innovation. Late majority are identified as skeptical about adopting an innovation, but pressure from their peers leads to adopting an innovation. Laggards have more skepticism than late majority about innovation and the change agent. Rogers (2003) further suggests laggards do not have a leadership role due to lack of resources and knowledge of the innovation. Laggards need reassurance that an innovation works before they adopt. Rogers (2003) states that the characteristics of the adopter differ. Although adopters differ, their usage of technology will also differ. Rogers (2003) suggests the role of leaders is important in the innovation process.

#### *Five Stages of Innovation Decision Process*

Rogers (2003) discussed five stages of the innovation decision process that include knowledge, persuasion, decision, implementation, and confirmation. The

knowledge stage is the first stage the individuals learn about an innovation and gathers knowledge of the innovation. Rogers (2003) divides the knowledge stage into three types that includes awareness knowledge, how-to knowledge, and principles knowledge. Awareness knowledge motivates individuals to learn about the innovation, which can lead to the adoption of the innovation. How-to knowledge is facts of how to use the innovation the correct way (Rogers 2003). Sahin (2006) suggests faculty choose not to use technology while teaching when they are unsure how to correctly use the technology even if their backgrounds are technical. Rogers (2003) describes principle knowledge as descriptive of how an innovation functions. Adoption can occur without principles knowledge, but issues of using the innovation incorrectly can cause non-adoption (Rogers 2003). Faculty that do not understand why or how to integrate technology into their curriculum will form barriers (Sahin, 2006).

According to Rogers (2003) in the persuasion stage individuals' attitudes toward the innovation can become negative or positive. Rogers (2003) said, "The formation of a favorable or unfavorable attitude toward an innovation does not always lead directly or indirectly to an adoption or rejection" (p. 176). Roger suggests during this stage there is more involvement. Decision stage is the third stage when the individual has a choice of adopting or not adopting the innovation. Rogers further suggests that innovations are adopted faster when there is a trial basis of the innovation. Implementation stage is when the innovation is used. During this stage, individuals can still experience uncertainty. Uncertainty can be reduced through the use of technical assistance. Rogers (2003) express that confirmation stage is the last stage when the individual has decided to adopt

or not adopt an innovation. During this stage, individuals may seek support for their decision (Rogers, 2003).

Horrigan (2016) discusses a report from the Pew Research Center that suggests American adults adopt technology personally and for job - related requirements. The study suggested adoption was based upon socioeconomic status, race and ethnicity, and level of access. Americans fall under multiple groups of digital readiness ranging from being prepared to not being prepared. Hesitant individuals will need assistance using new technology and determining if online information can be trusted (Horrigan, 2016).

#### *Theory of Reasoned Action & Theory of Planned Behavior*

Joo et al. (2016) define the Theory of Reasoned Action (TRA) as human behavior is predicted by intentions. TRA explains behavior when new technology is used (Joo, Lim, & Kim, 2016). Ajzen (1985) suggests that TRAs act as a predictor of behavior. Positive or negative evaluations of behavior is explained as social pressure experienced of what people think you should do and how they comply. Individual positive attitudes lead to behavioral actions. Educators' attitudes define the success of ICTs used in education (Ajzen, 1985). Sumak (2000) suggests users' beliefs to continually use technology will not always lead to technology adoption. Multiple factors play a role based upon influences of technology use, such as users' experience, and how prior behavior can modify the users' interactions.

Ajzen (1991) suggests that the Theory of Planned Behavior is a continuation from the Theory of Reasoned Action. Morris, Marzano, Dandy, and O'Brien (2012) suggests that the Theory of Reasoned Action and Theory of Planned Behavior both work together. Theory of Planned Behavior is based upon the intention of the individual to perform a

behavior. Ajzen (1991) refers to intentions as an assumption that determines how behavior is influenced through motivation. Ajzen (1991) states that, “intentions are indications of how hard people are willing to try” (p. 181). Ajzen (1991) expressed individuals’ behavioral achievement is based upon the individuals’ intention and ability. Ajzen (1991) refers to intention as motivation and ability as behavioral control. Ajzen (1991) said, “Perceived behavioral control plays an important part in the Theory of Planned Behavior” (p. 183). The Theory of Planned Behavior and Theory of Reasoned Action differ because of perceived behavioral control. Although the theories differ, Ajzen (1991) suggests that when both perceived behavioral control and behavioral intentions are used together, behavioral achievement can be predicted.

Ajzen (1985) discusses the Theory of Planned Behavior (TPB) as a cognitive approach of behavior based upon attitudes and beliefs of the individual (Ajzen, 1985). Ajzen (1971) suggests three beliefs of human behavior that include behavioral beliefs, normative beliefs, and control beliefs. Behavioral beliefs are expected beliefs of individuals and how they are motivated. Normative beliefs are factors that can delay performance of a behavior. Control beliefs are factors controlled by behavior. Morris et al. (2012) express that individuals perform a behavior with no difficulties, or they experience difficulties. TPB should be used to predict behavior and identify behavioral influences that recognize change (Morris, Marzano, Dandy, & O'Brien, 2012).

Morris and Venkatesh (2000) suggest, “Theory of Planned Behavior defines the relationship between attitudes, norms, and controls as determinants of intention and behavior” (p. 377). A teacher’s attitude toward behavior references how they feel favorable or unfavorable of the behavior. Subjective norms reference social pressure to

do or not do a behavior. Perceived behavioral control is teachers ease or difficulty when performing a behavior (Morris, Marzano, Dandy, & O'Brien, 2012).

Filippou, Cheong, and Cheong (2016) express that people stop performing a behavior they do not enjoy performing after a period of time. Six stages of behavior change were discussed by Filippou et al. (2016) that include: first, there is no desire to change; second, change is considered; third and fourth, new behavior is adopted through planning; fifth, new behavior is continued regardless of temptations to resume old behavior; and sixth, new behavior is fully adopted (Filippou, Cheong, & Cheong, 2016).

Morris and Venkatesh (2000) express that subjective norms are connected to the influence of peers and the influence of superiors when compared to technology adoption. Research studies reveal in an organizational environment, aging workers favor pleasing others, and they will agree with other opinions. Another study suggests that as age increases coworkers and superiors are friendlier. Age has a positive direct influence on subjective norms (Morris & Venkatesh, 2000).

### *Self-Determination Theory*

Lee, Lee, and Hwang (2015) suggests “Self-determination Theory as “humans have the basic propensities to be intrinsically motivated, to assimilate their social and physical worlds, to integrate external regulations into self-regulations, and in so doing, integrate themselves into a larger social whole” (p.419). Self-determination Theory (SDT) suggests that a person’s motivation is based on their behavior when they experience enjoyment (Li, Wang, You, & Gao, 2015). Leon, Nunez, and Liew (2015) discuss that the roles of teachers are critical to student through motivating learning and

achievements. Teachers with autonomous motivation are supportive and responsive; students are satisfied with school activities (Leon, Nunez, & Liew, 2015).

Self-determination Theory distinguishes between motivations that are controlled and intentional. According to Deci, Vallerand, Pelletier, and Ryan (1991) self-determined behaviors, “regulatory process is choice, but when it is controlled, the regulatory process is compliance (or in some cases defiance)” (Deci, Vallerand, Pelletier, & Ryan, 1991). However, students experience pressure to engage in learning when controlled motivation is used (Leon, Nunez, & Liew, 2015). According to Gagne and Deci (2005) intrinsic motivation is an example of autonomous motivation. Autonomous and controlled motivations are intentional (Gagne & Deci, 2005). Autonomous motivation and controlled motivation are engagements of individuals (Li, Wang, You, & Gao, 2015). Controlled motivation is acting by being pressured. Extrinsic rewards encourage controlled motivation (Gagne & Deci, 2005). Li, Wong, You, and Gao (2015) suggest that controlled motivation is committing to specific behaviors while under internal or external pressure. Intrinsic motivation is defined as willing choices made for a certain behavior (Li, Wang, You, & Gao, 2015).

Li et al. (2015) discuss motivated employees are more engaged than employees that are controlled motivated. Teachers need a lot of self-determination motivation to handle their duties. Individuals that are more experienced were more motivated and had better engagement. Different roles are displayed in working environments by intrinsic and extrinsic motivation (Li, Wang, You, & Gao, 2015).

Leon et al. (2015) discuss the differences between autonomous motivation and controlled motivation, which include autonomous students choose to engage in learning

without feeling pressured and controlled motivation students feel pressure to engage in learning. Leon et al. (2015) suggests that autonomous motivation support includes emotional, cognitive, and behavioral occurrences for students and their self-regulated learning. Self-regulated learning includes effort regulation and deep processing of information. Effort regulations are strong predictors of academic achievement (Leon, Nunez, & Liew, 2015).

Ajzen (1985) suggests that the Self-determination Theory (SDT) and the Theory of Planned Behaviour (TPB) both identify that individuals' positive attitudes lead to behavioral actions. Educators' attitudes define the success of ICTs use in education (Ajzen, 1985).

#### History of Digital Divide

Digital divide began in the 1980s with more focus on access issues and characteristics of individuals, such as age, location, and social status (Yu, Lin, & Liao, 2017). The focus of digital divide expanded to not focus on access of technology, to include the use of technology (Selwyn, 2002). According to Horrigan (2016) individuals were classified as "have" and "have not's" due to their lack of technology. Radovanovic, Hogan, and Lalic (2015) refer to digital divide as "a divide in literacy and skills" (p. 1734). Selwyn, (2002) express an example of the digital divide by saying "some individuals have the most powerful computers, the best telephone service and fastest internet service, as well as wealth of content and training relevant to their life. Another group of people don't have access to the newest and best computers, the most reliable telephone services or the fastest or most convenient Internet services. The difference between these two groups is ... the Digital Divide" (p.5). Digital divide was identified

by an early researcher Selwyn, (2002) who reported that access of ICTs are not evenly distributed in social and geographical. Access to ICTs differ based upon countries with regions of prosperity.

Akcayr, Dunbar and Akcayr (2016) report during the 1980s Digital Natives were known as individuals born after 1980, raised in a technological environment and having technological skills. Digital Natives were referred to as “Net Generation,” and “i-Generation” (Akcayr, Dunder, & Akcayr, 2016). Kurt, Gunuc, and Ersoy (2013) defines Digital Immigrants as “individuals who were not born exactly in technological age but who sometime use” (p.2). Digital Immigrants were identified as teachers, academicians, and other business individuals who are required to use technology in their profession. Kurt, Gunuc, and Ersoy (2013) discuss that Digital Immigrants have less knowledge of technology use when compared to Digital Natives that were born during the technology age.

Akcayr et al. (2016) express that digital technologies affect how Digital Natives think, interact, and understand the world. Bullen and Morgan (2016) describe the Net Generation as: digital literate, connected, and social they prefer to experience learning, and prefer immediate feedback (Bullen & Morgan, 2016). Toledo (2007) suggests Digital Natives’ first information literacy skills in the digital world consist of computers, videos, and the Internet, when compared to Digital Immigrants that formed their literacy skills in the print world.

Ghobadi and Ghobadi (2015) suggests at the turn of the 21<sup>st</sup> century the term digital divide highlighted “digital inequality in Information Society” of the political and academic agenda. Digital divide was later redefined to view social, mental, and cultural



factors of inequality access. According to Noor-Ul-Amin (2013) the term Information Technology (IT) replaced the term computer in the late 1980s. In 1992, email was available, and the word computers changed to Information Computing Technology. Yu, et al. (2017) defines Information Communication Technology (ICT) as “a support for data and information processing, storage, transmission and communication by using the Internet” (p. 197). Osborne and Morgan (2016) express that since 1990, digital divide individuals that live in poor households have declined due to an increase in computer access. Digital divide individuals more often have access to the Internet and connection of other devices. Campos-Castillo (2015) reports that in 2000, racial gaps began decreasing. In 2008 females had more access to the Internet than males. However, in other countries females have lower access levels to the Internet. Campos-Castillo (2015) reported in the US, digital divides were beginning to disappear because individuals are adopting new innovations of digital devices that include Internet access.

Radovanovic, Hogan, and Lalic (2015) report the definition of digital divide has changed from using technology to focusing on real life social inequalities. Sharma, Fantin, Prabhu, Guan, and Dattakumar (2016) suggest that Information Communication Technology development is challenged to reduce the size of digital divide individuals. A challenge is to provide an equal opportunity around communities (Sharma, Fantin, Prabhu, Guan, & Dattakumar, 2016).

Further Saleminck, Strijker, and Bosworth (2015) discuss that rural telephone networks were upgraded in Western society at the end of the twentieth century. Due to technological increases in rural areas, digitally divided individuals are reported less:

however the focus changed to issues of usage and adoption (Salemink, Strijker, & Bosworth, 2015).

### Factors that Affect Technology Integration

#### *Attitudes*

Teachers increase the value of their instruction of teaching by integrating ICTs. Attitudes of teachers, for example, can affect their decision to accept the use of ICTs or to reject them. Teachers can make learning more interesting for students by displaying a positive attitude. Copriady (2014) suggests that negative decisions are based upon experience, types of technology applications used, age, and self-confidence. A person's attitude has an impact on their behavior motivation. Teachers attitude about technology determines their use of technology. Teachers that have negative attitudes toward technology will not benefit or integrate technology into their curriculum (Copriady, 2014). Morris and Verkatesh (2000) state that a person's attitude for adopting new technology in a workplace is based upon how the person feels technology is useful.

Akbaba and Kurubacak (1999) report that technology growth is influenced by teachers attitudes of successful technology use, but some teachers struggle with the use of new technology. However, positive attitudes toward of technology can influence students' use of technology. Howard, Ma, and Yang (2016) explain that teachers may have impacted the way students feel about technology because their differences in attitudes were based upon subject areas, and changes of task performed (Howard, Ma, & Yang, 2016).

Blackwell, Lauricella, and Wartella (2014) suggest that a person's attitude and level of confidence in using technology determines if he or she will adopt any new

technology. Teachers impact the lives of student learning, and barriers limit teacher use of technology. Teo, Fan, and Du (2015) discuss teachers positive or negative attitudes can determine if technology will be integrated and implemented in schools. John (2015) suggests that when an individual's beliefs and customs are consistent, he or she will adopt an innovation. Van Deursen and vanDijk (2015) suggest that motivations are specific to goals and that attitudes relate to objects. Individuals' attitudes for adoption of technology are critical.

### *Technostress*

Yu et al. (2017) defines technostress as a negative individual reaction to the use of ICT devices. Stress faced by teachers is caused by not having enough training, reduced amounts of technology support, not enough time to prepare for lecture, and not feeling in control when technology issues occur. According to Coklar et al. (2016) technostress occurs from work overload and the teachers age can determine the use of technology. Joo et al. (2016) discuss stress of using new technology can cause negative effects. Fuglseth and Sorebo (2014) express that technostress can lead to burnout on the job, and employees can become dissatisfied. Employees that experience technostress experience problems dealing with or use of ICTs. Employees that are not satisfied with using ICTs can feel threatened and experience less control dealing with dissatisfaction. Overload, stress, and complex technology can cause barriers that affect ICT technology adoption. According to Yu et al. (2017), media technostress is caused when individuals cannot adapt to new ICT devices. Media technostress is caused by negative results of an individuals' attitude, beliefs, thoughts based upon their use of ICT and behavior to adopt (Yu, Lin, & Liao, 2017).

### *Technology Challenges and Barriers*

Nikolopoulou and Gialamas (2016) examines barriers teachers experience when integrating ICTs that include limited resources, less confidence, inadequate time, less training opportunities, problems with technology, lack knowledge of how to integrate in lessons, and lack of administrative support. The British Education Communications and Technology Agency published a report in 2004 of reasons why teachers use ICTs or reasons why they do not use ICTs in their class. The reasons include access levels determine if ICTs will be used, teachers lack time to prepare lessons, teachers are resistant to change, lack of equipment, and teachers that lack confidence using computers will not use them. Nikolopoulou and Gialamas (2016) reports teachers using ICTs in Spain experience a lack of resources, little support from institutions, and issues using computers due to time constraints.

Kopcha (2012) explains that mentored teachers are prepared for barriers, and they integrate technology more than non-mentored teachers. A study was conducted over 26 schools based on teachers attitudes of how they use technology. The findings reveal teachers mentored had more confidence using technology compared to non-mentored teachers. Kopcha (2012) reports teachers that receive no classroom support after attending training would not use student centered instruction when they use technology. Teachers should have skills and attitude to work through barriers because skills and attitude enable them to improve technology use while learning (Kopcha, 2012).

Pittman and Gaines (2015) say, “Technology access and support, professional development opportunities and positive attitudes toward technology integration, many teachers may experience barriers that make it difficult to increase the level of technology

integration in their classroom” (p. 541). Pittman and Gaines (2015) suggest the greatest barriers teachers experience is the need for additional time to manage their classroom. Pittman and Gaines (2015) reports teachers express when they used laptops barriers form, the barriers include managing their class, depending on others, the need of additional time, and problems using existing materials. Some teachers report technology is used in their class for small tasks.

### *Motivation*

Uluyol and Sahin (2016) suggests classroom leadership and supports are both required for teachers to use ICTs. Teachers must be encouraged to use technology, they must receive support when using technology, and they must feel the benefits of technology when using technology. Uluyol and Sahin (2016) express some teachers need support from their organization because the support motivates integration of ICT in their curriculum. Agbo (2015) suggests the support teachers receive from their organization should be technical, and pedagogical. Principals should support the use of ICTs. They should demonstrate their stimulation and performance expectations should be highly achieved. Principals cause change in schools based upon the actions they perform (Agbo, 2015).

