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The Adoption and Use of Technology by Teachers in the United Arab Emirates

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Walden University
2020

Abstract

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by

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MBA, Educational Management, 2008

BA, Education and Professional Development, 2008

Dissertation Submitted in Partial Fulfillment

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Abstract

Although technology integration in the classroom improves educational outcomes, cultural influences explaining varying integration of teacher technology adoption and use in the United Arab Emirates (UAE) had not been explored. This explanatory sequential mixed-methods study explored the influence of culture on perceptions of, use of, and factors influencing the decision to adopt technology among native Arab-speaking (NAS) and native English-speaking (NES) teachers (Phase 1) at a boys' secondary school in the UAE and how teachers who exhibit differing levels of adoption make decisions about and use technology in the classroom (Phase 2). The technology adoption model was used as the framework to examine factors influencing acceptance and use of technology. The quantitative Phase 1 surveyed all 75 teachers at the school (52 responded), and the qualitative Phase 2 participants included 4 teachers, 2 NAS and 2 NES. Data were collected using an online survey (Phase 1) and through observations and interviews (Phase 2). Survey data were analyzed descriptively and using 2-tailed *t* tests; qualitative data were analyzed through coding, categorizing, and theme development. Phase 1 results showed no statistically significant differences in intent to use technology or ease of use. However, NAS teachers ($M = 4.52$) rated the usefulness of technology significantly higher than NES teachers ($M = 4.14$), $t\,(51) = 2.26$, $p = .028$. Phase 2 observations and interviews showed NES teachers were more likely to use technology for whole class and teacher needs, and NAS teachers for individualized student support. Results from this study could assist school and technology administrators to institute better supports for teachers as they strive to adopt and use technology in their teaching.

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Dedication

This dissertation is dedicated to the memory of my father, the late George Washington Clarke, who first planted the idea of me pursuing studies to this level. I also dedicate it to my sons, Adonis St. Xavier Clarke and Nikkolai George D'Mitri Clarke, who exercised amazing patience and understanding during this journey. Love you loads, boys.

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Thanks to my dissertation chair, Dr. Christine Sorensen, who persevered with me for the duration of this journey. Your quiet strength, your wise guidance, and your constant encouragement when my spirits flagged were instrumental in helping me to arrive at this stage. I am forever grateful to you.

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I am forever grateful to the teachers at Hamza Bin Abdulmuttalib School in Baniyas, Abu Dhabi for their encouragement and assistance for the duration of this journey. This space is not enough to thank everyone individually who has contributed in any way to my studies. I therefore wish to thank everyone who has contributed in any way to my reaching this stage.

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Chapter 1: Introduction to the Study

The Abu Dhabi government has developed a 2030 plan that includes raising the education level of the United Arab Emirates (UAE) to be on par with world standards (Abu Dhabi Education Council [ADEC], 2011). To achieve this goal, the Ministry of Education created the ADEC to facilitate what was termed the *New School Model* (NSM). The first step in this process was to improve the level of English among the native population of the UAE, to make them proficient and able to enter higher education institutions abroad without having to complete a preliminary year to learn or improve their English (ADEC, 2014). One of the vehicles that the UAE government planned to employ in achieving these goals was to adopt and use technology to assist in teaching English (Dickson, 2012). To include English as the medium of instruction, the ADEC employed a cadre of Western teachers from the United States, the United Kingdom, Australia, New Zealand, and Canada (Dickson, 2012; Dorsey, 2018; Ridge, Kippels, & Farah, 2017).

Cultural differences were concerns in the ADEC's bid to incorporate technology into English instruction with the teaching force composed of a mix of native English-speaking teachers and teachers native to the UAE and other Arab-speaking Arabian Gulf nations. Along with Urebvu (1997), Nistor, Gogus, and Lerche (2013) and Dorsey (2018) have argued for the inclusion of multicultural considerations in teaching and in using technology in teaching, indicating the need for new and different approaches to technology acceptance and use in teaching. In the case of Abu Dhabi, cultural differences

could influence how teachers from different cultural groups approach technology adoption and use in the ADEC system.

This study aimed to ascertain how ADEC teachers with differing cultural backgrounds teaching at one ADEC secondary school were incorporating technology in their teaching and learning. A gap existed in explaining how different cultural groups adopt and use technology in their teaching and the two differing groups of ADEC teachers facing the same challenge provided an opportunity to examine this issue. The study is socially relevant because of its potential to reveal potential similarities and differences from a cultural perspective, especially as it relates to the Arabian Gulf region and Abu Dhabi. Additionally, education administrators in the UAE wanted to gain insights into cultural aspects of technology adoption, which could inform their decisions regarding training and providing suitable technologies to teachers.

This chapter includes a statement of the problem, discussion of the purpose, presentation of the research questions, and a review of the theoretical framework used to guide the study. The chapter concludes by summing up the research strategy, covering the nature of the study, defining terms, and discussing assumptions, scope and limitations, delimitations, and the likely significance of the study.

Background of the Study

The thrust of this study was mainly to compare the approach to technology adoption taken by two different cultural groups and how they apply technology to their teaching in a secondary school. In Abu Dhabi, a teaching group with a multicultural mix is expected to incorporate technology into their teaching, and their cultural differences

could have implications for training and professional development for the teachers. A study of how culture affects the way teachers adopt and use technology in their teaching had not been conducted in the Gulf Corporation Council (GCC) states.

Measuring Technology Acceptance

For more than two decades prior to 2009, user acceptance of technology was considered a foremost area of study, leading to the creation of several instruments to measure technology acceptance (Chuttur, 2009). Chuttur (2009) stated that within two decades, the technology adoption model (TAM) had surpassed use of other versions within the information systems circle. Chuttur suggested that those interested in learning about user acceptance of technology be advised to employ TAM.

Ursavas, Sahin, and McIlroy (2014) similarly suggested that TAM is suitable for studying an individual's technology acceptance and intention to use technology. TAM is still a highly used tool to assess technology adoption. Granic and Marangunic (2019) reviewed 21 studies about technology adoption from 2003 to 2018 and found TAM to be a credible tool for assessing different technologies, and its variables have proven to be significantly associated with accepting learning technology. TAM has become a prominent tool for predicting and defining system use and is now widely used as a measure in studies concerned with users' acceptance of technology (Chuttur, 2009; Granic & Marangunic, 2019). In this study, TAM was used to ascertain the level of technology acceptance in the secondary school under study and to select teachers for more in-depth observation and interview.