Uluyol and Sahin (2016) discuss that technology has raised opportunities in business and industry opportunities. Factors to consider for the use of ICTs are products, services, social interaction, and other human reasons. The use of ICTs increases attendance, grading, distributing textbooks, and preparing reports. Information Communication Technology increase instructional duties that include, creating lesson plans, tests, and creating comments on assignments (Uluyol & Sahin, 2016).

### *Access*

Campos-Castillo (2015) suggests that digital divide individuals lack access to computers and information technologies. Technology access limitations can cause knowledge gaps, barriers to educational opportunities, and cause issues with socioeconomic potential (Reynolds & Chiu, 2015). Campos-Castillo (2015) reports access differences include that race, gender, and socioeconomic status. In the United States, over the years access gaps have decreased. In a racial comparison Campos-Castillo (2015) reports whites had more Internet access when compared to other racial groups. Mason and Hackler (2003) suggests that individuals that have Internet access do not always use it due to their skills and opportunities. However, individuals that experience comfort will use the Internet more often. For example, a survey reports that a large number of non-internet users view using the internet hard (Mason & Hackler, 2003). Reynolds and Chiu (2015) suggest that digital skills and knowledge are required for online environments.

Abu-Shanab and Al-Jamal (2015) suggest people that have access to use Information Communication Technology may not know how to use technology due to a lack of skills and support. Van Deursen and vanDijk (2015) reports individuals should avoid using the internet when they have internet anxiety. Individuals using the internet must have self-efficacy. Hamari and Nousiainen (2015) refer to self-efficacy as a person believes he or she can perform a task to achieve a goal.

### *Teachers Beliefs and Practices*

First order barrier and second order barrier are two barriers to consider when thinking of integrating technology. First order barrier consists of environment readiness

and the teachers knowledge. Second order barrier is the teacher beliefs. Kim, Kim, Lee, Spector, and DeMeester (2013) said, “Teachers beliefs predict, reflect, and determine their actual teaching practice” (p.77). Teachers positive beliefs of integrating ICT tools into their teaching are based on their beliefs they can perform tasks and influence how they accept technology (Hamari & Nousiainen, 2015).

Akbaba and Kurubacak (1999) suggests some teachers believe if they use technology the following would occur: 1) they would not have control in their classroom, 2) felt too old to learn, 3) felt learning technology was extra, 4) teachers did not want to be unsuccessful, 5) they felt they did not want to change roles, 6) they felt they would lose their jobs, and 7) teachers did not want to become addicted to the internet, lose their status, or be replaced by technology. Some teachers felt learning new technology was time wasted (Akbaba & Kurubacak, 1999).

As noted by Tondeur (2016) “Teachers personal pedagogical beliefs play a key role in their pedagogical decisions regarding whether and how to integrate technology within their classroom practices” (p. 556). The use of technology devices does not predict the teachers pedagogical approach, but the devices allow new approaches of teaching and learning. Core beliefs connect to other belief because they are stable and difficult to change. Core beliefs in teaching forms resistance based upon years of teaching and experience forms a strong authority. However, teachers with less years of teaching are more open to change.

#### *Integration and Use of Information Communication Technology*

Nikolopoulou and Gialamas (2016) suggests, “Although ICTs now is a useful tool in class, many teachers still struggle to integrate technology in their teaching practice” (p.

60). Teo et al. (2015) explains that technology integration should be used to enhance learning and instruction as an instructional tool. Technology integration is influenced by education, experience, gender, age, and positive attitudes. Yu et al. (2017) discussed that Information Communication Technology is a form of knowledge that can be integrated. Using ICTs can reduce the digital divide because ICTs use motivates the use of new technology (Yu, Lin, & Liao, 2017).

Gil-Flores, Rodriguez-Santero, and Torres-Gordillo (2017) suggests teachers use of ICT is based upon: grade levels they teach, their age, gender, and the department they work. However, younger male teachers use ICTs more frequently than female teachers. Ninlawan (2015) suggests that teacher characteristics should include: enjoy teaching, experience developing courses, initiative to create innovations, use technology in their classroom, excited to help children, and effective communication (Ninlawan, 2015).

According to Copriady (2014) not all teachers will use technology when it is available at their school. Teachers that do not have skills and knowledge are not encouraged to use ICTs. Hinostroza, Ibieta, Claro, and Labbe (2016) suggests ICT usage provides teaching and learning benefits for teachers. Teachers are able to use new communication, interaction, and change their teaching and learning process. Although, it is suggested that ICT use are benefits for teaching and learning. Hinostroza, et al. (2016) reports that the benefits are not occurring. Education systems are challenged to integrate ICTs in schools. Teachers are asked to integrate ICTs in their teaching activities, but not all teachers are integrating ICTs.

Mizajani, Mahmud, Ayub, and Wong (2016) reports that teachers need training so they are able to integrate technology. Teachers that have low self-efficacy may choose



not to integrate technology even if their attitudes are positive. New skills should be learned by students, teachers, and educators when new technologies emerge. Training programs for teachers should include innovative techniques such as ICT skills (Mirzajani, Mahmud, Ayub, & Wong, 2016).

Blackwell et al. (2014) suggests two types of technology integration that include intrinsic barriers and extrinsic barriers. Intrinsic barriers limit how teachers use technology due to their beliefs, comfort of using technology, and how they value technology. Extrinsic barriers prevent teachers from using technology because of their lack of access, time restraints, training, support, and professional development. Although, teachers training opportunities have increased, not all teachers are integrating technology (Blackwell, Lauricella, and Wartella, 2014). Uluoyol and Sahin (2016) suggested that extrinsic barriers and intrinsic barriers can hinder ICT from being integrated. Extrinsic barriers lack resources and support, and intrinsic barriers are teacher beliefs, their attitude, and knowledge. Teachers can influence integration of ICTs by deciding to use technology, and how technology enhances students' knowledge (Uluoyol & Sahin, 2016).

Petko, Egger, Cantieni, and Wespi (2015) discuss the promotion of ICT in education has decreased because not all teachers integrate ICT in their curriculum. According to Petko et al. (2015) technology adoption should focus more on skills, teacher's beliefs, and less on hardware and software. Teachers must know the benefits of using ICTs. For example, ICTs increase teachers and student's knowledge. The promotion of ICT adoption should be based upon teachers skills, and how the teacher plans to use digital media to enhance student learning. Experienced teachers that use

technology will express an interest in adopting technology and less experienced teachers will not (Petko, Egger, Cantieni, & Wespi, 2015).

According to Rana (2016) an increase in teaching and learning occurs when technology is integrated in education. For example, teachers are able to increase student involvement while they are learning. Rana (2016) reports a study conducted in multiple countries that identified positive attitudes from teachers about using technology and computers. However, it was noted that teachers with prior experience using technology and computers were influenced more based upon gender. The gender relations relationship favored males more than females with positive attitudes (Rana, 2016).

Rana (2016) suggests teachers positive attitudes of computer use and acceptance of technology determines successful integration of technology in a course. According to Agbo (2015) the National Center for Education Statistics reports that teachers with less experience will use computers less when compared to teachers with more years of experience. Forty eight percent of teachers that had three years or less experience reports using computers, forty five percent of teachers with four to nine years' experience reports using the computer, forty seven percent of teachers that had ten to nineteen years' experience reports using the computer, and only thirty three percent of teachers with twenty plus years of experience reports using the computer.

Skryabin, Zhang, Luman, and Zhang (2015) discuss technology integration can be implemented by the teacher. Purpose of teachers integrating ICT in the twenty first century is to enhance students' skills. ICT use decrease gaps between socioeconomic factors and outcomes of the educational systems.

Kopcha (2012) suggests there is a gap in technology availability in classrooms and the amount of technology used by teachers. A report from the National Center of Education Statistics reports 3,000 teachers were surveyed for using technology during instruction, and less than half reports they use technology during instruction. Another study reports teachers use technology more for administrative tasks and non-instructional tasks. According to Kopcha (2012) technology gaps are due to technology access issues because some teachers feel technology is not available when it is available. Teachers reports leaning and using technology takes more time than dealing with students with behavior problems. Some teachers report professional development as a barrier because training received was not connected to the classroom. Kopcha (2012) further suggests teachers that understand how useful technology is and that issues are sometimes associated with technology are influenced to use technology for instructional purposes. Teachers with enhanced technology will continue to integrate technology when setbacks occur (Kopcha, 2012).

Noor-Ul-Amin (2013) discuss that the use of ICT have changed teaching from conventional teaching of using textbooks and lecture to contemporary teaching that encourage competency and performance. Integration of ICTs enables curriculum support for multiple subject areas. Noor-Ul-Amin (2013) suggests three conditions that will enable teachers to use ICT in their classrooms includes: 1) they must believe technology is effective; 2) believe no problem will be caused by using it; and 3) believe they are controlling technology. Noor-ul-Amin (2013) further discuss that most teachers learning environments do not include the use of ICTs because their responsibilities have changed as well as their skills (Noor-Ul-Amin, 2013).

### *Student Engagement*

According to Harbour et al. (2015) today's education focuses on high-stakes testing, being accountable, and student achievements. Since the No Child Left Behind Act, was passed, pressure was place on teachers, schools, and students for achievements and accountability. Student engagement encourages academic, behavior, and school success. Harbour et al. (2015) identifies engagement as a behavior, emotion, and being cognitive. Behavioral engagement relates to how students participate in school activities. Emotional engagement relates to student reactions of others. Cognitive engagement is student learning strategies used to understand different ideas.

According to Agbo (2015) when technology is used learning objectives will be enhanced. Learning technologies should engage students learning in multiple subjects and should be used in classrooms by teachers. When students are engaged their thinking increase, they are able to make more decisions, their ability to solve problems increase, as well as their behavior enhances (Agbo, 2015).

Howard et al. (2016) discuss teachers believe digital technology motivates and engage students. For example, laptops, smartphones, tablets, iPads, software, and other resources from online are digital technologies. Howard et al. (2016) reports eighty three percent of teachers from a middle school in the US expressed student engagement increased when students use laptops. Low achieving students were more engaged by eighty four percent, and high achieving students were more engaged by seventy one percent (Howard, Ma, & Yang, 2016).

Noor-Ul-Amin (2013) suggests that ICT should be used to enhance and support learning styles. Students' use of ICTs to learn more. They sometime use computers for

the purpose of gaining information and as a cognitive tool. ICTs enable learner's access to materials, enhances communication skills, motivate learning, and enhance training for teachers. Noor-Ul-Admin (2013) further suggests that attitude and achievements for students is due to positive effects from the use of digital technologies. Students that used computers scored higher than students that did not use computers or ICT based instruction. Students who received ICT based instruction gained more knowledge in less time, and found their class more enjoyable (Noor-Ul-Amin, 2013).

Kwan and Wong (2015) suggests that students learn when they are motivated due to cognitive factors of instruction or due to their academic duties. Educators believe critical thinking skills are developed using a constructivist environment and by encouraging active learners. Kwan and Wong (2015) further discuss motivation, cognitive, and strategies play an important role in critical thinking skills. Teachers developing critical thinking skills should develop these skills based on the characteristics of their students (Kwan & Wong, 2015).

#### Factors that Affect How Teachers are Motivated

##### *Age*

Rana (2016) said "Research results in some developed nations revealed narrowing gaps across age groups" (p. 193). Groups of Americans with older computer behaviors are better now than they were in the past. The age factor in Norway has a negative correlation for teachers revealing teachers have good experience on the internet. Rana (2016) reports in a comparison of teachers age groups that seventy seven percent of teachers age twenty-five or less have experience using the internet compared to twenty five percent of teachers ages fifty-six years and older have using the internet. Teacher's

ages twenty-five or less, sixty three percent have positive attitudes integrating technology in their curriculum compared to teachers ages fifty-six and older that report only thirty two percent positive attitudes for integrating technology into their curriculum (Rana, 2016).

Van Deursen, Van Dijk, and Peter (2015) states that, older adults demonstrate the lowest experience using the internet and digital technology. Skill levels are affected negatively with age. However, younger adults use the internet more than older adults (van Deursen, van Dijk, & Peter, 2015). Damodaran and Sardhu (2016) suggests some older adults do not use technology, but they are familiar with technology because of technology at their job. Many adults believe using the digital world is a challenge. Damodaran and Sardhu (2016) discuss older adults learning depends on the availability of ICT support. Although research revealed older adults will stop using computers before the younger adults (Damodaran & Sardhu, 2016).

Ardies, Maeyer, Gijbels, and van Keulen (2015) suggests age is the difference between males and female's technology interest. Males ages ten to fourteen have an increase in technology and females' interests decline. Morris and Venkatesh (2012) said, "Memory capacity decreases with age, particularly secondary memory" (p. 381). Morris and Venkatesh (2012) reports aging cause problems with accessing and retrieving information from memory. Aging causes difficulty processing complex stimuli and focusing on task type information. Using new technologies cause difficulties for some aging adults because of their vision. Aging adults experience issues with visual stimuli, but less occurrence was reported for younger adults.

## *Gender*

Ardies et al. (2015) reports male's attitudes are more positive about technology than female's attitudes. Gender differences occur among males and females that played with technological toy. Males built stronger relationships with technological toys than females that played with technological toys. Children that played with technological toys show positive attitudes about technology (Ardies, De Maeyer, Gijbels, & Van Keulen, 2015). Saha and Zaman (2017) refers to gender divide as males and females having differences accessing and using ICTs. There is a difference in the access of ICTs and the ability to use ICTs based on gender. According to Saha and Zaman (2017) in other countries women experience limitations accessing ICTs and they are falling behind men that have access. Although men and women reside in the exact geographic area with the same social structures, there is a difference in their social reality due to constraints of their social cultures.

Other countries define gender differences as differences among males and females. Women in other areas of the world lack access of ICT services compared to males that had access (Abu-Shanab & Al-Jamal, 2015). Rohatgi, Scherer, and Hatlevik (2016) suggests gender differences are based on how individual perceive and report digital literacy. For example, males report higher levels of ICT self-efficacy and female self-efficacy levels are higher with online communication (Rohatgi, Scherer, & Hatlevik, 2016).

Lau and Yuen (2015) discussed that females participate less in STEM classes in school and work compared to males that participate more. Female students are less interesting in competing than male students. A study was performed by the Educational

Foundation (EF), and the Association for Computing Machinery (ACM) reports female college students were less interested in using computers than males. It was noted by Lau and Yuen (2015) males and females associated using computers in different ways. Females for example, compare computing with typing and they can become bored, whereas males compare computing to electronics and find it interesting (Lau & Yuen, 2015).

Abu-Shanab and Al-Jamal (2015) reports female teachers are on a lower level than male teachers because male teachers having more freedom to learn how to use ICTs. For example, males and females use ICTs differently (Abu-Shanab & Al-Jamal, 2015). Teo et al. (2015) discuss female teachers do not use computers as often as male teachers because of limitation of access, their interest to use computers, and their skill levels, compared to males that use technology to complete assignments. Another study suggests that technology integration occurred more by male teachers and less by female teachers (Teo, Fan, & Du, 2015). Scherer and Fazilat (2015) discussed differences in integrating ICTs. Female teachers for example, identify themselves as less proficient with computer use and male teachers reports they felt more proficient (Scherer & Fazilat, 2015).

Rana (2016) suggests negative attitudes and computer anxiety was found mostly in females and less with males. A study on computer self-efficacy was reported by Rana (2016) suggests males will obtain computer self-efficacy before females. Scherer and Fazilat (2015) states there is a relationship in technology acceptance, integration of technology in teaching practices, and teacher's self-efficacy. Computer self-efficacy is an individual's ability to use the computer. Teacher's computer self-efficacy enables them to integrate computers into teaching and learning (Scherer & Fazilat, 2015).



Individual are influenced by their usage behaviors of ICT based on computer self-efficacy (John, 2015).

Abu-Shanab and Al-Jamal (2015) suggests that females use ICTs more for communication and males use ICTs for technical purposes. Gender divide are due to different preferences of males and females that influence their careers (Abu-Shanab & Al-Jamal, 2015). According to Van Deursen, Dijk, and Peter (2015) males compared to females have positive attitudes about using the internet and females have computer anxiety. Males use the internet more due to past experience of using technology (van Deursen, van Dijk, & Peter, 2015).

#### *Geographical Area*

According to Yu et al. (2017) ICT use in rural areas draws more attention due to increase economies and improvements for living conditions within rural areas. Yu et al. (2017) suggests that digital divide can be reduced by using ICTs. Residents of other countries information literacy rates are better than residents that reside in rural areas. ICT applications are not always available in rural areas. Farid, Ahmad, Niaz, Arif, Shamshirband, and Khattak (2015) discuss that teachers in rural areas have more problems using and adopting to technology because of demographic indifferences. However, studies reveal that students' communication skills are enhanced when ICT are available in rural areas. ICTs used in rural areas provide a solution to ICT illiteracy.

Salemink et al. (2015) suggests that Next Generation Access (NGA) speed and reliability was developed in certain areas. Differences are still growing between urban and rural areas that cause digital divide. Digital divide individuals in rural areas experience lack of access, costs of services not affordable, and fewer services being

available. According to Salemink et al. (2015) Internet use and adoption, as well as other application are increasing diversity and digital inclusions have changed based on binary issues. Salemink et al. (2015) said, “The debate is no longer about ‘haves’ and ‘have nots’ instead, it has started to focus on the degree of usage and different usage patterns” (p. 2). Salemink et al. (2015) discussed digital divide focus was changed to look at differences between urban and rural areas. Urban area structures have internet hotspots and high-speed internet, but rural areas do not. Rural areas internet access is low-tech including the lowest speed, and poor connections (Salemink, Strijker, & Bosworth, 2015).