Culture and Technology Acceptance and Use

A single definition cannot adequately define *culture*, as any definition will depend on the meanings attributed to it from different contexts (Mahmoudi, Brown, Saribagloo, & Dadashzadeh, 2015). Culture within organizations can be perceived as a range of beliefs, attitudes, policies, and behaviors, and school culture can be seen as a measure and a moral code to guide educational adaptations and attainment (Zhu & Bargiela-Chiappini, 2013). LeGros and Faez (2012) stated that a description of productive teaching shows many ideas controlled by the culture of the learning scenario. Ponte and Cullen (2013) noted that the pace of technology adoption across nations and within nations varies as technology adoption is based on many factors, such as socioeconomics, cultural practices, and availability of technology. Giorgetti, Campbell, and Arslan (2017) suggested that there are different purposes and values within cultures that can influence approaches to education.

Teo, Luan, and Sing (2008) provided a cross-cultural analysis of the use of technology between teachers in Singapore and teachers in Malaysia. Teo, Luan, and Sing stressed the importance of teachers having a comprehensive grasp of what precise role technology plays. They also noted the importance of providing teachers with the tools to effectively withstand any resultant stress from the process of innovation in educational technology and the strain of emphasizing the use of technology (Teo, Luan, & Sing, 2008).

Much research has been done about technology adoption in general and a considerable number of studies have used TAM as a tool for assessing technology

adoption and intention to use technology (Alfarani, 2015; Azam & Qaddus, 2012; Tsatsou, 2012). There have been fewer studies of cultural differences in technology adoption and use, such as the Teo, Lee, and Chai (2008) study, and researchers have not focused on differences among teachers from Western and Arab cultures. In this study, I attempted to address that gap by examining technology adoption and use among two groups of teachers in the UAE; both groups faced the challenge of adopting and using technology in their teaching. I used TAM as a starting point to look at levels of technology adoption and use and to identify specific cases to be examined in more depth to gain deeper insights.

Problem Statement

The ministry of education instituted the ADEC in 2008 to carry out the mandate of the government to enhance technology use in instruction and to improve practices within ADEC schools using English as the medium of instruction (Dickson, 2012; Dorsey, 2018; Pennington, 2015; Ridge et al., 2017). As part of the adoption of this new model, hundreds of native English-speaking teachers were employed from Western countries (the United States, Australia, New Zealand, Canada, and the United Kingdom), displacing Arab-speaking teachers (Dickson, 2012). Thus, the teaching force in UAE schools is composed of a mix of teachers from Western and Arab cultures. It was unclear how well teachers in Abu Dhabi were adapting to this technology focus and how they were integrating technology in instruction. Urebvu (1997) examined the relationship between culture and technology use and indicated a need for new paradigms from a multicultural perspective. While technology integration is a focus in improving the

schools in Abu Dhabi, cultural differences could affect teacher adoption and use of technology. There may be differences in the professional development and support needs of these two culturally different groups of teachers. This unique context in Abu Dhabi provided an opportunity to better understand technology adoption across cultures.

The TAM was devised by Davis (1989) to fill a need for reliable methods of measuring technology adoption in organizations. Davis identified three elements to understand users' decisions to accept and use technology in organizations: (a) perceived ease of use, (b) perceived usefulness, and (c) attitude toward adoption. Bagozzi (2008) criticized the TAM, saying that it failed to consider group, cultural, and social aspects of technology acceptance and, in particular, individual differences between cultures. Most of the research using TAM has been conducted in Western cultures, and little is known about how well findings translate to non-Western cultures. There is a paucity of literature discussing TAM or technology use in schools in general in the GCC states, including Abu Dhabi. Therefore, the purpose of this study was to explore technology acceptance and use among Abu Dhabi teachers at a secondary school, comparing results among the newer English-speaking teachers and native Arab-speaking teacher populations teaching in Abu Dhabi.

Purpose of the Study

Society is inundated with a plethora of technological innovations that shift the onus on educational planners to make a range of technologies available to teachers to enhance teaching and learning. The UAE government's 30-year plan involves using technology as a major tool to assist in raising the standards of education in the Emirate of

Abu Dhabi to world standards (Dorsey, 2018; Pennington, 2015). With the influx of Western teachers into the ADEC system, it became important to understand how Western, non-native teachers adopt and use technology in their teaching compared to the native teachers. Differences between the groups might have implications for professional development and technology support. Teachers are the key proponents of technology acceptance in schools, and therefore, it is imperative to have a firm grasp of the reasons behind their behavioral intentions (Teo, Lee, & Chai, 2008). Davis (1989) noted, "TAM aims to explain personal and cultural factors that determine a person's technology acceptance and intention to use" (p. 888). The purpose of this explanatory sequential mixed-methods research was to better understand how teachers from two different cultural groups (Western and Arab) teaching in a secondary school in Abu Dhabi adopted and used technology in their teaching. I started by looking at the levels of technology acceptance and use among all teachers in the school, as measured by the TAM, and then I used observations and interviews with a smaller sample selected based on TAM results to more deeply understand potential cultural differences in technology acceptance and practice in this mixed-methods study. The mixed-methods model is show in Figure 1 with the quantitative analysis having less emphasis than the qualitative portion. Explanatory sequential designs are used when one wants to identify appropriate participants to study in more depth qualitatively (Ary, Jacobs, Sorensen Irvine, & Walker, 2019). In this research study, I sought to better understand the relationships between technology acceptance, culture, and classroom practice with technology. Using the explanatory sequential design allowed the selection of teachers with differing levels of technology

acceptance from two different cultures whose classroom technology practices could then be studied in more depth.

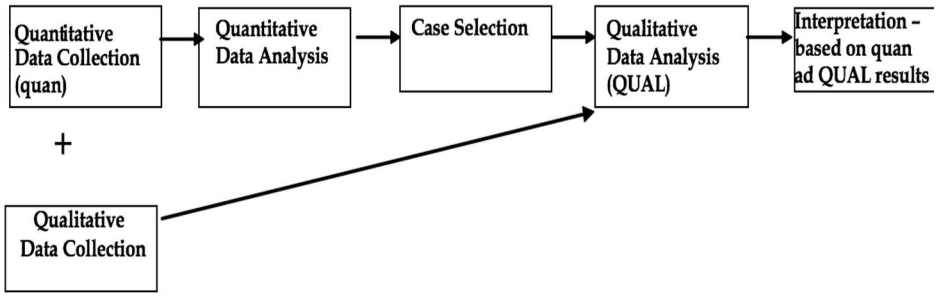

Figure 1. Explanatory sequential mixed method design used in this study.

Research Questions

The overarching area of interest in this study was to understand cultural differences that influence acceptance and use of technology in instruction. Three research questions were used to help examine this overarching interest. The less emphasized quantitative question (Phase 1) in the explanatory sequential design was the first research question, followed by the more emphasized qualitative questions that were explored in Phase 2 of the study. In the hypotheses, dependent variables are referred to as DV_1, DV_2, and DV_3, and the independent variables as IV.