Yu et al. (2017) discussed digital divide is formed when rural areas have information illiteracy of technology compared to residents that live in urban areas that do not. Osborne and Morgan (2016) suggests digital divide individuals lack technology and resources. Resources are less for teachers that work in low-income school districts. Urban area teachers use technology to develop students critical thinking compared to teachers in low-income districts who use technology less. Osborne and Morgan (2016) suggests teachers integrate technology for basic skills due to a lack of facilitators with their schools, and less disadvantaged students who attend those schools. More technology resources are used for student in urban areas. Technology is used most for entertainment by students residing in low-social economic households (Osborne & Morgan, 2016).

According to Farid et al (2015) Pakistan’s educational system are experiencing qualified teacher shortages, students are less motivated, curriculum is not current, and unequal opportunities between genders in urban and rural areas. Money spent on

education is less than two percent of the gross domestic product. Literacy rates among adults in urban areas are reported at seventy six percent compared to fifty one percent in rural areas. Farid et al. (2015) reports that literacy rates in rural areas are low due to a lack of educational facilities, shortage of qualified teachers, and a lack of awareness among the people receiving education. Issues of integrating ICTs in education systems in Pakistan are due to “economic, social, cultural, political, inflated cost for labs, personnel’s lack of skills, and lack of funds” (Farid, et al., 2015).

### Interactive Whiteboards

Today classroom learning has changed from traditional teaching to using vast technology tools as an instrument for teaching. Using interactive whiteboards (IWB) allow teachers to connect with the world outside by use of the internet. According to Al-Faki and Khamis (2014) teachers lacking literacy skills when using computers will be challenged. Some teachers are still using chalkboards and performing assessments without using electronic methods. Al-Faki and Khamis (2014) suggests when educational environments receive new technology the focus should be how it will be used for teaching and learning.

Al-Faki and Khamis (2014) “Learners of today are more familiar with technology than their teachers are” (p. 136). Today’s learners’ first language is through technology for entertainment. Al-Faki and Khamis (2014) IWB enhances student engagement and motivates student learning. Learners have the ability to participate by interacting with materials presented during the class. Al-Faki and Khamis (2014) expressed class discussions are enhanced through the use of IWB. Using the IWB allows for more

communication between teachers and learners. Learning techniques are visual and verbal, and learners cognitive and conceptual development is enhanced.

According to Al-Faki and Khamis (2014) some teachers challenged by using ICTs may experience problems during technology integration when teaching. Therefore, teachers need training in computer literacy and pedagogical applications to enhance teaching and learning. They must receive sufficient training in digital literacy to reduce challenges. Martin and Madigan (2006) suggests achievement of digital literacy, digital competencies are developed through situations in life, problem solving, or by completing a task. Individuals must be conscious when developing into digital literate people as they progress through life, work, and when studying further down the road. Digital literacy is knowledge and skills not considered as material but are specific learned skills that are missing (Martin & Madigan, 2006). Digital literacy is defined by multiple researchers. Sharma, Fantin, Prabhu, Guan, and Dattakumar (2016) identifies digital literacy as one's ability to use digital communication tools and systems. Martin and Madigan (2006) said "Digital literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action, and to reflect upon this process" (p.19).

Instefjord (2015) identified digital competencies as "set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks, solve problems, communicate, manage information, collaborate, create and share content, and build knowledge

effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming and empowerment” (p.157). Martin and Madigan (2006) said, “Digital literacy is an ongoing and dynamic process- it is not a threshold that, once achieved, guarantees familiarity with the digital forever after” (p. 20). Martin and Madigan (2006) further suggests digital competence changes as technology increase, but individuals should maintain digital literacy. Martin and Madigan (2006) said, “Digital literacy is a condition, not a threshold” (p. 20). Digital literacy enables individuals to participate in Information Communication Technology (Sharma, Fantin, Prabhu, Guan, & Dattakumar, 2016)

Al-Faki and Khamis (2014) said, “Teachers are no longer dispensers of knowledge; they are facilitators and guiders of learners’ learning” (p.140). Wong, Teo, and Russo (2013) states IWB are an important technology tool of the digital age. Teck (2013) reports that international researchers suggests the importance of using interactive whiteboards in digital generations. According to Teck (2013) although researchers suggests using interactive whiteboards create positive effects in learning and increase opportunities for teachers, some researchers in Australia believe pedagogical approach is required when using interactive whiteboards because the interactivity included with using interactive whiteboards require a new pedagogy.

Teck (2013) suggests that teachers need technical support onsite when using interactive whiteboards to prevent teachers from becoming frustrated from technical problems. Suggesting frustrated teachers may decide not to use technology in their classrooms. In a comparison of Ertmer (1999) first order barriers that implies less

devices and less support can cause second order barriers to occur. For example, becoming too upset to use technology devices. Wong et al., Teo (2013) said teachers engagement defines the success of integrating interactive whiteboards in teaching and leadership.

### Professional Development

Cranton (2016) found the purpose of professional development is to provide skills for participants. Linnemanstons and Jordan (2017) states professional development provides educators with necessary skills to increase teaching methods. Cranton (2016) discussed three types of learning for professional development includes: (1) nonformal learning, (2) informal learning, and (3) formal learning. Nonformal learning is professional development that includes workshops, discussion groups, and activities. Informal professional development includes conversations between faculty, sharing resources, reading journals, and activities. Formal learning takes place online. Cranton (2016) expressed professional development depends upon participants exchanging ideas and the exchange of knowledge among educators. However, Linnemanstons and Jordan (2017) said, teachers should continue learning during their teaching careers. Changes teachers make depends upon the time they spend for professional development (Linnemanstons & Jordan, 2017).

Henessay, Habler and Hofmann (2015) suggests that countries with limited resources should receive priority for professional development due to unqualified people teaching at schools. Policy makers in Sub-Saharan Africa (SSA) proposed focusing on the quality of education, how teaching experience will help improve low literacy rates, and on attainment. Hennessy et al. (2015) expressed that teachers in poor countries are

trained to the national standards of their country. For example, less than seventy five percent of primary schools teachers training are based on the national standard. Poor countries focus more on theory and not practice (Hennessy, Habler, & Hofmann, 2015).

According to Ninlawan (2015) standards teachers follow in Thailand outline their characteristics, work, behavior, and professional development. Ninlawan (2015) suggests teachers work standards for successful learning objectives should continue improving their skills and knowledge. Teachers should have experience, and discipline. However, students are motivated based upon the roles of educators and teachers (Ninlawan, 2015).

Thomas and Knezek (2008) states ICT skills standards aid in identifying expectations for students, as well as identifying capabilities of educators. Standards aid assurances that students' educations are completed, and teachers and school administrators utilize ICT skill standards to provide educational services that are competitive. Thomas and Knezek (2008) suggests standards identify "IT skills and higher order skills necessary to use ICT and learning technologies to improve learning, teaching, and school leadership" (p.334).

Mississippi Department of Education, Teaching with Technology Statewide Educational Technology Guide (2016) states, "Technology offers the opportunity for teachers to become more collaborative and extend learning beyond the classroom" (p.15). According to the Statewide Educational Technology Guide (2016) Mississippi Teaching Standards are based upon International Society for Technology in Education (ISTE) Standards (Wright & Porter, 2016).

Geldenhuis and Oosthuizen (2015) discussed how schools depend upon teachers that are motivated to learn new instructional skills and technology. Since there is a

constant change in education, teachers must continue to learn. Teachers are affected by social changes when demands are made. When teachers change, schools can adapt to those changes (Geldenhuis & Oosthuizen, 2015).

Hennessey et al. (2015) expressed teachers can be motivated by professional development and feel an impact in their outcome. Teachers are motivated most when they gain technology skills. New teachers may not be familiar with professional development and their training can take more time. Incentives should be used to promote professional development (Hennessey, Habler, & Hofmann, 2015).

Agbo (2015) discussed that teachers that are motivated about professional development will participate and make changes to their curriculum and integrate ICT in their teaching styles. Agbo (2015) said professional development programs offer incentives that encourage teachers to participate. However, professional development initiatives should lead to certifications. Training should be continuous to enable teachers to stay current with new technology (Agbo, 2015). Agbo (2015) suggests the use of technology innovations depends on teachers skills and knowledge, but when innovations are absent issues can occur using computers (Agbo, 2015).

According to Kim et al. (2013) researchers studied Technological Pedagogical Content Knowledge (TPACK) recently to identify how teachers skills lacked and what type of professional development should be used to create improvement of technology when teaching. Many researchers suggests that available technology enable technology integration, but pedagogy knowledge and content must be included when teaching with technology to increase learning and instruction. However, technology and knowledge



may not always create effective technology integration (Kim, Kim, Lee, Spector, & DeMeester, 2013).

Sumak and Sorgo (2000) said technology innovations of hardware and software development change rapidly. Although, a change must occur in pedagogy for additional skills because new technology can not easily replace aging technology. Sumak and Sorgo (2000) suggests teachers must have knowledge of how technology connects to content and pedagogy in order to implement technology.

### Summary

This literature review focused on multiple factors that included: attitudes, behaviors, and motivation. Many researchers express that teachers have technology available and choose not to use it can be due to several reasons. Copriady (2014) suggested teachers attitudes can affect how they use technology based upon positive and negative attitudes. Teachers with positive attitudes can enhance learning for students. Teachers with negative attitudes that choose not to use technology will be due to a lack of skills, lack of knowledge, age differences, gender differences, lack of experience using technology, and their confidence level while using technology.

Lee et al. (2015) expressed behaviors can affect technology adoption and behaviors can determine teachers motivation. Linnemanstons and Jordan (2017) expressed that professional development can be used to motivate teachers to use new technology. Agbo (2015) said when teachers received support from principals they become motivated. Teachers acceptance using technology can influence their students to use technology. Coklar et al. (2016) said negative effects are caused by negative

emotions, behaviors, and attitudes. All can be due to limitations of access, equipment, and training.

## CHAPTER III - METHODOLOGY

### Introduction

This chapter describes the use of interactive whiteboards, the adoption of interactive whiteboards, behavior differences, and motivation to use interactive whiteboards, education levels, and personal development based upon examining the roles of digital literacy among teachers as defined by the participant's ages. Next participants, research instrumentation, data collection procedures, and data analysis procedures are discussed. The following questions and hypotheses are guides for this research:

#### Research question 1:

Is there a relationship between behaviors and motivation to use interactive whiteboards based on geographical area, education, age, and gender among teachers (adopters) those that use interactive whiteboard and (non-adopters) those that do not use interactive whiteboards?

H1: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on geographical area.

H2: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on education.

H3: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on age.

H4: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on gender.

Research question 2:

What is the relationship between teachers adoption and integration of interactive whiteboards into their course curriculum based upon education level and training?

H5: There is a statistically significant difference among teacher's adoption and integration of interactive whiteboards to use in their course curriculum based upon their education levels and training?

Research question 3:

What is the relationship exist between teachers behaviors and motivation with the use of interactive whiteboards based upon their level of experience using technology?

H6: There is a statistically significant difference among teacher's behaviors and motivation with the use interactive whiteboards based upon their level of experience using technology.

### Research Design

This research study is a mixed method design because the author collected, analyzed, and mixes both quantitative and qualitative data within this study for the purpose of getting a better understanding of the research questions. Ivankova, Creswell, and Sticks (2006) State that the purpose of using a mixed method is to strengthen and enhance the analysis of the research study. This research study used a mixed method that

consists of performing a quantitative study first and second a qualitative study that includes interviews to help explain the outcomes from quantitative data.

The quantitative and qualitative methods were compared, and consist of two phases. Phase one of the study is the quantitative study. The purpose of the quantitative phase is to identify demographics, behavior differences, motivational effects, and adoption of interactive whiteboard from all 9<sup>th</sup> through 12<sup>th</sup> grade teachers that reside in the state of Mississippi. The goal of the quantitative phase is to identify digital divides based on teachers choosing to adopt or not adopt the use of IWB because of differences in their behaviors, motivation, education level, level of experience, and professional development.

The second phase is the qualitative study. The purpose of the qualitative phase is to obtain additional information about behaviors and motivational effects based on levels of experience when using interactive whiteboards. The quantitative data and results aided in identifying the research problem of why Digital Native and Digital Immigrant teachers choose not to use IWB when they are available at their schools. The qualitative data offers an explanation of statistical results and provide an in-depth look at Digital Native and Digital Immigrant teachers' levels of experience using technology.

This study examines three areas that include: 1) teachers adoption status of interactive whiteboards, behavioral differences, and motivation to use interactive whiteboards and the following factors: geographical area, education, age, gender, and use of interactive whiteboards. Geographical area, education, age, gender, and use of interactive whiteboards are the independent variables, and the dependent variables are behavioral differences and motivation to use interactive whiteboards, 2) teachers

adoption and integration of interactive whiteboards into course curriculum is based on education level and training. The independent variables are education level and training. The dependent variables are adoption and integration, and 3) teachers behaviors, motivation to use interactive whiteboards, and level of experience using technology. The independent variable is level of experience using technology and the dependent variables are behavior and motivation.

### Participants

Participants in this study are male and female teachers of grades ninth through twelfth. This study does not look at teachers that teach a specific course, to allow all teachers to participate. No specific age groups of teachers are specified to complete the survey to help determine how age can affect teachers motivation to use of interactive whiteboards. Participants were surveyed by the use of online surveys as well as, a small group of eight teachers were randomly selected and interviewed.

All participants selected resided in the southern and northern region of Mississippi. The sample size consisted of 611 teachers at public high schools in the state of Mississippi. The reasons the state of Mississippi was selected for this research study is to identify what type of technology issues if any teachers experience while using interactive whiteboards and to identify what technology indifferences if any exist among high schools in the southern and northern regions of Mississippi.

### Research Instrumentation

The survey instrument and interview questions were developed by this researcher to gather data from 9<sup>th</sup> through 12<sup>th</sup> grade high school teachers that reside in the southern and northern regions of Mississippi. The quantitative survey instrument (Appendix A)

contains 38 questions based on the literature pertaining to interactive whiteboards, teachers level of experience, teachers behaviors and motivation to use interactive whiteboards, teachers adoption of interactive whiteboards, and professional development of interactive whiteboards. Part I contains nine questions about the demographics of the participants. Part II contains questions ten through sixteen that focus on behavior and technology experience. Part III contains questions seventeen through twenty-two that focus on motivation to use technology. Part IV contains questions twenty-three through thirty-one that focus on interactive whiteboard use. Part V contains questions thirty-two through thirty-seven that looks at professional development. Question 38 asks participants if they want to continue with the survey. The qualitative survey questions were developed by this researcher. The qualitative survey contains 23 interview questions (Appendix B).

### *Phase I Quantitative*

In phase one, quantitative phase the survey instrument (Appendix A) includes items of different formats: multiple choice questions that ask to select one choice or all that apply, dichotomous answers such as yes or no, self assess items that are measured on various subscales, and open ended questions. The survey instrument consists of 38 questions that are organized in five parts.

The first part of the survey instrument ask demographic information gender, age, grade levels, years of teaching, degree earned, and equal opportunities that are analyzed to explore: the demographic comparisons among adopters and non adopter 9<sup>th</sup> through 12<sup>th</sup> grade high school teachers based on their behaviors and motivation to use interactive whiteboards. The second section, (behaviors and technology experience) includes

questions pertaining to teachers use of ICTs, Internet, and new technology. The second section uses two subscales. The first subscale is a five-point Likert scale rating is used from “Strongly agree” to “Strongly disagree.” The second subscale of section two uses a five-point frequency scale rating from “Daily Use” to “Never.”

The third section (motivation and technology use) uses multiple subscale ratings that include questions related to frequency of technology use, ICT use, and motivation to use technology. The first subscale collects data to determine frequency of technology use. A five-point frequency scale rating is used from “Daily” to “No Requirement.” The second section of part three determines frequency of technology use. A five-point frequency scale rating is used from “Do not discuss technology” to “Always.” The third section of the third part of the survey collects data to determine frequency of technology use. A five-point frequency scale rating is used from “Do not use” to “Always.” The fourth section of the third part of the survey collects data to determine ICT use. A four-point rating scale rating is used from “Do not use” to “Assessment.” The fifth section of the third part of the survey collects data to determine motivation. A four-point rating scale rating is used from “Do not use” to “Great motivation.”

The fourth section (interactive whiteboard) uses multiple subscale rating questions that relate to teachers use of interactive whiteboards. The first section of the subscale collects data to determine interactive whiteboard use. A five-point rating scale rating from “Very comfortable” to “Very uncomfortable.” The second five-point rating scale rating for interactive whiteboard use is from “Strongly agree” to “Strongly disagree.” The third five-point rating scale type questions for interactive whiteboard use are from “No training” to “3 or more days.” The fourth five-point rating scale ratings



questions for interactive whiteboard use are from “Very engaged” to “Very unengaged.” The fifth type subscale questions that pertains to interactive whiteboard use is from “Never” to “Always” A five-point rating scale is used to collect data to determine frequency of interactive whiteboard use. The final subscale of the fourth section collects data to determine frequency of interactive whiteboard use. A four-point Likert scale rating is used from “Times per day” to “Times per year.” The fifth section (professional development and training) questions address the training teachers receive. Two subscale type questions are used. The first is a five-point Likert scale rating used is from “Strongly agree” to “Strongly disagree.” The second subscale type question used in the fifth section uses a five-point Likert scale rating from “Never” to “Always.”

### *Phase II Qualitative*

The second phase is the qualitative phase. The qualitative phase focused on behaviors and motivational effects of teachers based on their level of experience using interactive whiteboards. Individual interviews were conducted with a small group of eight teachers. The group of participants were selected based upon their response to the final question in phase I that ask if they would like to continue to the second phase of the survey.

The qualitative survey instrument contains 23 questions. The questions consist of open-ended questions. The researcher reached out to the participants who wish to continue with the survey and setup times for interviews. Interviews were recorded and transcribed.

## Data Collection Procedures

The Institutional Review Board (IRB) of The University of Southern Mississippi was contacted for approval to perform surveys at public high schools in Mississippi. All letters of permission to school districts were submitted to obtain permission before IRB would approve the research study. Upon receiving permissions from high school superintendent's approval was received from the Institutional Research Board. Once approval was received Mississippi high school principals were contacted for permission to survey high school teachers in their schools.

### *Phase I Quantitative*

Quantitative phase one, data collection consisted of using online surveys. The survey consisted of thirty-eight questions. Qualtrics was used as the application to collect the data for online surveys. The researcher emailed each school district Superintendent in the southern and northern regions of Mississippi to obtain permission to contact Principals at the high schools in their districts for approval to survey the teachers before obtaining permission from Institutional Research Board from The University of Southern Mississippi. Once the Institutional Research Board provides approval of each School District the researcher contacted each Principals of the approved School District for permission to contact teachers to participate in a survey. Data collection lasted for approximately four weeks. This process took approximately 8 to 12 weeks to complete. Each group received information that the survey information obtained will be kept confidential. The data was stored in Qualtrics on the server of the researchers account for one year. After one year, the data was deleted.

## *Phase II Qualitative*

Qualitative phase two data collection consisted of interviewing participants from the southern and northern parts of Mississippi. Interview participants were obtained based upon responses to an open-ended question at the end of the quantitative survey asking participants if they would like to participate in the second phase of the research study. Participants that choose to participate in the survey received an email and interview was setup. Participant interviews sessions were recorded and notes were taken. After the completion of interviews all notes, and data recorded was transcribed, coded, and analyzed.

### Data Analysis Procedures

Data was monitored and coded by the researcher based upon school districts that participate in the survey. Participants of online surveys data was collected, analyzed, and interpreted by the use of SPSS software. This study utilizes multiple linear regressions for all research questions. Multiple linear regression method is used to predict dependent variables from independent variables and determine a relationship between the variables. Multiple linear regression method was used to test the hypotheses using .05 alpha level for each question.

A data triangulation strategy was used to collect from quantitative and qualitative data sets. The data triangle consisted of data collected in this study at different times, in different context, and from different people. Cohen and Manion (1986) define triangulation as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint” (p. 254).

Turner, Turner, and McGregor (2007) suggests confidence in the findings of a study can be improved by differences in events, locations, and times for collecting data.

### *Phase I Analysis*

Phase I, the quantitative phase. The analysis was performed using SPSS software. The results were reported in discussion. The first research question explores if there is a relationship between behaviors and motivation of Digital Native and Digital Immigrant teachers' who are adopters, and non-adopters to the use of interactive whiteboards based on demographics geographical area, education, age, and gender. Question one contains four hypotheses related to teachers demographics.

Research question two examines the relationship among Digital Native and Digital Immigrant teachers' adoption and integration of interactive whiteboards based on education level and professional development. Question two contains one hypothesis that relates to teachers adoption of interactive whiteboards. Research question three examines the relationship of teachers behaviors and motivation of using interactive whiteboards based on their level of experience. A descriptive analysis was used for this question that includes analyzing frequency of using interactive whiteboards. Question three contains one hypothesis that relates to teachers level of experience.

### *Phase II Analysis*

Phase II, the qualitative phase, data analysis consisted of describing information and developing themes. Interviews were recorded and transcribed verbatim of audio recordings by using Microsoft Word. The focus of the interview is to capture whole statements from both the researcher and the participants being interviewed. All data obtained from interviews was coded and analyzed. Coding consisted of looking for

similar phrases, relationships among variables, themes, and differences in groups.

Microsoft Excel was also used to organize all interviews. Columns were labeled and coded researcher, participant, interview questions, and participant response. Each row within the Excel document represents a question and a response.

Description includes detailed information about participants, place they are located based upon answers received to research questions. Interpretation of data was performed. The research was analyzed by use of descriptive, differential, and correlation statistics to compare independent variables and dependent variables of adoption to use interactive whiteboards. The qualitative questionnaire looks at level of experience using technology.

#### Summary

This chapter analyzed the methods used in detail. This chapter offers details of the methodology used in the introduction, research design, participants, research instruments, data collection procedures, and data analysis procedures. The next chapter analyzes all data collected from the participants in this chapter. The findings were organized based upon the three research questions and the hypotheses. The statistical procedures were utilized to identify why teachers choose not to use interactive whiteboards and other technology when they are available at their schools.

## CHAPTER IV – RESULTS AND FINDINGS

### Introduction

This chapter describes quantitative results including demographic information, results of the discussion, behaviors of teachers, teachers motivation and technology use, teachers use of interactive whiteboards, and professional development and training. This chapter also describes qualitative findings including demographics, behaviors of teachers, technology experience of teachers, motivational differences, and technology use, interactive whiteboard, and professional development and training.

Many studies have identified multiple facets of digital divide among teachers. Some studies on instructional technology focused on possible causes of digital divide and solutions. This present study focus was to identify any correlation and relationship between teachers' behaviors and motivation to use IWBs. An online survey *Digital Literacy Among Teachers* (see Appendix F) was distributed to respond to suggested questions.

As described in Chapter 1, the focus of this research is to examine the roles of digital literacy in high schools to identify digital divides among teachers that teach grades 9<sup>th</sup> through 12<sup>th</sup> and adopt or choose to not adopt the interactive whiteboards. To obtain a better understanding about teachers adoption or non-adoption of IWBs the following research questions were developed. 1) Is there a relationship between behaviors and motivation to use interactive whiteboards based on geographical area, education, age, and gender among teachers (adopters) those who use interactive whiteboard and (non-adopters) those who do not use interactive whiteboards? 2) What is the relationship between teachers' adoption and integration of interactive whiteboards into their course

curriculum based upon education level and training? 3) What is the relationship between teachers' behaviors and motivation with the use of interactive whiteboards based upon their level of experience using technology?

This study was a mixed method design. In order to effectively answer the research questions, data collection was conducted in two phases to identify the research questions in both the quantitative phase and qualitative phase. During the quantitative phase, 94 Mississippi high school teachers completed the online questionnaire. The qualitative phase consisted of interviewing eight Mississippi high school teachers. The first part presented in this chapter is phase I quantitative and following is phase II qualitative.

### Phase I Quantitative Results

This section discusses results in quantitative phase, includes demographics of teachers that participated in the research study. Also discussed are behaviors of teachers, teachers motivation and technology use, teachers use of interactive whiteboards, as well as their professional development and training. This phase compares highest and lowest ratings of subscale questions and descriptive statistics.

A Cronbach's alpha test was used to determine the reliability of subscale items within the instrument. The Cronbach's Alpha reliability analysis showed all subscale questions were reliable,  $\alpha = .757$ . The score of the Cronbach's Alpha must be higher than .7 for internal consistency. All subscales items were above or close to .70. See Table 1.

Table 1 – *Cronbach’s Alpha*

Title	Cronbach’s Alpha
Behavior	.919
Technology Experience	.710
Motivation	.744
Technology Use	.774
Interactive Whiteboards	.720

*Demographic Information of Teachers*

The *Digital Literacy Among Teachers* (see Appendix F) survey instrument was forwarded to 26 school district superintendents in the State of Mississippi, and of the 26 only 14 school districts participated. The 14 school districts were located in multiple regions in Mississippi. The regions that participated included Northeast, Delta, East Central, Capital, Pine Belt, and the Mississippi Gulf Coast. The Northeast region participants include Corinth, Union, Lee, and Monroe school districts. The Mississippi Delta region included Holmes County. Participants in the East Central region included Neshoba and Lowdnes school districts. Included in the Capital region was Pearl public school district. Pine Belt region participants included Hattiesburg, Columbia, Forest Municipal, and Perry. School districts of the Mississippi Gulf Coast that participated included Gulfport and Moss Point.

Six hundred and eleven questionnaires were distributed to fourteen school districts in Mississippi. Out of the 611 questionnaires distributed, 94 questionnaires were completed from 9<sup>th</sup> through 12<sup>th</sup> grade high school teachers. The survey return rate was



15.38%. The 94 participants of this study were high school teachers of the southern and northern parts of Mississippi. Table 2 *Demographics of Participants* below, 58 (61.7%) more participants were females and more participants were between the ages of 30 to 39. For additional information see Table 2.

Table 2 - *Demographics of Participants*

Gender	Frequency	Percent
Female	58	61.7
Male	26	27.7
Incomplete Response	2	10.6
Total	94	100
Age	Frequency	Percent
20-29	9	9.6
30-39	31	33.0
40-49	29	30.9
50-59	22	23.4
60 and Above	3	3.2
Total	94	100.1

Table 3 identifies demographic geographical area and education of participants. More participants 49 (52.1%) indicated they were from southern regions of Mississippi, and 49 (52.1%) reported they have a Masters' degree. Most participants, 42.6%, reported they would continue education, and 83% indicated there are equal opportunities for both male and female teachers. For additional information see Table 3.

Table 3 – *Demographics: Geographical Area & Education*

Geography	Frequency	Percent
North Mississippi	42	44.7
South Mississippi	49	52.1
Incomplete Response	3	3.2
Total	94	100
Education	Frequency	Percent
Bachelors	32	34.0
Masters	49	52.1
Specialist	6	6.4
Doctorate	6	6.4
No Response	1	1.1
Total	94	100
Continue Education	Frequency	Percent
Yes	34	36.2%
Maybe	40	42.6%
No	20	21.3%
Equal Opportunities	Frequency	Percent
Yes	78	83%
Maybe	12	12.8%
No	4	4.3%

*Table 4 Demographics: Teaching Experience and Grades Taught* of participants, 28 (29.8%) participants reported having 11 to 15 years of teaching experience. A total of 94 participants reported teaching multiple grades. A similar number of 74 (78.7%) participants taught grade 10. For additional information see Table 4.

Table 4 - *Demographics: Teaching Experience & Grade Levels Taught*

Experience	Frequency	Percent
2 Years or less	11	11.7
3-5 Years	7	7.4
6-10 Years	18	19.1
11-15 Years	28	29.8
16-20 Years	8	8.5
21 Years or more	22	23.4
Total	94	100.0

Grades Taught	Frequency	Percent
9 <sup>th</sup>	65	69.1
10 <sup>th</sup>	74	78.7
11 <sup>th</sup>	73	77.7
12 <sup>th</sup>	73	77.7

*Teachers Behavior and Technology Experience*

Table 5 includes descriptive statistics for Behavior and Technology Experience of Teachers. This table provides data for all questions 10 through 18 listed under the subheading Behavior and Technology Experience. Question 17 participants reported, “I

experience stress when using new technology” was the highest rating of 4.05 among all questions compared to question 12 participants reported, “I have internet access” had the lowest rating of 1.26.

Table 5 - *Descriptive Statistics Teachers Behavior and Technology Experience (N=94)*

Question	Mean	Standard Deviation
Q17 I experience stress when using new technology.	4.05	1.061
Q18 I experience stress while integrating new technology.	4.02	.973
Q16 The lack of hardware (computers, interactive whiteboards, etc.) hinders or stops technology use in my classroom.	3.54	1.206
Q15 I have adequate equipment in my classroom.	2.11	.978
Q11 My IT department is available for troubleshooting on technical issues.	1.82	.761
Q10 I use Information Communication Technology (ICT) while teaching	1.78	.706
Q14 I like to use new technology.	1.67	.694
Q13 I have internet access in my classroom.	1.28	.450
Q12 I have internet access.	1.26	.438

*Teachers Motivation and Technology Use*

*Table 6 consists of descriptive statistics for Teachers Motivation and Technology Use.* This table includes data for frequency questions 19 through 24-9 listed in the subheading Teachers Motivation and Technology Use. Question 21-1 participants were asked about the their frequency of using Information Communication Technology

Internet sites had the highest value of 4.52 among all questions, compared to question 23-2 where participants were asked about their frequency of using Information Communication Technology wiki blogs reported the lowest value of 2.01.

Table 6 - *Descriptive Statistics Teachers Motivation and Technology Use*

Question	Mean	Standard Deviation
Q23-1 How frequently do you use each of the following Information Communication Technology? Internet Sites	4.14	.798
Q22-1 How frequently do you use technology for student use? Computers	4.11	1.021
Q23-3 How frequently do you use each of the following Information Communication Technology? Educational Websites	3.90	.839
Q23-5 How frequently do you use each of the following Information Communication Technology? Video Sites	3.73	.964
Q21-2 How frequently do you use technology for delivery of instruction: Interactive whiteboard	3.59	1.617
Q24-8 How were you motivated to use technology? Self	3.49	.635
Q24-2 How were you motivated to use technology? Professional development	3.34	.580
Q22-2 How frequently do you use technology for student use? Interactive whiteboard	3.32	1.555
Q21-3 How frequently do you use technology for delivery of instruction: LCD Projector	3.30	1.673
Q24-4 How were you motivated to use technology? Colleagues	3.28	.539

Table 6 (continues).

Q20 How frequently do you motivate colleagues to use technology?	3.20	1.122
Q22-4 How frequently do you use technology for student use? LCD Projector	3.14	1.655
Q24-5 How were you motivated to use technology? Administrators	3.12	.657
Q19 How frequently does your school district require technology use in the classroom?	2.99	1.862
Q24-3 How were you motivated to use technology? Teacher preparation program	2.89	1.058
Q24-7 How were you motivated to use technology? Friends	2.85	.833
Q21-4 How frequently do you use technology for delivery of instruction: Other	2.81	1.461
Q24-1 How were you motivated to use technology? Mentor Teachers	2.76	.906
Q23-6 How frequently do you use each of the following Information Communication Technology? Other	2.62	1.402
Q24-6 How were you motivated to use technology? Family Members	2.55	.903
Q22-5 How frequently do you use technology for student use? Other	2.51	1.469

Table 6 (continues).

Q23-4 How frequently do you use each of the following Information Communication Technology? Social Networking	2.38	1.382
Q22-3 How frequently do you use technology for student use? Interactive whiteboard	2.37	1.427
Q24-9 How were you motivated to use technology? Other	2.08	1.130
Q23-2 How frequently do you use each of the following Information Communication Technology? Wiki Blog	2.01	1.202

*Teachers Use of Interactive Whiteboards*

Table 7 consists of descriptive statistics for teachers' use of interactive whiteboards. This table provides data for all questions 25 through 31-4 listed under the subheading interactive whiteboards. Question 28 participants were reported having problems using interactive whiteboards when assistance is available lists the highest value of 3.66% among all questions, and question 31-1 participants were asked about their frequency of using interactive whiteboards for delivery of instruction reported the lowest value of 1.82%.

Table 7 - *Descriptive Statistics Teachers Use of Interactive Whiteboard*

Question	Mean	Standard Deviation
Q28 I have problems using interactive whiteboards when assistance is available.	3.66	.846
Q31-3 How frequently do you use interactive whiteboards? Assessment of Student Learning	2.76	1.127

Table 7 (continues).

Q31-4 How frequently do you use interactive whiteboards? Other	2.63	1.323
Q31-2 How frequently do you use interactive whiteboards? Student Use	2.40	1.156
Q30 How engaged are your students when using interactive whiteboards?	2.23	.912
Q29 How much training have you received to use interactive whiteboards?	2.02	1.439
Q25 Please choose the response that best describes how you feel when using interactive whiteboards.	1.98	1.119
Q27 I have confidence when using interactive whiteboards while teaching.	1.86	.872
Q26 I enjoy using interactive whiteboards while teaching.	1.85	.893
Q31-1 How frequently do you use interactive whiteboards? Delivery of Instruction	1.82	1.196

*Adoption and Integration of Interactive Whiteboards.* The survey questions 25, 26, 27, 28, 29, 30, and 31(1-4) were used to provide descriptive statistics for adoption and integration of interactive whiteboards. Question 25, “Please choose the response that best describes how you feel when using interactive whiteboards.” Participants selected “very comfortable” scored 45.7% highest when compared to participants that selected “very uncomfortable” that scored 2.1% lowest. Question 26, “I enjoy using interactive



whiteboards while teaching.” Participants responded “strongly agree” scored 44.7% highest when compared to participants that selected “strongly disagree” that scored 0% the lowest score.

Question 27, “I have confidence when using interactive whiteboards while teaching.” Participants responding “strongly agree” scored 42.6% highest when compared to participants that responded, “strongly disagree” that scored 0% lowest score.

Question 28, “I have problems using interactive whiteboards when assistance is available.” Participants responded “neither agree nor disagree scored 40.4% highest when compared to participants that responded, “strongly agree” that scored 1.1% lowest.

Question 29, “How much training have you received to use interactive whiteboard.” Participants selected “no training” scored 44.7% highest when compared to participants that responded “2 days” that scored 3.2% lowest.

Question 30, “How engaged are your students when using interactive whiteboards?” Participants selecting “engaged” scored 37.7% highest when compared to participants that selected “very unengaged” that scored 0% lowest. Question 31, “How frequently do you use interactive whiteboards?” Participants selecting “I use interactive whiteboards delivery of instruction times per day” scored 58.5% highest when compared to participants that selected “I use interactive whiteboards that selected “other” scored 5.3% lowest.

### *Professional Development and Training*

Table 8 includes descriptive statistics for professional development and training. This table provides data for all questions 32 through 37-4 listed under the subheading professional development and training. Question 34 participants were asked if lack of

training hinders or stops them from using interactive whiteboards lists the highest value of 3.24% among all questions, and question 37-1 participants were asked how professional development was offered at their school reported the lowest value of .0745.