RQ1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitudes toward technology adoption between native English-speaking (NES) and native Arabic-speaking (NAS) teachers at a secondary school in Abu Dhabi?

$H_0$1: There are no statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

$H_1$1: There are statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

RQ2: How do NES teachers and NAS teachers in a secondary school, who exhibit differing levels of technology acceptance, use technology in their classrooms?

RQ3: How do NES teachers and NAS teachers in a secondary school, who exhibit differing levels of technology acceptance, make decisions about adoption and use of technology in their classrooms?

Conceptual Framework

The conceptual framework for this study was grounded in the TAM and findings in the literature that indicated there are cultural influences that affect teaching practice. Davis (1989) devised the TAM in a bid to explain the ways users perceive and use technology (Teo, Ursavas, & Bahcekapili, 2012). The TAM is based on the theory of reasoned action (TRA) by Fishbein and Ajzen (1975), a behavior theory aligned with sociopsychology behavior that explains social behavior and an individual's attitude. TAM was created to give an understanding of key elements of cognitive and affective factors identified in previous research and their effect on technology acceptance (Teo, 2012). Other models of technology acceptance have been created, but the TAM has been the most widely acknowledged in explaining the behavioral intention of individuals (Wong, Osman, Goh, & Rahmat, 2013).

Wong, Teo, and Russo (2012) explained that the TAM was introduced to create a theory able to elucidate the relationship between attitude, intention, and behavior. The

TAM revealed a theoretical framework that shows the importance of perceived usefulness and ease of use as important factors in determining the user acceptance of technology (Teo, 2011; Wong et al., 2013). TAM was created based on two main tenets—perceived use of technology and perceived usefulness of technologies—that are rudiments of user acceptance (Al-Adwan, Al-Adwan, & Smedley, 2013; Teo, 2012; Teo, Lee, & Chai, 2008). Perceived usefulness denotes how much an individual believes the technology will enhance their job performance, while perceived ease of use is how much the user is confident that the technology will be free of effort (Davis, 1989).

Since its inception, the TAM has been used to measure technology acceptance of a wide range of technologies in a wide range of fields (Al-Adwan et al., 2013). Bogazzi (2008) has argued that TAM does not consider other variables, such as culture and social construction. In addition, TAM has not been in widespread use outside of developed countries, and Teo (2011) suggested the model be given additional testing in different cultures to ascertain its cultural validity.

Golshan and Ranjbar (2017) noted that effective teaching depends on the cultural origin of the teacher or the cultural mix of the organizations; what constitutes productive pedagogy mirrors the behaviors and beliefs of the culture and language where the teaching and learning take place. LeGros and Faez (2012) argued that the idea of knowledge and teaching characteristics is based on the premise that all cultures have different notions of the concepts of culture. Therefore, the conceptual framework for this study was that culture influences technology adoption, including perceptions of

usefulness and ease of use, which in turn influences teacher decisions to use technology and classroom teaching practices with technology. Figure 2 shows this framework.

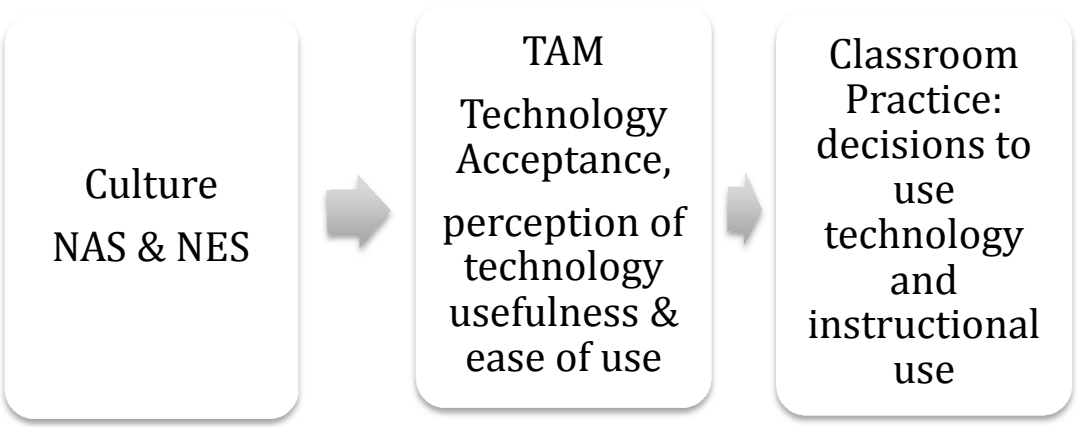

Figure 2. Conceptual framework.

Nature of the Study

An explanatory sequential mixed-methods design was used to collect data from two culturally representative groups of teachers in one secondary school in Abu Dhabi about how they adopted and used technology in their teaching. In Phase 1 of the research, the TAM survey, a quantitative tool, was used to collect data from a target population of all teachers in the school. Following analysis of the TAM data to answer the first research question about differences in technology acceptance between the two groups, a subset of teachers from each group who scored high and low on the TAM was selected for more in-depth qualitative study using observations and interviews in Phase 2 to understand the influences of culture on classroom technology practices. This approach provided both general information about differences and similarities between the two cultural groups in

terms of technology acceptance and allowed a deeper understanding of technology decision making and use among teachers from both groups. Finally, I developed interpretations based on the results of both the quantitative and qualitative findings. Teddlie and Tashakkori (2008) discussed how mixed-methods designs use both inductive and deductive logic in a distinctive sequence. In a sequential design, data are collected and examined in one stage to inform data collection in the next phase, and different forms of data are collected in sequence at different phases in a study. Onwuegbuzie and Teddlie (2013) described how mixed-methods data analysis ends with data integration, in which both the quantitative and qualitative data and interpretations are integrated into a coherent whole. Johnson and Onwuegbuzie (2004) posited that mixed methods are used to implement the strengths of one method to overcome the weaknesses of the other; mixed-method research can provide stronger evidence for a conclusion through corroboration, can enhance insights that could have been missed with a single method, and may produce a more complete understanding of a phenomenon.

This study was designed to describe how teachers within a specific education system and cultural context use technology to enhance their teaching, allowing teachers to share their experiences of adopting and using technology in their teaching and learning. Additionally, the design revealed cultural influences in how teachers adopt and use technology as part of their teaching approach. A mixed-methods study helped unearth how these culturally different teachers view the use of technology in their teaching experiences. This research was set in a real-world situation in the classroom to obtain a comprehensive perspective of the way that teachers apply technology in their classes as

well as whether, in the present situation, there are any cultural implications. The mixed-method study was conducted to examine whether culture had a bearing on how teachers from different cultures adopt and use technology in the teaching and learning environment.