Table 8 - *Descriptive Statistics Professional Development and Training*

Question	Mean	Standard Deviation
Q34 The lack of training hinders or stop the use of interactive whiteboards in the classroom.	3.24	1.119
Q 33 I frequently receive training to use new technology.	2.56	1.026
Q35 How frequently do the training or professional development you receive focus on using interactive whiteboards?	2.26	.936
Q36 Is there a difference in the training male and female teachers receive?	1.98	.147
Q32 I am required to attend professional development.	1.49	.855
Q37-4 How is professional development offered at your school? Check all that apply. Not offered	.9787	.14508
Q37-3 How is professional development offered at your school? Check all that apply. Webinar	.5426	.50086
Q37-2 How is professional development offered at your school? Check all that apply. Offsite	.4681	.50166
Q37-1 How is professional development offered at your school? Check all that apply. Onsite	.0745	.26394

Question 32, “I am required to attend professional development.” Participant selecting “strongly agree” scored 64.9% highest when compared to participants that selected “disagree” and “strongly disagree” that both scored 2.1% lowest. Question 33, “I frequently receive training to use new technology.” Participants that selected “agree” scored 47.9% highest when compared to participants that selected “strongly disagree” that scored 3.2% lowest.

Question 34, “The lack of training hinders or stops the use of interactive whiteboards in the classroom.” Participants who selected “neither agree nor disagree” scored 31.9% highest when compared to participants that selected “strongly agree” that scored 3.2% lowest. Question 35, “How frequently do the training or professional development you receive focus on using interactive whiteboards?” Participants selected “rarely” scored 40.4% highest when compared to participants that selected “always” that scored 1.1%. Question 36, “Is there a difference in the training male and female teachers receive?” Participants who selected “no” scored 94.7% highest when compared to participants that selected “yes” that scored 2.1%. Question 37, “How is professional development offered at your school? Check all that apply.” Participants who selected “onsite” scored 92.6% highest when compared to participants that selected “not offered” that scored 2.1%.

### Phase II Qualitative Findings

As discussed in Chapter 1, the purpose of the qualitative phase was to gain additional information about behaviors and motivational effects based on levels of experience when using interactive whiteboards. The coding strategies used in the qualitative phase included structural coding in cycle one and pattern coding in cycle two.

Eight Mississippi high school teachers were interviewed. The interviews ranged from 20 to 30 minutes in length. There were twenty-three interview questions (see Appendix G). All data was recorded; notes were taken and transcribed. Although participant responses were similar, each response was unique. The author compared responses among participants to form similar responses.

*Demographic Characteristic of Participants*

Table 9 includes demographic information obtained from each participant interviewed that included coded pseudonym names, age, gender, years of experience, educational degrees, and the grades taught by each participant. Pseudonym names were selected to protect the participants' identity. A majority of the teachers were in the age groups 50 to 59. A majority of the participants were female. Overall, more participants had Masters' degrees. For additional information see Table 9.

Table 9 - *Demographic Characteristics of Participants*

Name (pseudonym)	Age	Gender	Years of Experience	Degree	Grades
Participant 1	40-49	F	0-2	Masters	9, 10, 11
Participant 2	40-49	F	11-15	Masters	11, 12
Participant 3	60 and Up	F	21	Masters	7, 8, 9
Participant 4	30-39	F	10	Bachelors	11
Participant 5	50 -59	F	11-15	Masters	10
Participant 6	50-59	F	16-20	Masters	9-12
Participant 7	30-39	F	11-15	Bachelor's	10
Participant 8	50-59	M	21	Masters	9-12

### *Behaviors of Teachers*

*Role Differences.* Findings from this study show that the role teachers play in selecting new technology varied. Such as participant 2 stated, “I would say a small role” or “none.” However, some teachers reported they do have the ability to make suggestions. For instance if purchasing something minor or inexpensive.

*Lack of Technology.* Findings from this study indicated that most teachers admitted that have technology issues and not have enough equipments. For example, they either do not have enough technology or the existing equipment do not work as some teachers stated, “We all are so excited that we live in a generation of tech savvy”but “Old school teachers don’t really bring as much as some of us that are actually driven.” In addition, the slow internet causes problems during the testing time as one teacher mentioned.

### *Technology Experience of Teachers*

*Technology Experience.* Findings of the study shows that majority of teachers got their first computer in the late 90s or early 2000s when the computer was still big and heavy. For example, “When they were huge and bulky. A majority of participants reported their first email account in the 90s. For example one participant reported, “I was in junior high.” A majority of participants reported getting their first social networking account in early to late 2000s. For example participant 7 said, “I believe I was in college.” Teachers also discussed the type of experience they had before teaching. Majority of teachers reported using Word, Excel, and PowerPoint. Participant 3 reported, “No other experience with technology before teaching.” Participant 8 said, “Prior to teaching I don’t know if there was a whole lot of technology.”

*Successful Technology Use.* Teachers least successful experience using technology for teaching was identified by multiple participants as experiencing technical issues. For example, “When the network went down, we had to go back old school.” “Technology is good when it works, but it’s really bad when it does not.” “I had to improvise to use another form of technology.” Teachers most successful experience using technology for teaching was identified by most participants as using various software to keep students engaged. For example, “Google Classroom,” “Using Schoology and the MacBook makes giving the assignments easy.” Other teachers discussed using YouTube clips to bring history to life.

#### *Motivational Differences*

*Motivation and Technology Use.* Multiple teachers said they are motivated to use technology by their students. A majority of teachers said their students, “are my motivation in everything I do.” One teacher said that she keeps her student interested because, “they benefit the most using technology.” Not all teachers enjoy using new technology. Many teachers said “Some teachers will do just what is required because they don’t like to do technology.” All participants said they are motivated by their Principal to use technology. Some teachers said their Principals encourage the use of technology. Although it was reported that principals encourage the teachers to use technology one teacher said, “We are limited as far as a budget for technology, but for those of us that do have it, he certainly encourages us to use what we have available to us.”

*Influence of Technology Use.* A majority of teachers discussed how they are influenced by other teachers to use technology. One teacher, for example said, “Other

teachers find things that work and share it and take time and show us how to use it.” It was expressed most by teachers that “younger teachers push for technology use, and more seasoned teachers tend to shy away from it.” The reason why teachers reported they were influenced by their students is because “they know the latest technology. Teachers said if their students suggest a form of technology they research the technology. Many teachers said they do what they have to do to keep their classroom interesting, and their main purpose is to encourage their students.

### *Interactive Whiteboards*

*Using Interactive Whiteboards.* The majority of participants reported using interactive whiteboards while teaching. Many teachers reported how they enjoy using their interactive whiteboard. However, not all teachers use interactive whiteboard for various reasons. The main reason why some teachers said they do not use an interactive whiteboard was because of a lack of funding. One teachers reported using, “I do use a projector and a poor man’s whiteboard.” Not all teachers are experiencing funding issues at their schools. Some participants reported not using their interactive whiteboards for other reasons such as, “I do not use mine as much since we have the MacBook’s as I use to.” Most teachers that do not have interactive whiteboards in their classroom discussed trying to be as interactive as possible by using computers, audio text, Google Classroom, and YouTube.”

*Availability of Interactive Whiteboards.* The majority of participants reported having an interactive whiteboard in their classroom. All participants said their schools have interactive whiteboards. Although it was reported that each school has interactive whiteboards, the problem is not all teachers have an interactive whiteboard in their

classroom. For example, “not in my classroom, but we have some in the school.” Because there are not enough interactive whiteboards for each teacher, barriers are forming. The barriers are caused by a lack of funding to purchase additional interactive whiteboards. One teacher reported when they need to use an interactive whiteboard they have to share whiteboards in their schools if they are available.

*Lack of technical support.* Technical issues *were* reported as a hindrance of the use of interactive whiteboards. Teachers discussed having network issues when they used new technology in their classroom. Teachers discussed when they experience network issues or Internet problems occur, “we do as little as possible.” Teachers said a lot of their whiteboards and other equipment are outdated, and they have to use other technology when their interactive whiteboards are not working.

*Problems with Interactive Whiteboards.* Multiple participants reported experiencing technical and Internet problems while using the interactive whiteboards. One teacher said the program on her interactive whiteboard is not installed correctly so this causes problems when she uses it. Multiple teachers reported experiencing glitches with the Internet or sensitivity problems with their interactive whiteboard. For example, “I have visual issues the light does not work.” Other teachers reported not using interactive whiteboards. For example, “I don’t have one in my room, I don’t have an opportunity to practice and no training on it” or “I don’t use one.” Teachers said when they experience problems while using the interactive whiteboard they called the IT department. Teachers said they have to report to their IT department and wait. One teacher said she uses other technology when her interactive whiteboard does not work.



For example, “I try to restart everything” or “I roll with plan b and screen capture after adjusting the unit.”

*Mentor Teachers and Interactive Whiteboards.* Roles mentor teachers have in the use of interactive whiteboards were reported by a majority of participants as not technology roles. Teachers said that their mentor teachers are role models. Some teachers interviewed were mentor teachers. One teacher reported, “I go in and help troubleshoot.” Another teacher said, “Younger teachers keep me up to date on stuff. Whatever questions I have I ask her.”

*Benefits of using Interactive Whiteboards.* Majority of participants reported their teaching style changed to using more enhanced activities because of using interactive whiteboards. Teachers discussed how they interact with their students saying, “I bring kids to the whiteboard to break the teacher kid barrier.” Other teachers discussed incorporating videos into their lessons. The use of interactive whiteboards was reported to engage students because technology is used because lessons are more interactive and they have more of a hands-on approach.

#### *Professional Development and Training*

*Inefficient Professional Development.* The majority of participants reported taking some kind of technology course. Some participants took technology in education courses because they were part of their educational program curriculum. Teachers discussed taking various software courses or general courses. One teacher reported, “None specific to technology” or “There were not any technology courses in my program.” A majority of participants reported their school district offers CEU’s or professional development for

continuing education. Some participants said, “They don’t offer anything” or “I don’t know.” One reported, “Our evaluations and standards require us to use technology.”

### Summary

This chapter described the results of a mixed methods research study. The purpose of this study was examining the roles of digital literacy in high schools to identify digital divides among teachers that teach grades 9<sup>th</sup> through 12<sup>th</sup> that adopt or choose not to adopt the use of interactive whiteboards. The information collected through the phase I quantitative was described in detail. The results of phase I quantitative are reported. Descriptive statistics information was reported in this chapter. Regression analysis results were reported in this chapter. The phase II qualitative purpose was to collect additional data to further explain the quantitative phase. Eight high school teachers were interviewed from different school districts. The results of both a quantitative and qualitative study provided additional information to offer a better understanding of this chapter.

## CHAPTER V – FINDINGS AND DISCUSSIONS

### Introduction

This chapter interprets and summarizes the results and findings from chapter IV to further explain the research results and findings. Included in this chapter are Procedure Summary, Findings and Discussions, Limitations. Recommendations for Future Research, and Summary.

### Procedure Summary

To conduct phase I, the quantitative study, the researcher emailed a Consent Form, (see Appendix A) and Participation Request Letter for Superintendents (see Appendix B) to all 151 Mississippi school district superintendents requesting approval to contact principals to gain access to high schools. After permission was received from school district superintendents, all Consent Forms were forwarded to the Institutional Review Board (IRB) and permission to conduct the research was obtained (see Appendix C). Twenty-six school districts agreed to participate in the study, but only fourteen participated. Permission Request Letters for Principals (see Appendix D) were emailed to principals to gain permission to contact teachers. Upon receiving permission from principals, an Invitation Letter for Teachers (see Appendix E) that included a link to the online survey was emailed to all high school teachers within the approved school districts. All online survey questions (see Appendix F) were designed to identify a relationship among high school teachers to determine how they are digitally divided. In all 611 teachers were emailed, and only 94 teachers completed the online survey.

A Cronbach's Alpha test was conducted to determine the reliability of the subscale questions. The overall reliability of all subscale questions rate was .757. The

participants in this study are Mississippi high school teachers. Their ages varied from 20 to 60 and above.

### Findings and Discussions

The findings of each of the three research questions are discussed in this section. The findings were developed based upon responses received from online surveys and interview sessions. Descriptive Analysis was performed on all independent variables. The following variables are categorical and were recoded. The comparison groups for each of these variables were: a) Gender – female; b) Age – thirty; c) Years teaching experience – 11 to 15 years; d) Education/Degree – Masters’; e) Continue Education – maybe.

#### *Research Question 1*

*Is there a relationship between behaviors and motivation to use interactive whiteboards based on geographical area, education, age, and gender among teachers (adopters) those that use interactive whiteboard and (non-adopters) those that do not use interactive whiteboards?*

A multiple regression analysis was run, and data was collected from demographic survey questions to determine if a significant relationship was present between behaviors and motivation to use interactive whiteboard based on geographical area, education, age, and gender among teachers. The researcher hypothesized *H1*: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on geographical area. *H2*: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on education. *H3*: There is a statistically significant

difference between adoption status of behaviors and motivation to use interactive whiteboards based on age. *H4*: There is a statistically significant difference between adoption status of behaviors and motivation to use interactive whiteboards based on gender.

The findings indicated a statistically significant relationship exists with behavior and motivation to use interactive whiteboards and the independent variables (geographical area, education, age, and gender),  $R^2 = .705$ ,  $F(20, 47) = 2.318$ ,  $p = .009$ . The IV's explains 70.5% of the variance in the DV. The p-value for the overall model is significant. The amount of variance explained by the model independent variables is statistically significant. The findings of the analysis indicated a statistically significant value of .002 for research question, "How frequently do you use interactive whiteboards for delivery of instruction?" The findings of the analysis indicated a statistically significant value of .007 for research question, "How frequently do you use interactive whiteboards for student use?"

The findings of prior research is consistent with multiple findings of this study. The findings revealed more teachers from rural northern regions in Mississippi reported internet issues, network issues, and funding issues were the reasons why interactive whiteboards were not available in their classrooms. This finding is supported by Salemink et al. (2015) that rural areas internet access is low-tech that includes the lowest speed, and poor connections. Osborne and Morgan (2016) suggests resources are less for teachers that work in low-income school districts. Overall, more participants in this study had Masters' degrees. Geldenhuys and Oosthuizen (2015) said education is constantly changing, so teachers must continue to learn. Farid, Ahmad, Niaz, Arif,

Shamshirband, and Khattak (2015) said teachers in rural areas have more problems using and adopting to technology because of their demographic indifferences.

Younger teachers were more motivated to use technology compared to some older teachers that shied away from using technology. This finding is supported by Lee, Lee, and Hwang (2015) Self-Determination Theory that motivation is a behavior based on enjoying an experience. The findings revealed when younger teachers experienced problems using interactive whiteboards, they would troubleshoot and attempt to solve the problem, and older teachers preferred calling the IT department or ask other teachers for help. This finding is supported by Rogers (2003) Diffusion of Innovation Theory that identified that innovators have technical knowledge, and laggards have skeptical about an innovation. This findings are supported by Damodaran and Sardhu (2016) that older adults' learning depends on the availability of ICT support. The findings revealed in both quantitative phase I and qualitative phase II a majority of participants in this study were female. Although more females participated in this survey, the majority of participants reported equal opportunities for both male and female teachers. Only one male reported experiencing technical issues due to using outdated equipment. This finding was not supported by the research.

*Research Question 2:*

*What is the relationship between teachers adoption and integration of interactive whiteboards into their course curriculum based upon education level and training?*

I originally planned to use professional development as an independent variable to identify the training teachers received. However, since the questions are on different

scales an average could not be created. No regression model was run. All data represented for research question 2 is data collected from phase II qualitative.

Qualitative phase II findings identified a majority of teachers reported having Masters' degrees and 11 to 15 years of teaching experience. More female teachers participated. Negative behaviors were found with participants' professional development and training. The findings revealed professional development and training of teachers were not always specific to technology, and not all teachers received training to use interactive whiteboards. Hennessey et al. (2015) express that teachers can be motivated by professional development and feel an impact in their outcome. The findings revealed not all teachers were using IWBs. This finding is supported by Copraidy (2014) that identified not all teachers will use technology when it is available at their school. Some teachers reported not using their IWB. The findings revealed not all departments had IWBs. Most participants reported their math and English departments had IWBs. The findings revealed that teachers who did not have access to interactive whiteboards integrated other forms of technology into their course curriculum, such as computers, whiteboard and a projector, Chrome Books, and other methods when they could not borrow an IWB from another teacher.

*Research Question 3:*

*What is the relationship that exists between teacher's behaviors and motivation with the use of interactive whiteboards based upon their level of experience using technology?*

A multiple regression analysis was run to collect data to determine if a significant relationship was present between behaviors and motivation to use IWB based on level of

experience using technology. Multiple regression analysis was run to analyze research question 3 to identify if a significant relationship existed with dependent variable behavior and motivation. The researcher hypothesized in *H6* that a statistically significant difference among teachers' behaviors and motivation with the use interactive whiteboards based upon their level of experience using technology. The results indicated a significant relationship exists with behavior/motivation and independent variables (age, gender, technology use, and level of experience),  $R^2 = .801$ ,  $F(31, 46) = 2.650$ ,  $p < .001$ . The IV's explained 80.1% of the variance in the DV. The p value for the entire model is significant.

Participants that reported they taught over six years are .016 less compared to participants that reported they have taught over 11 to 15 years. Participants were asked, "How frequently do you use technology? I use the following technology for delivery of instruction." selected "other" scored a significant rate of .012. Participants were asked, "How frequently do you use technology for student use? I use the following technology for student use" who selected "interactive whiteboard" scored a significant rate of .025.

The findings revealed a significant relationship between teachers' behaviors and motivation to use of IWBs based on their level of experience using technology. Positive behaviors were found in some teachers use of technology. The findings revealed a majority of participants were motivated to use new technology. One participant reported some teachers did only what was required. This finding was supported by Ajzen (1985) Theory of Reason Action that identifies human behavior as predicted by intentions. This finding is also supported by Ajzen (1991) Theory of Planned Behavior that identifies individuals' intentions to perform a behavior. This finding was also supported by Sahin



(2006) that faculty choose not to use technology while teaching when they are unsure how to use technology correctly. Overall, the findings revealed that younger teachers were more enthused to use technology. This finding is consistent with the literature review in chapter 2 Theory of Planned Behavior.

### Limitations

#### *Phase I Quantitative*

The sample size was small, so it caused a limitation of data. The process of requesting permission from school district Superintendents before receiving permission from Institutional Research Board (IRB) caused major delays. Another limitation was the time frame the research was done near the end of the school year. This was not the best time because state testing was performed, and many teachers were not available to take the survey. Another limitation was I should have performed a pilot study with online survey questions because some questions were not answered. The pilot study would have enabled restructure of certain survey questions. Due to a limited number of participants, a large number of non-significant values were identified. There was a limitation of participants from south Mississippi, which caused an unequal amount of participants from north and south Mississippi.

#### *Phase II Qualitative*

A limitation in phase II was most participants were from older age groups, and technology was not available when they started their career. This lack of technology created barrier for the older teachers. An additional limitation was all teachers that participated in this study did not have the ability to use interactive whiteboards everyday due to a lack of funding and a lack of interactive whiteboards. Although this proved

reasons for digital divide, some survey responses were biased based upon a lack of opportunity to use interactive whiteboards. Another limitation was only one male participated in phase II. The majority of information was obtained from a female's perspective.

### Future Research

The researcher suggests future research should look at teachers' knowledge of using interactive whiteboards and how their experience using interactive whiteboards affects how interactive whiteboards are used. Additional research should be conducted to determine how much training teachers receive using new technology. Further, research should focus on determining if the gap from a lack of training and experience is due to a lack of interest or a lack of funding by the institution. Although participants reported their school district does not require technology in the classroom, participants also report that their principals motivate technology use and the benefits of using technology. One reason why technology is not being used is because of funding issues. Some teachers have to share their resources. Multiple participants reported funding as the cause of major issues for a lack of interactive whiteboards at schools that caused a lack of motivation using technology. Future research should also look at how administration enforces technology use when resources and funding are not available.

### Summary

This was a mixed method research study. The participants of the study were 9<sup>th</sup> through 12<sup>th</sup> grade teachers that reside in the state of Mississippi. Fourteen school districts participated. Data collected was performed in phase I quantitative and phase II quantitative phase. Phase I quantitative consisted of 94 online participants, and 8

participants were interviewed in phase II qualitative. The research project titled, *Digital Literacy Among Teachers: Identifying Digital Divides Among Interactive Whiteboard Users in Public High School*. The purpose of the study is to examine the roles of digital literacy in high schools in order to identify digital divides among teachers.

Teachers' use of technology during instruction benefits teachers and students. Technology opens many avenues for teachers to enhance lessons, increase the students' retention, and enhance both teachers' and students' knowledge. Today's children are tech savvy learners born in a technology age. However, their teachers may or may not be digital literate. This study identified problems that teachers experienced were due to a lack of resources. Digital divides identified in this study were based on age, lack of resources, lack of training, and the lack of motivation.

# APPENDIX A - Consent Form



## INSTITUTIONAL REVIEW BOARD STANDARD (SIGNED) INFORMED CONSENT

<b>STANDARD (SIGNED) INFORMED CONSENT PROCEDURES</b>
<p>This completed document must be signed by each consenting research participant.</p> <ul style="list-style-type: none"> <li>The Project Information and Research Description sections of this form should be completed by the Principal Investigator before submitting this form for IRB approval.</li> <li>Signed copies of the consent form should be provided to all participants.</li> </ul> <p style="text-align: right; font-size: small;">Last BC IRB Rev. 9/16/2012</p>

Today's date: April 24, 2019		
<b>PROJECT INFORMATION</b>		
Project Title: Digital Literacy Among Teachers: Identifying Digital Divide Among Interactive Whiteboard Users in Public High Schools		
Principal Investigator: Tammy Oatis	Phone: 228-861-2076	Email: tammy.morgan@usm.edu
College: The University of Southern Mississippi	Department: Educational Research and Administration	
<b>RESEARCH DESCRIPTION</b>		
<p><b>1. Purpose:</b></p> <p>[Describe purpose of the investigation, why it is being performed and what use may be made of the results.]</p> <p>This is a mixed method study.</p> <p><b>The Quantitative Study</b>                  The purpose of the quantitative study is to examine the teachers roles of digital literacy in high schools in order to identify digital divides among Digital Immigrant and Digital Native teachers who teach grades 9th through 12th that adopt or choose not to adopt the use Interactive Whiteboards when they are available.</p> <p>The goal of the quantitative study is to determine if there is a relationship between behaviors and motivation to use interactive whiteboards as it relates to geographical area, education, age, and gender. The goal is to also determine if there is a relationship between adoption and integration of interactive whiteboards in course curriculum as it relates to education level and training. This study is important because it will give insight about professional deveelopment from the teachers perspective. The quantiitative study consists of an online questionnaire of 453 high school teachers in the state of Mississippi. There is minimum risk involved with this study. Participation is voluntary and can be stopped at any point without penalty or prejudice.</p> <p><b>The Qualitative Study</b>                  The purpose of the qualitative study is to offer an explanation of statistical results and provide an indept look at Digital Native and Digital Immigrant teachers levels of experience using technology. The goal is to determine if there is a relationship between teachers behaviors and motivation to use Interactive Whiteboards as it relates experience using new technology. This study is important because it will give insight about professional deveelopment from the teachers perspective.</p> <p>The qualitative study consists of interviewing 10 participants face to face. There is minimum risk involved with this interview. Researcher will schedule interviews at the convience of the participants. Researcher will keep the information received from the participant confidential. Participation is voluntary, the interview can be stopped at any point without penalty or prejudice, and if participants participate in in interviews they agree to</p>		

all of the terms and conditions set forth.

## 2. Description of Study:

[Describe the experimental procedure(s), including duration, amount of time required of the participants, number of participants, restrictions on normal activities, invasive techniques, etc.]

This is a mixed method study.

### The Quantitative Study (Phase I)

After receiving permission from IRB, the researcher will email High School Principals (see attached Standard Signature Consent Form) to receive permission to survey teachers. The email will clarify that all participants must teach 9th through 12th grade classes. The email will inform the school principals that they must sign and return the Standard Signed Consent form.

After receiving consent from High School Principals to survey 9th through 12th grade teachers at high schools in their districts, an email will be sent to participants. The email will include (see attached Participation Letter for Teachers). The online questionnaire is created by the use of Qualtrics. The online questionnaire link is included at the end of the email (see attached survey questions). When participants click the link to the online questionnaire, they agree to participate in the research study. Data collection will take place through an online questionnaire created by the researcher. When participants complete the online questionnaire it becomes part of the data base. The online questionnaire will take 30 minutes to complete. Participants have the option to leave the online questionnaire at any time by clicking the exit button on the Qualtrics website.

### The Qualitative Study (Phase II)

In Phase I of the study High School Principals signed a consent form giving permission for 9<sup>th</sup> through 12<sup>th</sup> grade teachers in their districts to participate in the research study. A participation letter will be emailed to 10 selected participants from Phase I that answered yes to the final research question that asked if they would like to continue to Phase II of the research study. The researcher will contact participants and setup times for interviews. Consent forms will be signed before interview begins. After consent forms are signed, all consent forms will be locked in researchers file cabinet at her residence. The researcher will explain to the participants the purpose of the research project, how the interview will be conducted emphasizing that participation is voluntary, interview can be stopped at any point without penalty or prejudice, and they agree to all terms and conditions involved with the study. The data collection process involves interviewing each participant face to face with a list of open-ended and discussion interview questions (see attached Interview Questions) developed by the researcher. There will be a total of one meeting with each participant between March and May, 2019. The interview will last for approximately 30 minutes. All interviews will be audio recorded and later transcribed. Participant can decide the time and location for the interview. The researcher will negotiate the interview location to ensure that the participants privacy and confidentiality are protected.

## 3. Benefits:

[Describe any benefits that may occur to the participant or to others as a result of participation in the study, including all benefits or payments. If the potential for medical injury exists, identify treatment procedures or the absence thereof.]

### The Quantitative and Qualitative Study

While participants will not receive direct benefits, it is hoped that this research will contribute to the literature and practice in the discipline. Participants that participate in this study will gain additional knowledge about technology. Participants will also provide information that will further the research of this study.

## 4. Risks:

[Describe any known physical, psychological, social, or financial research-related risks, inconveniences, or side effects (expected and potential) and indicate what measures will be taken to minimize them. If the potential for medical injury exists, identify treatment procedures or the absence thereof.]

The Quantitative Study

There are minimal risk involved with this study. The quantitative study is anonymous. There will be no identification of any types in research results. Any information pertaining to this project will not be disclosed to anyone outside of the project during the research period. Participation is voluntary, the online questionnaire can be stopped at any point without penalty or prejudice. All participants confidentiality will be protected. Participants have the option to leave the online questionnaire at any time by clicking the exit button on the Qualtrics website.

**The Qualitative Study**

There are minimal risk involved with this study. The qualitative study is not anonymous. There will be no identification of any types in research results. Any information pertaining to this project will not be disclosed to anyone outside of the project during the research period. Pseudonym will be used through the data collection process rather than real names in any written products resulting from this project. Names will not be disclosed at any time to individuals other than the researcher. I will schedule interviews at the convenience of the participants. I will keep the information I receive from the participant confidential. Participation is voluntary, the interview can be stopped at any point without penalty or prejudice, and if participants participate in interviews they agree to all of the terms and conditions set forth. All interviews will be scheduled based upon the convenience of participants. All participants confidentiality will be protected.

**5. Confidentiality:**

[Describe confidentiality procedures. Detail the extent, if any, to which confidentiality of records identifying the participant will be protected.]

**The Quantitative Study**

The online questionnaire will take 30 minutes. This is an anonymous study. Participation is voluntary, and can be stopped at any point without penalty or prejudice. All participants confidentiality will be protected. All online questionnaire data will be kept in a locked drawer at the researchers residents.

**The Qualitative Study**

All face to face interviews will be scheduled at the convenience of the participant. The interview will last for 30 minutes. The interview will be recorded. I will keep the information I receive from the respondent confidential. Participation is voluntary, and the interview can be stopped at any point without penalty or prejudice. All participants confidentiality will be protected. Pseudonyms, rather than real names, will be used in any written products resulting from this research study.

**6. Alternative Procedures:**

[Describe alternatives to participation that will be presented to participants in the study (generally another accepted course of therapy or diagnostic procedure, etc.).]

NA

**7. Participant's Assurance:**

This project has been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations.

Any questions or concerns about rights as a research participant should be directed to the Chair of the IRB at 601-266-5997. Participation in this project is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits.

Any questions about the research should be directed to the Principal Investigator using the contact information provided in Project Information Section above.

**CONSENT TO PARTICIPATE IN RESEARCH**

Participant's Name: \_\_\_\_\_

I hereby consent to participate in this research project. All research procedures and their purpose were explained to me, and I had the opportunity to ask questions about both the procedures and their purpose. I received information about all expected benefits, risks, inconveniences, or discomforts, and I had the opportunity to ask questions about them. I understand my participation in the project is completely voluntary and that I may withdraw from the project at any time without penalty, prejudice, or loss of benefits. I understand the extent to which my personal information will be kept confidential. As the research proceeds, I understand that any new information that emerges and that might be relevant to my willingness to continue my participation will be provided to me.

Questions concerning the research, at any time during or after the project, should be directed to the Principal Investigator with the contact information provided above. This project and this consent form have been reviewed by USM's Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5116, Hattiesburg, MS 39406-0001, 601-266-5997.

**Include the following information only if applicable. Otherwise delete this entire paragraph before submitting for IRB approval:** The University of Southern Mississippi has no mechanism to provide compensation for participants who may incur injuries as a result of participation in research projects. However, efforts will be made to make available the facilities and professional skills at the University. Participants may incur charges as a result of treatment related to research injuries. Information regarding treatment or the absence of treatment has been given above.

\_\_\_\_\_  
**Research Participant**

\_\_\_\_\_  
**Person Explaining the Study**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Date**

## APPENDIX B - Participation Request Letter for Superintendents

Sample: PARTICIPATION REQUEST LETTER

Tammy Oatis  
619 Georgia Street  
Gulfport, MS 39501  
228.861-2076  
[tammy.morgan@usm.edu](mailto:tammy.morgan@usm.edu)

Date

Superintendent  
School District  
Address  
City, State Zip Code

Dear Superintendent:

I am an Instructional Technology & Design doctoral candidate enrolled in the School of Interdisciplinary Studies and Professional Development at The University of Southern Mississippi. I am conducting a research study as part of the requirements of my Ph.D. degree in Instructional Technology and Design. I am currently working on my dissertation and would appreciate the participation of 9<sup>th</sup> through 12<sup>th</sup> grade teachers from your school district in my study. I am writing to ask for written permission to contact high school principal for permission to survey high school teachers in your district. My research is being supervised by my committee chair and advisor, Shuyan Wang, Ph.D.

The title of my study is **Digital Literacy Among Teachers: Identifying Digital Divide Among Interactive Whiteboard Users in Public High Schools**. The target population for this study is public High School teachers in Mississippi. Participation by teachers in this project is purely voluntary. If the teachers participate in phase 1 of this study, they will be asked to complete a 30-minute questionnaire. This questionnaire contains questions that will obtain demographic information from each participant as well as data regarding each participant's behaviors and technology experience, motivation and technology use, interactive whiteboard, and professional development and training. Eight teachers will be selected to participate in phase 2 the interview process of the study. The interview questions are designed to obtain additional information on each participant's level of experience using technology.



Please provide a letter on school district letterhead or send an email to me providing permission to contact high school principals in your district principals to obtain permission to survey high school teachers.' The letter may be sent to the address above. An email may be sent to [tammy.morgan@usm.edu](mailto:tammy.morgan@usm.edu). I attached an example of the return letter.

Sincerely,  
Tammy Oatis

## APPENDIX C - IRB Approval Letter

**Office of  
Research Integrity**



118 COLLEGE DRIVE #5125 • HATTIESBURG, MS | 601.266.6576 | USM.EDU/ORI

### NOTICE OF INSTITUTIONAL REVIEW BOARD ACTION

The project below has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services regulations (45 CFR Part 46), and University Policy to ensure:

- The risks to subjects are minimized and reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered involving risks to subjects must be reported immediately. Problems should be reported to ORI via the Incident template on Cayuse IRB.
- The period of approval is twelve months. An application for renewal must be submitted for projects exceeding twelve months.

PROTOCOL NUMBER: IRB-19-74

PROJECT TITLE: Oatis Dissertation

SCHOOL/PROGRAM: Curriculum and Instruction, School of IAPD

RESEARCHER(S): Tammy Oatis, Shuyan Wang

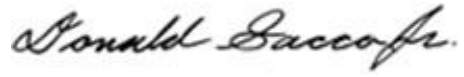
IRB COMMITTEE ACTION: Approved

CATEGORY: Expedited

6. Collection of data from voice, video, digital, or image recordings made for research purposes.

7. Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

PERIOD OF APPROVAL: March 19, 2019 to March 18, 2020

A handwritten signature in black ink that reads "Donald Sacco". The signature is written in a cursive style with a prominent initial "D".

**Donald Sacco, Ph.D.**  
**Institutional Review Board Chairperson**

## APPENDIX D - Permission Request Letter for Principals

Sample: PERMISSION REQUEST LETTER

Tammy Oatis  
619 Georgia Street  
Gulfport, MS 39501  
228.861-2076  
[tammy.morgan@usm.edu](mailto:tammy.morgan@usm.edu)

Date

Dear Principal:

I am an Instructional Technology & Design doctoral candidate enrolled in the School of Interdisciplinary Studies and Professional Development at The University of Southern Mississippi. I am conducting a research study as part of the requirements of my Ph.D. degree in Instructional Technology and Design. I am currently working on my dissertation and would appreciate the participation of 9<sup>th</sup> through 12<sup>th</sup> grade teachers from your high school in my study. I am writing to ask for written permission to contact 9<sup>th</sup> through 12<sup>th</sup> grade teachers at your high school. I have already obtained permission from your School District Superintendent to contact you for permission to survey your 9<sup>th</sup> through 12<sup>th</sup> grade teachers.' My research is being supervised by my committee chair and advisor, Shuyan Wang, Ph.D.

The title of my study is **Digital Literacy Among Teachers: Identifying Digital Divide Among Interactive Whiteboard Users in Public High Schools**. The target population for this study is public High School teachers in Mississippi. Participation by teachers in this project is purely voluntary. If the teachers participate in phase 1 of this study, they will be asked to complete a 30-minute online questionnaire. This online questionnaire contains questions that will obtain demographic information from each participant as well as data regarding each participant's behaviors and technology experience, motivation and technology use, interactive whiteboard, and professional development and training. Eight teachers will be selected to participate in phase 2, the interview process of the study. The interview questions are designed to obtain additional information on each participant's level of experience using technology.

I would like to request a copy of all 9<sup>th</sup> through 12<sup>th</sup> grade teachers email addresses. Please sign and email back the attached (Standard Signature Informed Consent Form).

The consent form may be sent to the address above or emailed to [tammy.morgan@usm.edu](mailto:tammy.morgan@usm.edu). You must sign and return the attached consent form before I can contact the teachers.