The nature of the study was a mixed-methods approach. A survey based on the TAM was used to gather data about teacher perceptions of technology usefulness, ease of use, and attitudes toward technology use in Abu-Dhabi. The survey used was the TAM survey developed by Davis (1989) as adapted by Gardner and Amoroso (2004). Following analysis of TAM data, qualitative methods were used to conduct observations and semistructured interviews with a subsample of teachers. Teachers were purposively selected for observation and interview based on the TAM survey results. Data were collected from the teachers in a secondary school in the ADEC system.

While the TAM survey was used to gather data on general teacher perceptions of technology usefulness and attitudes toward technology use, observations were used to more deeply examine how teachers from two distinct cultural groups with differing levels of technology acceptance used technology in their classrooms, and interviews gathered information about how the teachers made decisions about using technologies in their classrooms. The participants were interviewed on site, either in their classroom, a faculty office, or where they were most comfortable and where there were few or no distractions. Analysis of the data included descriptive and comparative statistics for the TAM and analysis of interview and observation data using qualitative interpretive methods searching for recurring patterns. The mixed-methods study design was used to explain

shared and differing experiences among teachers from different cultures both teaching in the same school. The methodology will be further explained in Chapter 3.

Definitions

Educational technology: The Association for Educational Technology and Communications (AECT) definition is, "The study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" and is considered the standard in the field (Januszewski & Molenda, 2008, p. 15).

Intention to use: Teachers' decision about whether to use technology in their teaching (Davis, 1989) and measured by the TAM in this study.

Perceived ease of use: How much teachers believe using technology will not require them to exert too much mental effort (Davis, 1989) and measured by the TAM in this study.

Perceived usefulness: How much teachers believe using technology in their teaching will improve their teaching and learning experiences (Davis, 1989) and measured by the TAM in this study.

Technology acceptance model (TAM): Used to measure the behavioral intention to use technology (Teo & Noyes, 2014). For the purposes of this study, attitude toward technology was measured by the TAM.

Technology adoption: This is the willingness displayed by individuals to accept and use technology to carry out asks that the technology was created to support (Teo, 2011).

Technology integration: The extent to which teachers adopt and use technology in their teaching to add to the teaching and learning in their classrooms (Surry, Stefurak, & Gray, 2011).

Assumptions

This study included a few assumptions. First, I assumed that participants would respond to the survey honestly. I further assumed that teachers would be forthcoming in their responses to interview questions. In addition, I assumed that the teachers from this secondary school of ADEC were representative of other teachers from Western and Arab cultures. And I assumed that the small sample of teachers interviewed and observed was representative of the larger ADEC groups. These assumptions may not be true and thus could also be a study limitation.

Scope and Delimitations

In this study, I examined cultural differences that may affect how teachers adopt and use technology in their teaching. I described the perceptions of technology usefulness among NES and NAS teachers teaching in a secondary school in the ADEC. Thus, the study was confined to ADEC teachers from both Western and Arab cultures and how they adopt and use technology in their teaching. The research was carried out in one boys' high school in Abu Dhabi and does not include information from teachers who teach girls or teachers in other high schools. The study was focused on discovering whether culture plays any significant role on how teachers choose and use technology. The study did not include how students or others within the school context adopt and use technology or how teachers adopt and use technology outside of the classroom context.

The population from which this sample was derived was a mix of native Arab speakers and native English speakers who taught within the ADEC system. It did not include teachers from these backgrounds who may teach outside of ADEC. This study stemmed from an interest in the ADEC's drive to get the Abu Dhabi education system up to global standards by using technology as one of the means of attaining this status.

The TAM was used to collect data in one school in the Abu Dhabi region, but the survey did not extend to other ADEC schools or schools within other Emirates as they do not fall under the aegis of the ADEC. The TAM was selected from among several other possible measures of technology adoption (Teo & Noyes, 2014). The TAM is specifically designed to measure teacher perceptions in the adoption and use of technology and has been widely used.

While the TAM was more widely administered, the teachers selected for observation and interview were limited to four, two from each cultural group. These specific cases were selected to ensure one teacher from each cultural group was selected who exhibited low and high adoption as measured with the TAM.

Limitations

The study was restricted to teachers at one secondary school in the ADEC in the Abu Dhabi Emirate in the UAE. This is a limitation as these ADEC teachers may not be representative of other teachers with Western and Arab cultural backgrounds. Although the study was restricted and constrained to teachers at one ADEC school, it may be possible to later extend it to other public schools within other Emirates or to other schools

within Abu Dhabi. Some demographic background was collected to help interpret the representativeness of the group.

Respondents might not have responded with frankness, which might have resulted in inaccurate representation of the views of the general population, which could in turn have affected internal validity. Native Arab speakers may have misunderstood unfamiliar English words or concepts used in the survey, which would be understood by native English speakers. This situation was minimized by acquiring assistance from Arab members of staff who had certified fluency in English from the International English Language Test delivered by the British Council. These teachers attained at least a 6.5 passing score on the test, with scores ranging from 0 to 10, and have taught for at least 10 years. They reviewed the instrument for potential language issues, and the instrument was piloted by three Arab-speaking teachers not at the study school to ensure understandability.

The school chosen for this research was a boys' secondary school. Because of cultural restrictions, a boys' school was chosen for study as I am a single man, and it is inappropriate in Arab culture for a single man to observe or interview female teachers. This was an additional limitation to the study as results may not generalize to female teachers. Male teachers were interviewed face to face on site. The time that was available to complete this study was limited, so the study was not as extensive as it could have been, and the population and the sample were pared down to manageable sizes to complete the study in a reasonable time.

Significance of the Study

This study was important because the results may enhance understanding of technology acceptance and adoption among teachers with different cultural backgrounds, specifically in a non-Western context. Understanding the similarities and potential differences in technology acceptance and use across cultures can inform professional development plans and how to best help teachers from different cultures incorporate technology into instructional best practices. This information can give education planners ideas on how to plan for technology acquisitions and teacher professional development to promote adoption and use of technologies in their teaching and learning. By better understanding cultural influences, positive social change could occur through a better understanding of the needs of teachers in technology professional development and improved methods to help them integrate technology into their classrooms to support student learning.

Significance to Practice

The results of this study can help educational administrators to ascertain how teachers adopt and use technology in their teaching. The findings can provide information to educational planners and administrators about teachers' cross-cultural perspectives on their adoption and use of technology in their teaching. Better understanding of these aspects may give educational administrators clearer ideas on how to proceed in planning curricula suitable for multicultural application and on the professional development and supports that might be needed. Additionally, the findings can be useful in providing

insights about technology that is specific to the needs of the teachers and the curriculum in ADEC and potentially beyond.