Sincerely,

Tammy Oatis

## APPENDIX E - Invitation Letter for Teachers

Sample:

Participation Invitation Letter for Teachers

Title: Digital Literacy Among Teachers: Identifying Digital Divide Among Interactive Whiteboard Users in Public High Schools.

Dear High School Teachers,

My name is Tammy Oatis and I am a doctoral candidate in the School of Interdisciplinary Studies and Professional Development at The University of Southern Mississippi. I am conducting a research study as part of the requirements of my Ph.D. degree in Instructional Technology and Design. I would like to invite you to participate my study. Your participation is highly appreciated.

This is a mixed method study. Phase I of the study examines teachers roles of digital literacy in high schools in order to identify digital divides among Digital Immigrant and Digital Native teachers' who teach grades 9th through 12th that adopt or choose not to adopt the use interactive whiteboards when they are available. Phase I of the study is an online questionnaire that will take less than 30 minutes to complete. Phase II of the study focuses on Digital Native and Digital Immigrant teacher's levels of experience using technology. Phase II of the study are interviews. If you do not feel comfortable answering some of the question, you can stop at anytime.

Participation is confidential. Results of the study may be published or presented at professional journals and conferences. However, all sensitive information such as school names, school locations, and ages will be substituted with pseudonyms in the study. It means no one will know your participation.

I am happy to answer all questions you have about the study. I can be reached at [tammy.morgan@usm.edu](mailto:tammy.morgan@usm.edu) or 228-861-2076. If you have questions about your research participant rights, you can contact the Chair of the Institutional Review Board at The University of Southern Mississippi at (601) 266-6820.

Thank you for your consideration. By clicking the survey link below, you confirm that you have read this letter and agree to participate in this study.

Sincerely,

Tammy Oatis

School of Interdisciplinary Studies and Professional Development

The University of Southern Mississippi  
730 E. Beach Boulevard  
Long Beach, MS, 39560

[https://usmuw.col.qualtrics.com/jfe/form/SV\\_7WCQW4ttMzhV8Ox](https://usmuw.col.qualtrics.com/jfe/form/SV_7WCQW4ttMzhV8Ox)

## APPENDIX F – Digital Literacy Among Teachers Survey Instrument

Directions: The following questionnaire is divided into five parts. The first part contains questions about demographics, the second part contains questions about technology experience, the third part contains questions about technology use, the fourth part contains questions about interactive whiteboards, and the fifth part contains questions about professional development and training.

### Part I: Demographics

1. What is your gender?  
 Male  
 Female
2. What age group do you belong:  
 20 to 29  
 30 to 39  
 40 to 49  
 50 to 59  
 60 and above
3. What is the name of the school that you employed?
4. What grade or grades do you teach? (Check all that apply)  
9, 10, 11, 12<sup>th</sup>
5. What subject(s) do you teach?
6. How long have you been teaching?
  - a. 2 years or less
  - b. 3-5 years
  - c. 6-10 years
  - d. 11-15 years
  - e. 17 – 20 years
  - f. 21 years or more
7. What is your highest degree earned?  
Bachelors  
Masters  
Specialists  
Doctorate
8. Do you plan to further your education?  
 Yes



\_\_\_\_\_ No

9. Are there equal opportunities for both male and female teachers where you work?

\_\_\_\_\_ Yes

\_\_\_\_\_ No. If No why?

## **Part II: Behaviors and Technology Experience**

10. I use Information Communication Technology (ICT) while teaching.

\_\_\_\_\_ Strongly Agree

\_\_\_\_\_ Agree

\_\_\_\_\_ Neither Agree nor Disagree

\_\_\_\_\_ Disagree

\_\_\_\_\_ Strongly Disagree

11. My IT department available for troubleshooting on technical issues.

\_\_\_\_\_ Strongly Agree

\_\_\_\_\_ Agree

\_\_\_\_\_ Neither Agree nor Disagree

\_\_\_\_\_ Disagree

\_\_\_\_\_ Strongly Disagree

12. I have Internet access.

\_\_\_\_\_ Strongly Agree

\_\_\_\_\_ Agree

\_\_\_\_\_ Neither Agree nor Disagree

\_\_\_\_\_ Disagree

\_\_\_\_\_ Strongly Disagree

13. I have Internet access in my classroom.

\_\_\_\_\_ Strongly Agree

\_\_\_\_\_ Agree

\_\_\_\_\_ Neither Agree nor Disagree

\_\_\_\_\_ Disagree

\_\_\_\_\_ Strongly Disagree

14. I like to use new technology.

\_\_\_\_\_ Strongly Agree

\_\_\_\_\_ Agree

\_\_\_\_\_ Neither Agree nor Disagree

\_\_\_\_\_ Disagree

\_\_\_\_\_ Strongly Disagree

15. I have adequate equipment in my classroom?

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

16. The lack of hardware (computers, interactive whiteboards, etc.) hinders or stops technology use in my classroom?

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

17. I experience stress when using new technology.

- Daily
- Weekly
- Monthly
- Yearly
- Never

18. I experience stress while integrating new technology.

- Daily
- Weekly
- Monthly
- Yearly
- Never

### **Part III: Motivation and Technology use**

19. How frequently does your school district require technology use in the classroom?

- Daily
- Weekly
- Monthly
- Yearly
- No requirement

20. How frequently do you motivate colleagues to use technology?

- Do not discuss technology
- Rarely
- Occasionally
- Frequently

\_\_\_\_\_Always

21. How frequently do you use technology?

I use the following technology for Delivery of Instruction:	Do Not Use	Rarely	Occasionally	Frequently	Always
Computers					
Interactive Whiteboard					
LCD Projector					
Other					

22. How frequently do you use technology for student use?

I use technology for Student Use:	Do Not Use	Rarely	Occasionally	Frequently	Always
Computers					
Interactive Whiteboard					
Interactive Whiteboard Response					
LCD Projector					
Other					

23. How frequently do you use each of the following Information Communication Technology?

How do I use each of the following?	Do Not Use	Delivery of Instruction	Student Use	Assessment
Internet Sites				
Wiki/Blog				

Educational Websites				
Social Networking				
Video Sites				
Other				

24. How were you motivated to use technology?

The following has had an influence on my use of technology in the classroom:	Do Not Use	No Motivation	Some Motivation	Great Motivation
Mentor Teachers				
Professional Development				
Teacher preparation program				
Colleagues				
Administrators				
Family members				
Friends				
Self				
Other				

#### Part IV: Interactive Whiteboards

25. Please choose the response that best describes how you feel when using interactive whiteboards.

- a. Very comfortable
- b. Somewhat comfortable
- c. Comfortable
- d. Uncomfortable
- e. Very uncomfortable

26. I enjoy using interactive whiteboards while teaching.

- \_\_\_\_\_ Strongly Agree  
 \_\_\_\_\_ Agree

- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

27. I have confidence when using interactive whiteboards while teaching?

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

28. I have problems using interactive whiteboards when assistance is available?

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

29. How much training have you received to use interactive whiteboard?

- No training
- Less than ½ day
- ½ day
- 1 day
- 2 days
- 3 or more days

30. How engaged are your student when using interactive whiteboards?

- Very engaged
- Somewhat engaged
- Engaged
- Unengaged
- Very unengaged

31. How frequently do you use interactive whiteboards?

I use Interactive Whiteboards:	Times Per Day	Times Per Week	Times Per Month	Times Per Year
Delivery of Instruction				
Student Use				

Assessment of Student Learning				
Other				

**Part V: Professional Development and Training**

32. I am required to attend professional development.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

33. I frequently receive training to use new technology.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

34. The lack of training hinders or stops the use of interactive whiteboards in the classroom.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

35. How frequently do the training or professional development you receive focus on using interactive whiteboards?

- Never
- Rarely
- Occasionally
- Frequently
- Always

36. Is there a difference in the training male and female teachers receive?

\_\_\_\_\_ Yes, If yes explain

\_\_\_\_\_ No

37. How is professional development offered at your school? Check all that apply

\_\_\_\_\_ Onsite

\_\_\_\_\_ Offsite

\_\_\_\_\_ Webinar

\_\_\_\_\_ Not offered

38. Would you like to participate in the second phase of the research study?

\_\_\_\_\_ Yes if yes please fill out the contact information below.

\_\_\_\_\_ No

Name \_\_\_\_\_

Email \_\_\_\_\_

Telephone number \_\_\_\_\_

School \_\_\_\_\_

APPENDIX G – Interview Questions

Name \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_

School: \_\_\_\_\_ Content Area: \_\_\_\_\_

1. What age group do you belong:

\_\_\_\_\_ 20 to 29

\_\_\_\_\_ 30 to 39

\_\_\_\_\_ 40 to 49

\_\_\_\_\_ 50 to 59

\_\_\_\_\_ 60 and above

2. What is your gender?

\_\_\_\_\_ Male

\_\_\_\_\_ Female

3. What grade or grades do you teach? (Check all that apply)

\_\_\_\_\_ 9

\_\_\_\_\_ 10

\_\_\_\_\_ 11

\_\_\_\_\_ 12

4. How long have you been teaching?

\_\_\_\_\_ 2 years or less

\_\_\_\_\_ 3-5 years

\_\_\_\_\_ 6-10 years

\_\_\_\_\_ 11-15 years

\_\_\_\_\_ 16-20 years

\_\_\_\_\_ 21 years or more

5. What type of degree do you have?

\_\_\_\_\_ Bachelors

\_\_\_\_\_ Masters

\_\_\_\_\_ Specialist

\_\_\_\_\_ Doctorate

6. What type of technology college courses have you taken?

7. What type of incentives does your school district offer for continuing education?

8. When did you get your first computer? First email account? First social networking account?



9. What role does the teacher play in selecting new technology?
10. What are some of the technology discussion topics/reasons for discussion among teachers?'
11. Do you have interactive whiteboards in your school/classroom?
12. What hinders you from using interactive whiteboards?
13. What type of issues do you experience when using interactive whiteboards?
14. When you experience technology problems using interactive whiteboards what do you do?
15. What role did/does mentor teacher have in the use of interactive whiteboards?
16. How has your teaching style changed because of using interactive whiteboards?
17. What or who has been most influential on using/not using technology? Why?
18. What type of technology tools do you use when teaching?
19. What other experiences with technology did you have prior to teaching?
20. What and who motivates you to use technology?
21. Do the principal at your school motivate teachers to use technology?
22. What has been your least successful experience using technology for teaching?  
Why?
23. What has been your most successful experience using technology for teaching?  
Why?

## REFERENCES

- Abu-Shanab, E., & Al-Jamal, N. (2015). Exploring the gender digital divide in Jordan. *Gender, Technology and Development, 19*(1), 91-113.
- Agbo, I. S. (2015). Factors influencing the use of Information and Communication Technology (ICT) in teaching and learning computer studies in Ohaukwu local government area of Ebonyi State-Nigeria. *Journal of Education and Practice, 6*(7), 71-86.
- Ajzen, I. (1971). The relationship of attitudes and normative beliefs to cheating in college, *the Journal of Social Psychology, 83*, pp. 199-207
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp.11-39). Springer Berlin Heidelberg.
- Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes, 50*, 179-211.
- Akbaba, S., & Kurubacak, G. (1999). Teachers' attitudes towards technology. *Computers in the Social Studies, 7*(2), 833-836.
- Akcay, A.O., Arslan, H., Guven, U. (2015). Teachers' attitudes toward using interactive whiteboards. *Middle Eastern & African Journal of Educational Research, 17*, pp. 22-30.
- Akçayr, M., DüNDAR, H., & Akçayr, G. (2016). What makes you a digital native? Is it enough to be born after 1980?. *Computers in Human Behavior, 60*, 435-440.
- Al-Faki, I.M.; Khamis, A.H.A. (2014). Difficulties facing teachers in using interactive whiteboards in their classes, *American International Journal of Social Science, Vol 3*(2), pp. 136-158

- Ardies, J., De Maeyer, S., Gijbels, D., & van Keulen, H. (2015). Students attitudes towards technology. *International Journal of Technology and Design Education*, 25(1), 43-65.
- Balta, N.; Duran, M. (2015). Attitudes of students and teachers towards the use of interactive whiteboards in elementary and secondary school classroom. *The Turkish Online Journal of Educational Technology*, 14(2), pp. 15-21
- Blackwell, C. K., Lauricella, A. R., & Wartella, E. (2014). Factors influencing digital technology use in early childhood education. *Computers & Education*, 77, 82-90.
- Brown, C., & Czerniewicz, L. (2010). Debunking the ‘digital native’: Beyond digital apartheid, towards digital democracy. *Journal of Computer Assisted Learning*, 26(5), 357-369.
- Bullen, M., & Morgan, T. (2016). Digital learners not digital natives. *La Cuestión Universitaria*, (7), 60-68.
- Butler, D. L., & Sellbom, M. (2002). Barriers to adopting technology. *Educause Quarterly*, 2, 22-28.
- Campos-Castillo, C. (2015). Revisiting the first-level digital divide in the United States: Gender and race/ethnicity patterns, 2007–2012. *Social Science Computer Review*, 33(4), 423-439.
- Coelho, T. R., & Segatto, A. P. (2013). Contribution of ICT (Information and Communication Technology) for development: a case study in Brazil. In *Proceedings of International Conference on Information Resources Management*.
- Cohen, L. and Manion, L. (1986) *Research Methods in Education*. London: Croom Helm.
- Coklar, A. N., Efiltili, E., Şahin, Y. L., & Akçay, A. (2016). Determining the reasons of

- technostress experienced by teachers: A qualitative study. *Turkish Online Journal of Qualitative Inquiry*, 7(2), 71-96.
- Copriady, J. (2014). Self-motivation as a mediator for teachers readiness in applying ICT in teaching and learning. *TOJET: The Turkish Online Journal of Educational Technology*, 13(4).
- Cranton, P. (2016). Continuing professional education for teachers and university and college faculty. *New Directions for Adult and Continuing Education*, 2016(151), 43-52.
- Damodaran, L., & Sandhu, J. (2016). The role of a social context for ICT learning and support in reducing digital inequalities for older ICT users. *International Journal of Learning Technology*, 11(2), 156-175.
- Deci, E. L., & Ryan, R. M. (1985). Cognitive evaluation theory. In *Intrinsic motivation and self-determination in human behavior* (pp. 43-85). Springer US.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational psychologist*, 26(3-4), 325-346.
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, 49(3), 182.
- Dostal, J. (2011). Reflections on the use of interactive whiteboards in instruction in international context. *The New Educational Review*, 25(3) p. 205-220. Retrieved from [https://www.researchgate.net/profile/Jiri\\_Dostal5/publication/278406421\\_Reflecti](https://www.researchgate.net/profile/Jiri_Dostal5/publication/278406421_Reflecti)

[Reflections on the Use of Interactive Whiteboards in Instruction in International Context](https://www.researchgate.net/publication/311111111/links/55804c4d08ae607ddc322125/Reflections-on-the-Use-of-Interactive-Whiteboards-in-Instruction-in-International-Context.pdf)  
[ontext/links/55804c4d08ae607ddc322125/Reflections-on-the-Use-of-Interactive-Whiteboards-in-Instruction-in-International-Context.pdf](https://www.researchgate.net/publication/311111111/links/55804c4d08ae607ddc322125/Reflections-on-the-Use-of-Interactive-Whiteboards-in-Instruction-in-International-Context.pdf)

Dror, I. E. (2008). Technology enhanced learning: The good, the bad, and the ugly.

*Pragmatics & Cognition*, 16(2), 215-223.

Ertmer, P.A. (1999). Addressing first and second order barriers to change: Strategies for

technology integration. *Educational Technology Research and Development*,

47(4), 47-61.

Farid, S., Ahmad, R., Niaz, I. A., Arif, M., Shamshirband, S., & Khattak, M. D. (2015).

Identification and prioritization of critical issues for the promotion of e-learning

in Pakistan. *Computers in Human Behavior*, 51, 161-171.

Figueiredo, M. C., Rocha, Z. D. F. D. C., & Dutra, A. (2016). CTSA approach in

education: opportunities and challenges in continuing education teachers.'

*HOLOS*, 2, 373-388.

Filippou, J., Cheong, C., & Cheong, F. (2016). Modelling the impact of study behaviours

On academic performance to inform the design of a persuasive system.

*Information & Management*, 53(7), 892-903.

Flanagan, S., Shoffner, M. (2013). Teaching without technology: Secondary English

teachers and classroom technology use, *Contemporary Issues in Technology and*

*Teacher Education*, 13(3), pp. 242-261.

Fuglseth, A. M., & Sjørebø, Ø. (2014). The effects of technostress within the context of

employee use of ICT. *Computers in Human Behavior*, 40, 161-170.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation.

*Journal of Organizational behavior*, 26(4), 331-362.

- Gashan, AlK., Yousif, A.A. (2015) Teachers attitudes toward using interactive whiteboards in English language classrooms, *International Education Studies*, Vol 8(2), pp. 176-184.
- Geldenhuys, J. L., & Oosthuizen, L. C. (2015). Challenges influencing teachers involvement in continuous professional development: A South African perspective. *Teaching and teacher education*, 51, 203-212.
- Ghobadi, S., & Ghobadi, Z. (2015). How access gaps interact and shape digital divide: a cognitive investigation. *Behavior & Information Technology*, 34(4), 330-340.  
doi:10.1080/0144929X.2013.833650
- Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441-449.
- Hamari, J., & Nousiainen, T. (2015, January). Why do teachers use game-based learning technologies? The role of individual and institutional ICT readiness. In *System Sciences (HICSS), 2015 48th Hawaii International Conference on* (pp. 682-691). IEEE.
- Harbour, K. E., Evanovich, L. L., Sweigart, C. A., & Hughes, L. E. (2015). A brief review of effective teaching practices that maximize student engagement. *Preventing School Failure: Alternative Education for Children and Youth*, 59(1), 5-13.
- Hargittai, E., & Hinnant, A. (2008). Digital inequality differences in young adults' use of

- the Internet. *Communication Research*, 35(5), 602-621.
- Hennessy, S., Haßler, B., & Hofmann, R. (2015). Challenges and opportunities for teacher professional development in interactive use of technology in African schools. *Technology, Pedagogy and Education*, 24(5), 1-28.
- Hinostroza, J. E., Ibieta, A.I., Claro, M., Labbe, C. (2016). Characterization of teachers use of computers and Internet inside and outside the classroom: The need to focus on the quality, *Education and Information Technologies*. 21(6) pp 1595-1610  
Retrieved from <https://doi-org.lynx.lib.usm.edu/10.1007/s10639-015-9404-6>
- Hohlfeld, T. N., Ritzhaupt, A. D., Barron, A. E., & Kemker, K. (2008). Examining the digital divide in K-12 public schools: Four-year trends for supporting ICT literacy in Florida. *Computers & Education*, 51(4), 1648-1663.
- Horrigan, J.B. (2016). Digital readiness gaps, *Pew Research Center*. Retrieved from [http://www.pewinternet.org/files/2016/09/PI\\_2016.09.20\\_Digital-Readiness-Gaps\\_FINAL.pdf](http://www.pewinternet.org/files/2016/09/PI_2016.09.20_Digital-Readiness-Gaps_FINAL.pdf)
- Howard, S. K., Ma, J., & Yang, J. (2016). Student rules: Exploring patterns of students' computer-efficacy and engagement with digital technologies in learning. *Computers & Education*, 101, 29-42.
- Hüsing, T., & Selhofer, H. (2002). The digital divide index-A measure of social inequalities in the adoption of ICT. *ECIS 2002 Proceedings*, 35.
- Instedford, B. (2015). Appropriation of digital competence in teacher education, *Nordic Journal of Digital Literacy*, p. 155-171.
- Jackson, L. A., Zhao, Y., Kolenic III, A., Fitzgerald, H. E., Harold, R., & Von Eye, A.

- (2008). Race, gender, and information technology use: The new digital divide. *Cyber Psychology & Behavior*, 11(4), 437-442.
- Jelyani, S.J., Janfaza, A., Soori, A. (2014). Integration of smartboards in EFL classrooms, *International Journal of Education & Literacy Studies*, Vol 2(2), pp. 20-23.
- John, S. P. (2015). The integration of information technology in higher education: A study of faculty's attitude towards IT adoption in the teaching process. *Contaduría Administración*, 60, 230-252.
- Joo, Y. J., Lim, K. Y., & Kim, N. H. (2016). The effects of secondary teachers technostress on the intention to use technology in South Korea. *Computers & Education*, 95, 114-122.
- Judge, S., Puckett, K., & Bell, S. M. (2006). Closing the digital divide: Update from the early childhood longitudinal study. *The Journal of Educational Research*, 100(1), 52-60.
- Junco, R., Merson, D., & Salter, D. W. (2010). The effect of gender, ethnicity, and income on college students' use of communication technologies. *Cyberpsychology, Behavior, and Social Networking*, 13(6), 619-627.
- Kay, D., (2016) Statewide Educational Technology Guide, *Mississippi Department of Education*, 1-41
- Kim, C., Kim, M.K., Lee, C., Spector, J.M., DeMeester, K. (2013). Teacher beliefs and technology integration, *Teaching and Teacher Education*, 29, pp. 76-85.
- Kopcha, T.J. (2012). Teachers perceptions of the barriers to technology integration and practices with technology under situated professional development, *Computers & Education*, 59, pp. 1109-1121.



- Korkmaz, D., Cakil, I. (2013). Teachers difficulties about using smart boards, *Social and Behavioral Science*, 83, pp. 595-599.
- Kurt, A.A., Gunuc, S., Ersoy, M. (2013) The current state of digitalization: Digital Native, Digital Immigrant and Digital Settler. *Journal of Faculty of Educational Sciences*, 46(1), 1-22
- Kvasny, L. (2006). Cultural (re) production of digital inequality in a US community technology initiative. *Information, Communication & Society*, 9(02), 160-181.
- Kwan, Y. W., & Wong, A. F. (2015). Effects of the constructivist learning environment on students' critical thinking ability: Cognitive and motivational variables as mediators. *International Journal of Educational Research*, 70, 68-79.
- LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., & Carpenter, S. (2007). Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy*, 31(6), 359-373.
- Lau, W. W., & Yuen, A. H. (2015). Factorial invariance across gender of a perceived ICT literacy scale. *Learning and Individual Differences*, 41, 79-85.
- Lee, Y., Lee, J., & Hwang, Y. (2015). Relating motivation to information and communication technology acceptance: Self-determination theory perspective. *Computers in Human Behavior*, 51, 418-428.
- León, J., Núñez, J. L., & Liew, J. (2015). Self-determination and STEM education: Effects of autonomy, motivation, and self-regulated learning on high school math achievement. *Learning and Individual Differences*, 43, 156-163.
- Li, M., Wang, Z., You, X., & Gao, J. (2015). Value congruence and teachers work

engagement: The mediating role of autonomous and controlled motivation.  
*Personality and Individual Differences*, 80, 113-118.

Linnemanstons, K. A., & Jordan, C. M. (2017). Learning through place: Evaluation of a professional development program for understanding the impact of place-based education and teacher continuing education needs. *Journal of Sustainability Education*, 12.

Martin, A., Madigan, D. (2006). *Digital Literacies for Learning*, Facet Publishing, London, England

Mason, S. M., & Hacker, K. L. (2003). Applying communication theory to digital divide research. *It & Society*, 1(5), 40-55.

Meneses, J., Momino, J.M. (2010). Putting digital literacy in practice: How schools contribute to digital inclusion in the network society. *The Information Society*. 26, 197-208.

Mirzajani, H., Mahmud, R., Fauzi Mohd Ayub, A., & Wong, S. L. (2016). Teachers acceptance of ICT and its integration in the classroom. *Quality Assurance in Education*, 24(1), 26-40.

Mo, D., Swinnen, J., Zhang, L., Yi, H., Qu, Q., Boswell, M., & Rozelle, S. (2013). Can one-to-one computing narrow the digital divide and the educational gap in China? The case of Beijing migrant schools. *World development*, 46, 14-29.

Mominó, J. M., & Meneses, J. (2007). Digital inequalities in children and young people: A technological matter?. In *New Millennium Learners Conference, Florence*.

Morris, J., Marzano, M., Dandy, N., & O'Brien, L. (2012). Theories and models of behavior and behaviour change. *Forest Research: Surrey, United Kingdom*.

- Morris, M.G.; Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force, *Personnel Psychology*, 53
- Nikolopoulou, K., Gialamas, V. (2016). Barriers to ICT use in high schools: Greek teachers perceptions. *Springer*, 3(1) 59-75
- Ninlawan, G. (2015). Factors Which Affect Teachers Professional Development in Teaching Innovation and Educational Technology in the 21st Century under the Bureau of Special Education, Office of the Basic Education Commission. *Procedia-Social and Behavioral Sciences*, 197, 1732-1735.
- Noor-Ul-Amin, S. (2013). An effective use of ICT for education and learning by drawing on worldwide knowledge, research, and experience: ICT as a change agent for education. *Scholarly Journal of Education*, 2(4), 38-45.
- Osborne, J. H., & Morgan, H. (2016). Focus on Technology: Alleviating the digital divide in the United States: Hani Morgan, Editor. *Childhood Education*, 92(3), 254-256.
- Pearce, K.E., & Rice, R.E. (2013). Digital divides from access to activities: Comparing mobile and personal computer Internet users. *Journal of Communication*. 63(4). 721-744.
- Petko, D., Egger, N., Cantieni, A., & Wespi, B. (2015). Digital media adoption in schools: Bottom-up, top-down, complementary or optional?, *Computers & Education*, 84, 49-61.
- Pittman, T., Gaines, T. (2015) Technology integration in third, fourth and fifth grade classrooms in a Florida School district. *Education Tech Research Dev*, 63 539–554

- Prensky, M. (2001) Digital native, digital immigrant, *On the Horizon*, 9(5), 1-6 Retrieved from  
<http://www.marcprensky.com/writing/Prensky%20%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf>
- Radovanovic, D., Hogan,B., Lalic, D. (2015) Overcoming digital divides in higher education: Digital literacy beyond Facebook, *New Media Society*, 17(10) pp 1733-1749 Retrieved from  
<http://journals.sagepub.com.lynx.lib.usm.edu/doi/full/10.1177/1461444815588323>
- Rana, N. (2016). A study to assess teacher educators' attitudes towards technology integration in classrooms. *MIER Journal of Educational Studies, Trends and Practices*, 2(2).
- Reich, J., Murnane, R., & Willett, J. (2012). The state of wiki usage in us k–12 schools leveraging web 2.0 data warehouses to assess quality and equity in online learning environments. *Educational Researcher*, 41(1), 7-15.
- Reisdorf, B. C., & Groselj, D. (2015). Internet (non-) use types and motivational access: Implications for digital inequalities research. *new media & society*, 1461444815621539.
- Reynolds, R., & Chiu, M. M. (2015). Reducing digital divide effects through student engagement in coordinated game design, online resource use, and social computing activities in school. *Journal of the Association for Information Science and Technology*.
- Richter, G., Raban, D. R., & Rafaeli, S. (2015). Studying gamification: the effect of

- rewards and incentives on motivation. In *Gamification in education and business* (pp. 21-46). Springer International Publishing.
- Rogers, E. (1995). *Diffusion of innovation* (4<sup>th</sup> ed.) New York: Free Press.
- Rogers, E. M. (2002). Diffusion of preventive innovations, *Addictive Behaviors*, 27, pp. 989-993.
- Rogers, E. (2003). *Diffusion of innovation* (5<sup>th</sup> ed.) New York: Free Press.
- Rohatgi, A., Scherer, R., & Hatlevik, O. E. (2016). The role of ICT self-efficacy for students' ICT use and their achievement in a computer and information literacy test. *Computers & Education*, 102, 103-116.
- Saadé, R., & Bahli, B. (2005). The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: an extension of the technology acceptance model. *Information & management*, 42(2), 317-327.
- Saha, R., Zaman, S. (2017) Gender Digital Divide in Higher Education: A Study on University of Barisal, Bangladesh, *IOSR Journal of Humanities and Social Science*, 22(1) pp 11-17 Retrieved from [https://www.researchgate.net/publication/313331196\\_Gender\\_Digital\\_Divide\\_in\\_Higher\\_Education\\_A\\_Study\\_on\\_University\\_of\\_Barisal\\_Bangladesh](https://www.researchgate.net/publication/313331196_Gender_Digital_Divide_in_Higher_Education_A_Study_on_University_of_Barisal_Bangladesh)
- Sahin, I. (2006) Detailed review of Rogers' diffusion of innovation theory and educational technology-related studies based on Rogers' theory. *The Turkish Online Journal of Educational Technology*, p 14-23.
- Salemink, K., Strijker, D., & Bosworth, G. (2015). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*.

- Scherer, R., & Siddiq, F. (2015). Revisiting teachers computer self-efficacy: A differentiated view on gender differences. *Computers in Human Behavior*, 53, 48-57.
- Selwyn, N. (2002). *Defining the 'digital divide': Developing a theoretical understanding of inequalities in the information age*. School of Social Sciences, Cardiff University.
- Senkbeil, M., & Ihme, J. M. (2017). Motivational factors predicting ICT literacy: First evidence on the structure of an ICT motivation inventory. *Computers & Education*, 108, 145-158.
- Shank, D. B., & Cotten, S. R. (2014). Does technology empower urban youth? The Relationship of technology use to self-efficacy. *Computers & Education*, 70, 184-193.
- Sharma, R., Fantin, A. R., Prabhu, N., Guan, C., & Dattakumar, A. (2016). Digital literacy and knowledge societies: A grounded theory investigation of sustainable development. *Telecommunications Policy*, 40(7), 628-643.
- Shelley II, M. C., Thrane, L. E., & Shulman, S. W. (2006). Lost in cyberspace: Barriers to bridging the digital divide in e-politics. *International Journal of Internet and Enterprise Management*, 4(3), 228-243.
- Smith, H.J., Higgins, S., Wall, K., Miller, J. (2005). Interactive whiteboards: Boon or ban wagon? A critical review of the literature, *Journal of Computer Assisted Learning*, 21, pp. 91-101.

- Skryabin, M.; Zhang, J., Luman, L., Zhang, D. (2015) How the ICT development level and usage influence student achievement in reading, mathematics, and science, *Computers & Education*, 85, pp. 49-58.
- Soomro, K., Kale, U., Curtis, R., & Akcaoglu, M. (2017) "Development of an instrument to measure Faculty's information and communication technology access (FICTA)." *Education and Information Technologies*, 23(1), pp. 253-269.
- Stiakakis, E., Kariotellis, P., & Vlachopoulou, M. (2009, September). From the digital divide to digital inequality: A secondary research in the European Union. In *International Conference on e-Democracy* (pp. 43-54). Springer Berlin Heidelberg.
- Sumak, B., Sorgo, A. (2016) The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre- and post- adopters. *Computers in Human Behavior*, 64, pp. 602-620.
- Teck, W. (2013). Affordances of interactive whiteboards and associated pedagogical practices: Perspectives of Teachers of science with children aged five to six years. *Turkish online Journal of Educational Technology- TOJET*, 12(1), 1-8.
- Teo, T., Fan, X., & Du, J. (2015). Technology acceptance among pre-service teachers: Does gender matter?. *Australasian Journal of Educational Technology*, 31(3).
- Thomas, L. G., Knezek, D.G. (2008) Information, communication, and educational technology standards for students, teachers, and school leaders. *International Handbook of Information Technology in Primary and Secondary Education*. Pp. 333-348.
- Toledo, C. (2007). Digital culture: Immigrants and tourist responding to the natives

drumbeat. *International Journal of Teaching and Learning in Higher Education*, 19(1), 84-92.

Tondeur, J., Brank, J., Ertmer, P., and Ottenbreit-Leftwich, A. (2016) Understanding the relationship between teachers pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. *Education Tech Research Dev*,

*Retrieved from*

<http://web.a.ebscohost.com.lynx.lib.usm.edu/ehost/pdfviewer/pdfviewer?vid=0&sid=73722520-2f85-435e-b884-8dd04fc84641%40sessionmgr4008>

Turner, P., Turner, S. and McGregor, I. (2007) Listening, Corporeality and Presence, 10<sup>th</sup> Internation Workshop on Presence, Barcelona, 43-50.

Uluyol, Ç., & Şahin, S. (2016). Elementary school teachers ICT use in the classroom and their motivators for using ICT. *British Journal of Educational Technology*, 47(1), 65-75.

Valadez, J. R., & Duran, R. (2007). Redefining the digital divide: Beyond access to Computers and the Internet. *The High School Journal*, 90(3), 31-44.

Van Deursen, A. J., van Dijk, J. A., & Peter, M. (2015). Increasing inequalities in what we do online: A longitudinal cross-sectional analysis of Internet activities among the Dutch population (2010 to 2013) over gender, age, education, and income. *Telematics and informatics*, 32(2), 259-272.

Van Deursen, A., & Van Dijk, J. (2010). Internet skills and the digital divide. *New Media & Society*, 13(6), 893-911.

Van Deursen, A. J., van Dijk, J. A., & Peters, O. (2011). Rethinking Internet skills: The



- contribution of gender, age, education, Internet experience, and hours online to medium-and content-related Internet skills. *Poetics*, 39(2), 125-144.
- Van Deursen, A. J., & van Dijk, J. A. (2015). Toward a multifaceted model of internet access for understanding digital divides: an empirical investigation. *The Information Society*, 31(5), 379-391.
- Van Dijk, J. A. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4-5), 221-235.
- Vekiri, I., & Chronaki, A. (2008). Gender issues in technology use: Perceived social support, computer self-efficacy and value beliefs, and computer use beyond school. *Computers & education*, 51(3), 1392-1404.
- Venkatesh, V., Morris, M., Ackerman, P. (2000) A longitudinal field investigation of gender difference in individual technology adoption decision-making processes. *Organizational Behavior and Human Decision Processes*. Vol. 83, No 1, pp 33-60.
- Wei, L. (2012). Number matters: The multimodality of Internet use as an indicator of the digital inequalities. *Journal of Computer-Mediated Communication*, 17(3), 303-318.
- Wong, K.T., Teo, T., Russo, S. (2013). Interactive whiteboard acceptance: Applicability of the UTAUT model to student teachers,' *Asia Pacific Education Researcher*, 22, pp. 1-10.
- Wright, C.M., Porter, J.Q. (2016). Office of Technology and Strategic Services Statewide Educational Technology Guide, pp. 1-30.

Retrieved from: <https://www.mdek12.org/sites/default/files/documents/statewide-educational-technology-guide-8-25.pdf>

Yong, S.T., Gates, P. (2014). Born Digital: Are they really digital natives? *International Journal of e-Education, e-Business, e-Management and e-Learning*, Vol. 4, No.2. pp. 100-105

Yu, T. K., Lin, M. L., & Liao, Y. K. (2017). Understanding factors influencing information communication technology adoption behavior: The moderators of information literacy and digital skills. *Computers in Human Behavior*, 71, 196-208.

Zillien, N., & Hargittai, E. (2009). Digital distinction: Status-specific types of Internet usage. *Social Science Quarterly*, 90(2), 274-291.