The survey findings can be used to raise awareness of teacher technology adoption and use. Additionally, teachers can become more aware of their technological needs and how they use technology compared to their colleagues from another culture. Better understanding of cultural differences may foster a more collaborative ethos among teachers and enhance teaching and learning.

The study can be used as a guide to educational administrators to help them decide how best to support teachers in adopting and using technology and, more specifically, whether there are important cultural differences that may lead to differentiated supports. Such supports could include professional development, technical assistance, or coaching and mentoring in the classroom.

Significance to Theory

The study provided me with information about technology adoption and use from cultural perspectives in a specific geographic location, which had not been explored by researchers previously. Additionally, the study revealed cultural perspectives of teachers in a Middle Eastern location about how they adopted and used technology in their teaching. A study had not been conducted about how teachers in this specific cultural context adopted and used technology in general, nor from differing cultural perspectives that exist in the context. This research can add to the body of knowledge in education technology and culture and can be used to inform the development of instruments such as

the TAM used to measure teacher acceptance and intent to use to ensure they address cultural components.

Significance to Social Change

This study contributes to positive social change by providing a clearer understanding of the cultural and technological needs of teachers. This understanding may improve the situation of teachers as more effective professional development can be planned to help them better adopt and integrate technology into their classrooms to support their pedagogy and student learning. Additionally, teachers could develop confidence in their views about appropriate technologies to enhance their pedagogy as they work in their classrooms with their students, providing insights into their needs and students' needs. Better understanding of technology adoption within cultural contexts can help teachers better employ technology to bridge teaching and learning gaps and create a positive teaching and learning environment in their classrooms. Teachers could extend their grasp of technology adoption and use and cultural application to other teachers, eventually spreading the influence throughout the organization, thereby triggering a comprehensive improvement in technology adoption and use and consequently a comprehensive improvement in teaching and learning.

Summary and Transition

The aim of this study was to describe how teachers from different cultures within an education system perceive, adopt, and infuse technology into their teaching. With technology in society becoming more widely available, it is becoming increasingly urgent for teachers to understand technology integration in education and make it an important

part of their teaching toolkit. Teachers' perceptions about technology adoption and use can influence whether technology integration is accepted or rejected in schools. Notably, a multicultural perspective can prove useful in education systems that employ teachers from across several cultures.

Chapter 1 included an introduction, the problem statement, the nature of the study, the purpose, the theoretical framework, definition of terms, assumptions, and the significance of the study. Chapter 2 contains a review of relevant literature, Chapter 3 is about the research design and methodology, Chapter 4 includes analysis of the results of the study, and Chapter 5 contains discussion and conclusion.

Chapter 2: Literature Review

Introduction

Technology adoption in schools continues to lag behind societal expectations. Teachers struggle with change and adoption of new technologies in the classroom. While much research has been done in this area, few studies have approached it with an eye to cultural influences. In this study, I sought to better understand technology adoption within a single context (ADEC) that includes two groups of teachers who are culturally different: teachers from Western backgrounds who are NES and teachers from the UAE who are NAS. I sought to better understand the acceptance and use of technology among both groups, but also cultural influences that might affect such acceptance and use.

The aim of this literature review is to examine what is known about teacher technology adoption in general and cultural influences and any effect they have on the way teachers adopt and use technology in the teaching and learning environment. The main emphasis of this study was examining how teachers from different cultural groups adopt and use technology in teaching in keeping with the ideas of Urebvu (1997), who posited that there is an association between culture and technology use and stipulated that that there needs to be a new paradigm from a multicultural point of view. Donovan, Green, and Hansen (2012) agreed with this perspective when they suggested that the only technology integration program that will be successful is the one in which technology use is immersed in all activities, unlike the usual means of encouraging technology use. Based on their cultural differences and professional needs, different groups of teachers may adopt and use technology differently.

After I review the literature search strategies used and the conceptual framework adopted, in Chapter 2 I include key areas connected to the intent of this study. First, I review models in the literature related to technology adoption and what is known about what influences teachers in their adoption of and use of technology. This will include a review of the TAM, devised by Davis (1989), which is the model used in this study to measure how each group adopts and uses technology. Second, I will review literature on technology use in K to 12 education. Third, findings from other education studies using the TAM will be presented. Fourth, I will examine what is known about the influence of culture on teaching and, more specifically, the adoption and use of technology. Finally, the literature review will include research specifically about teachers and technology in the UAE, the location of this study.

Literature Search Strategy

For this literature review, I accessed the following databases: Academic Search Complete, EBSCOhost, Education Research Complete, ERIC, ProQuest Central, and SAGE. Additionally, I used Google Scholar to access information that I did not locate in the Walden library. The following search terms were employed as individual entries along with various other combinations of terms: *technology acceptance model*, *UTAUT*, *united theory of acceptance and use of technology*, *teachers' adoption and use of technology*, *cultural differences*, *perceived usefulness*, *perceived ease of use*, *performance expectancy*, *intention to use technology*, *technology enhanced teaching*, *technology across cultures*, *teaching across cultures*, *teaching strategies across cultures*, *differences in teaching in different countries*, *content based adoption model*, *attitude*

toward teaching, *models of technology adoption*, *theory and technology*, and *technology in the secondary school*. The peer-reviewed and full-text search criteria were used. In addition to searching for literature in the past 5 years, I expanded my search to include seminal articles that provided important vital perspectives in helping to explain the research topic and answer the research questions. This strategy provided manageable numbers of articles to assist in my literature review, although at times there were some dated articles I had to discard. I also accessed the Abu Dhabi Education Council e-Library where I found some suitable articles that I could not locate in the Walden library.

Models Related to Technology Adoption

Several models have been advanced to look at the adoption or diffusion of technology in both education and other settings. This section of the literature review addresses a selection of four of the most well-known models of technology adoption in educational contexts, starting with the TAM, the model selected for use in this study. Also covered are the unified theory of acceptance and use of technology (UTAUT), Rogers' diffusion of innovation theory, and the concerns-based adoption model (CBAM) proposed by Hall and Hord.

Technology Acceptance Model

The TAM was devised by Davis (1989) in a bid to explain the ways users perceive and use technology (Teo, 2012). The TAM is based on the theory of reasoned action (TRA) by Fishbein and Ajzen (1975), a behavior theory aligned with sociopsychology behavior that explains social behavior and an individual's attitude. TAM was created to give an understanding of key elements of cognitive and affective

factors identified in previous research and their effect on technology acceptance (Teo, 2012). Other models of technology acceptance have been created, but the TAM has been the most widely acknowledged in explaining the behavioral intention of individuals (Granic & Marangunic, 2019; Wong et al., 2013).

During the 1970s, there was growing dependence on technology, but the adoption of technology within organizations was not keeping up with the increased needs, so researchers started to focus mainly on system use (Chuttur, 2009). Davis (1989) found that the bulk of the studies conducted did not result in valid measurements that could explain system acceptance or rejection. Davis therefore conducted studies based on Fishbein and Ajzen (1975), who were responsible for the theory of reasoned action, and improved the model to create the TAM. As the TAM was developed, Davis included additional elements and edited other features, while other researchers were making similar contributions to the TAM (Chuttur, 2009).

TAM has been applied extensively in many areas of information systems implementation (Venkatesh & Bala, 2008). TAM has also been used in e-government (Phang et al., 2006), and Persico, Manca, and Pozzi (2014) described its application in e-learning. However, most TAM-focused research has been conducted among business representatives (Teo, Lee, & Chai, 2008; Wong et al., 2013). The TAM is deemed one of the most renowned models of ascertaining the acceptance and use of technology and it has also been useful in predicting user acceptance (Al-Adwan et al., 2013).

Wong et al. (2012) explained that Davis (1989) introduced the TAM to create a theory able to elucidate the relationship between attitude, intention, and behavior. The

TAM revealed a theoretical framework that shows the importance of perceived usefulness and ease of use as important factors in determining the user acceptance of technology (Teo, 2011; Wong et al., 2012). TAM was created based on two main tenets—perceived use of technology and perceived usefulness of technologies—that are rudiments of user acceptance (Al-Adwan et al., 2013; Teo, Lee, & Chai, 2008; Teo et al., 2012). Perceived usefulness denotes how much an individual believes the technology will enhance their job performance, while perceived ease of use is how much the user is confident that the technology will be free of effort (Davis, 1989).

Since its inception, the TAM model has been used to measure technology acceptance of a wide range of technologies in a wide range of fields (Al-Adwan et al., 2013). Nonetheless, there have been calls by researchers to expand the range of the TAM to include additional variables of technology acceptance, such as technology complexity, age, and gender, thereby suggesting unifying TAM with other models (Kabachi Yardakul, Ursavas, & Becit Isciturk, 2014). Kabachi Yardakul et al. (2014) argued that in research designed to examine the acceptance of technology by teachers or teacher trainees, perceived acceptance of technology and perceived ease of use were supplements of "behavioral intentions" and "attitudes toward using" (p. 23). Similarly, Bagozzi (2008) has argued that the TAM has not taken other variables into account, such as groups, culture, and social construction, particularly the variety evident in different cultures. Teo (2011) noted that, for the past 10 years, many researchers have studied the effect and reach of the TAM. Wong et al. found that the TAM has not been in widespread use outside of developed countries. Teo (2011) suggested that the model be given additional

testing in different cultures to ascertain its cultural validity. Teo also added that because so few validations of TAM have been carried out in educational environments, its application in this setting has been limited.

Some researchers, however, do not embrace the TAM for predicting system use, as they assert that robust research has not been conducted in measuring the TAM, with little attention given to the real issues of technology acceptance (Nistor et al., 2013). Shroff, Deneen, and Ng (2011) examined student behavior, using the TAM to measure students' intentions to use e-portfolios in their learning. The findings of the study suggested that students perceived use of technology correlated with their attitudes toward the use of technology (Shroff et al., 2011). El-Gayar, Moran, and Hawkes (2011) proposed that behavioral intention, which explains the usefulness and ease of use of the technology, can dictate how someone accepts and uses technology.

In a survey to understand how perceived usability and technology self-efficacy influence teachers to accept technology, Holden and Rada (2011) found that including perceived usability in TAM revealed inherent discrepancies and explained aspects of TAM better than if it was left out of the model. Studies have revealed that cognitive elements, such as personality, self-efficacy, and demographics, can trigger various levels of impact on user technology acceptance (Alavi & Joachimsthaler, 1992). Holden and Rada (2011) added to the definition of TAM as, "a theoretical model that predicts how a user comes to accept and use a given information technology" (p. 144). According to Holden and Rada (2011), the focus on usability and its measurement are recent ideas, coming into vogue just within the last three decades.

Despite the importance attributed to the TAM as a widely used model of technology acceptance in research, criticisms have been leveled at the model. Ursavas et al. (2014) presented some critical views on the impact of the TAM and discussed the need for the model to cover several cultures and technologies to obtain a wider scope of the model. El-Gayar et al. (2011) argued that the TAM has limitations that inhibit its ability to direct systems design and management practices that are important in shaping how individuals accept and use technology. Teo (2011) noted that despite the praise that has been attributed to the TAM, it is deficient in external validity that would allow for deeper understanding of the factors that explain technology acceptance. According to Lei, Chen, and Chi (2013), TAM does not fully explain technology acceptance, and as such, its reach should be extended to include "the impact of human behaviors" (p. 122). Lei et al. also stressed that technology acceptance should not focus merely on user characteristics, but there should be some focus on the influence of social interaction. The TAM was later incorporated into a larger theory, UTAUT.

Unified Theory of Acceptance and Use of Technology

The late 1980s was an era when several models of technology acceptance were introduced into society (Teo & Van Schaik, 2009). However, a significant development was a study by Venkatesh, Morris, Davis, and Davis (2003), which was comparable to the TAM initially published by Davis, Bogazzi, and Warsaw (1989). Eight of the most viable theoretical models were combined into one model known as the UTAUT (Mtebe & Raisamo, 2014; Teo & Van Schaik, 2009). Mtebe and Raisamo (2014) listed the eight combined models as (a) TAM, (b) innovation diffusion theory, (c) theory of reasoned

action, (d) motivation model, (e) theory of planned behavior, (f) model of PC utilization, (g) social cognitive theory, and (h) motivational model. Mtebe and Raisamo (2014) and Thomas et al. (2014) named four factors that make up the UTAUT: (a) performance expectancy, (b) social influence, (c) facilitating conditions, and (d) effort expectancy. However, Thomas et al. later added *user behavior* and *behavioral intentions* to the list. Teo (2012) posited that the main thesis observed in the UTAUT was focal behavior. This perspective has been studied by Nistor, Lerche, Weinberger, Ceobanu, and Heymann (2014), who suggested that Venkatesh et al. (2003) developed the UTAUT under the influence of the intention to use, albeit, affected by the variables, performance expectancy, effort expectancy, and social justice.

Another important inclusion in the UTAUT model was the complementary relationship between age and gender and each of the performance expectancy and social factors (Thomas et al., 2014). The interconnection between voluntariness of use and social variables on behavioral intention are also integral to the UTAUT (Venkatesh et al., 2003). The UTAUT did not include a positive or negative attitude of the individual's use of technology, which was a vital aspect of the TAM (Thomas, Singh, & Gaffar, 2013). But Venkatesh et al. (2003) argued that attitude does not greatly impact the behavioral intention of an individual toward technology use and is only relevant when performance expectancy and effort expectancy are not included in the model. Some researchers claim educators' decisions to use technology will be based on how easy it is for them to use the technology as well as the effort expectancy (Teo & Noyes, 2014). The core constructs of

the UTAUT are performance expectancy, effort expectancy, social influences, and facilitating conditions.

Performance expectancy. Performance expectancy is the extent to which the individual is convinced that using the technology or system will improve their job performance (Teo & Noyes, 2014). Venkatesh et al. (2003) promoted the idea that performance expectancy is the most effective way to predict behavioral intentions to use (BIU) information technology. From an educational perspective, accepting performance expectancy will allow more efficiency within the teaching and learning Wong context by adding speed and accuracy to the activities (Teo & Noyes, 2014). Yueh, Huang, and Chang (2015) explained that performance expectancy is formed when students consider a technology or a system to be beneficial in completing their projects. This perspective aligns with the premise of the UTAUT that suggests that enhanced performance expectancy helps in increased performance of tasks as it is directly determines the level of system use.

Effort expectancy. Effort expectancy is said to be the ease with which individuals can use information systems (Venkatesh et al., 2003). When new behaviors develop, sometimes the individual is tentative in accepting the technology because of fear of problems with the technology (Khechine, Lakhal, Pascot, & Bytha, 2014). As time elapses and users get more comfortable, perceived ease of use becomes more prominent. Effort expectancy is therefore more noticeable in the early stages of behavioral intentions to use technology (Khechine et al., 2014). Ultimately users will no longer be affected by perceived ease of use in using technology (Attuquayefio & Addo, 2014).

Social influence. Social influence means the level of importance that the individual associates with how others perceive that he or she should use the innovation (Venkatesh et al., 2003; Yueh et al. , 2015). This premise has been shown within the UTAUT model as well as earlier models, and this perspective results in positive association with the behavioral intention to use technology (Khechine et al., 2014).

Facilitating conditions. Individuals are aware of the organization and technical structures that have been put in place to facilitate their use of the system. This awareness is known as facilitating condition (Khechine et al., 2014). The individual's level of use will be driven by whether the support available is constant or inconsistent (Attuquayefio & Addo, 2014). Some writers (Martin & Herrero, 2012; Teo & Noyes, 2014) suggested that another way of describing facilitating conditions is how the environment affects the level of difficulty that the individual assesses to using the technology, including the availability of training as potentially important in deciding technology use. Venkatesh et al. (2003) supported this view and suggested that facilitating conditions, such as infrastructure support, is available within the effort expectancy variable, which explains the level of difficulty in using technology. Teo and Noyes (2014) in their study of preservice teachers' intention to use technology concluded that the three UTAUT constructs, performance expectancy, effort expectancy, and social influence were statistically related to behavior of intention to use technology. In addition to TAM and UTAUT, another well-known model related to technology acceptance in called diffusion of innovation.

Diffusion of Innovation

The main proponent of the diffusion of innovation theory was Rogers (2003) who proposed a rationale for the slow pace of the adoption and use of innovations despite that they can provide advantages. Rogers (2003) described diffusion as, "a process in which an innovation is communicated through certain channels over time among members of a social system" (p. 23). Rogers proffered innovation, communication channels, time, and social systems as the four essential characteristics of diffusion. An innovation is the emergence of a new plan, new method, or a new object (Rogers, 2003). The diffusion of innovations theory suggested that the newness of the innovation contributes to levels of uncertainty in adopting the innovation (Rogers, 2003). Robinson (2009) noted that based on Rogers' theory of diffusion of innovation, the initial innovations in the adoption process generally begin with a small number of innovators. An adoption population usually goes through five phases depending on the tendency of the individual or unit in the adoption process.

The adoption process includes the potential adopter collecting information about the technology, scrutinizing the technology, before deciding whether the technology adds to the value of what existed before or adds to the skillset that existed prior to the adoption (Rogers, 2003). Because of this, people are more likely to discover the impact of adopting new technology on their work experiences before investing in the new technology (Rogers, 2003). Five qualities from the perspective of the innovators have been presented as having an impact on how new technologies are spread, according to Rogers (2003). The qualities are:

- There is the knowledge phase where the potential value of the innovation is realized as the individual becomes more aware of its existence
- Persuasion phase is next where the adopter weighs the advantages and disadvantages of adopting the innovation to measure its compatibility with their needs and experiences.
- Next, there is the decision stage where the individual chooses to adopt the innovation depending on the ease with which he or she can use it and whether new skills must be acquired first. The adopter will decide at this phase whether to adopt, reject, or adopt on a trial basis.
- The implementation phase is where the adopter begins to use the innovation. The pace of implementation may be dependent on whether it will need any alterations or adjustments before it is ready for use.
- Finally, there is the confirmation stage where the adopter ascertains the value of the innovation decision that was made.

Rogers (2003) opined that without communication channels diffusion of innovations would be more tedious. A communication channel is the conduit through which messages are transmitted from one party to another. Communication channels can be divided into mass media and interpersonal channels. Mass media channels allow messages to be passed on to large audiences while interpersonal channels are concerned with message being exchanged between two or more individuals. Rogers (2003) also considered opinion leaders to be important in the adoption process. Opinion leaders are those members of a social group who wield a lot of influence over other members of the

group. They are usually more exposed than their followers and are pivotal in the adoption of innovation process as they are usually privy to external means of communication as well as being of a higher economic status. The most influential opinion leaders are quite adept at impacting other individuals' behavior, attitude, and with high consistency. Rogers argued that despite the process not being wholly collective, it is nonetheless based on the decisions of members of the social group. Rogers (2003) placed all members of a social group into categories based on the time they take to adopt an innovation compared to other members of the group. The categories from least to most innovative are (a) laggards, (b) late majority, (c) early majority, (d) adopters, and (e) innovators. Xian and Madhavan (2014) declared that Rogers's diffusion of innovation theory underscores how central interpersonal communication is spreading innovation.

Per Enfield, Myers, Lara, and Frick (2011), the theory of diffusion of innovations is a means of grasping ways in which a change agent can drive the adoption of innovation. The major idea that a change agent should be concerned about includes the phases of adoption, types of mass media and interpersonal communication channels, the role of opinion leaders, and finally, the relationship that the change agent has with the social group. A final model reviewed for this study that relates to technology adoption is the CBAM.

Concerns-based Adoption Model

The CBAM was developed in the 1970s by the Research Development Center for Teacher Education (Hall & Hord, 1987). The CBAM was developed from a framework created by Fullan (2007) and it advocates seven stages of concern (SoC) which teachers

experience as they try to apply new innovations: awareness, information, personal, management, consequence, collaboration, and refocusing. As noted by Hosman and Cvetanoska (2010), the CBAM has been widely used in the fields of education and educational technology but has not made much impression in other fields since its inception. Hosman and Cvetanoska argued that despite CBAM not disseminating to other fields, there is much about it that could benefit any field that is concerned with technological processes. They argued that this is because it is important to understand the complex change process in the adoption of innovations.

Fuller (1969) shared a categorization of teachers' concerns about innovation: (a) SoC, (b) levels of use (LoU), and (c) innovative configurations (IC). According to Roach, Kratochwill, and Frank (2009) the SoC in the CBAM could prove to be a valuable process for anyone interested in ascertaining teachers' perceptions and behavior toward an innovation. Donovan, Hartley, and Struder (2007) noted that the SoC is mainly concerned with the change from the initial stages in innovation adoption as divined by the innovator. Donovan et al. added that the SoC can be a suitable tool for assessing the adoption process. Straub (2009) supported the idea that change ought to come from the point of view of the individual.

Hosman and Cvetanoska (2010) submitted that under the SoC the CBAM covers a wide swathe of major issues through which innovation must proceed over a span of time and adopters begin at an early stage. Hosman and Cvetanoska posited that "Adopters advance from early-stage concerns about self-oriented issues (awareness, information, and personal concerns), to intermediate level task-related concerns about effective

management and use of innovation, to eventual higher concerns regarding the impact of innovation on students" (p. 4). They highlighted concerns about how students collaborate with teachers to assist in the adoption process. Donovan and Green (2014) argued that it is a complex undertaking to study the adoption and use of technology in schools because so many variables should be considered within the complexity of the school operations. The authors suggested that educational technology researchers emulate what Zhao and Frank (2003, p. 6) espoused as, "dynamic, organic, and complex response to grasp" of technology adoption and use in schools. This is a perspective also shared by Hall (2013) who argued that it is a complex process in deciding to adopt and use specific technology innovations in schools. Like Donovan and Green (2014), Hall highlighted a number of potential barriers to adoption and use of technology in the classroom. In keeping with the focus of this study, Hosman and Cvetanoska advocated that teachers are the key proponents of educational innovation and growth, and the success or failure of innovations will largely depend on how willing teachers are to adapt to change.

Hord, Stiegelbauer, Hall, and George (2006) presented that at the center of the CBAM there are three assessment structures, namely the SoC, the LoU, and the Innovation Configurations. Interestingly, Hosman and Cvetanoska (2013) presented only two of these key tools of the CBAM: SoC and the LoU, failing to mention the IC in their article.

Other researchers (Hall & Hord, 2011b; Hollingshead, 2009) also presented the IC as a third key dimension of the CBAM. Despite this omission, the description of the SoC and the LoU by Hosman and Cvetanoska (2013) was similar to the other researchers

who described all three stages. The three key stages of the CBAM were also presented by Donovan et al. (2007) who discussed concerns of teachers who were implementing a one-to-one laptop program in a middle level school. Donovan et al. argued that the SoC stage of CBAM is mainly about any changes that are implemented at the outset of the innovation as the innovation is perceived by the individual. They also suggested that the SoC is a suitable instrument for evaluating the adoption process. Next, I will delve further into information about the three key areas of the CBAM, SoC, LoU, and IC.

Levels of use. Khoboli and O'toole (2012) described the LoU as a behavior that is associated with the innovation. Saunders (2012) was a proponent of the behavioral perspectives of change, particularly as far as the individual is initiating new practices. Hollingshead (2009) similarly noted that the LoU is concerned with how innovators react during the innovation process where the interaction of each participant is from a particular level of classification. Hall, Hollingshead and Christman (2019) also stated that this is a process that can begin at the nonuser's level, which provides details about anyone who has not yet become a part of the innovation process. Other authors (Hall & Hord, 2011b; Hall, Dirksen, & George, 2006) concluded that LoU supports change and change is a developmental process that individuals must experience specific LoU. The authors suggested, however, that all innovators will not progress at the same pace; neither will they progress in a continuous manner. Hall et al. (2019) noted that the innovation is in use only when individuals begin to manipulate the tasks.

Innovation configuration map. The SoC is focused on addressing the user's concerns, prior to adoption of an innovation and the LoU is an interview protocol that

allows educators to ascertain how much staff members are using the innovation and at what stage they are operating. However, the IC map is set up to guide leaders to create potential actions and behaviors that they need their staff to fulfill individually (Donovan, Green, & Mason, 2014). Hall and Hord (2011a) described the IC as a process used to provide clear unambiguous statement of the exact construction of a new program or process, where the primary focus is on the major aspects of the program. This is a point of view discussed earlier by Christou, Eliophatou-Menon, and Phillippou (2004) who also argued that the IC gives clear indications of the differences for each section of a new process and indicating relevant behavior from irrelevant ones. According to Hall and Hord (2006), the IC should not be confused with rubrics as rubrics rate the components while the IC describes them. Documents derived from the IC will change with improvement and growth in the new process. It is essential for teachers to understand their part in a new school system (Hall & Hord, 2006).

Stages of concern. SoC means the ways in which individuals perceive and feel about taking on novel experiences and what concerns they experience as they take on new practices (Al-Shabbatat, 2014; Hosman & Cvetanoska, 2013; Saunders, 2012; Young, 2013). Young (2013) described SoC as the behavior, emotions and motives about effecting change with the level of concern triggered by the volume of change being considered. This view is shared by Al Shabbatat, 2014 who claimed that SoC is also about comprehending how much anxiety individuals experience before deciding to adopt technology.

From the features of the SoC, the CBAM advances several steps that adopters of innovations will experience with the passing of time (Hosman & Cvetanoska, 2013). Young (2013) and Hosman and Cvetanoska (2010) described the process in the SoC as beginning with the metacognition issues such as awareness, information, and personal concerns, followed by management attributes or tasks which measure how technology is administered, and finally, the effect that describes how others react to the use of the technology. Al-Shabbatat (2014) espoused similar ideas and added that the initial concerns are not as powerful as the latter ones, but they all highlight the individual's perceptions at different stages of the adoption process.

Now that models of technology adoption have been reviewed, next is a look at technology adoption in K-12 schools. What do we know from existing literature about the process and use of technology by teachers in the classroom?

Studies of Teachers and Technology Adoption

The massive change that has been wrought to society by computers is reminiscent of the Industrial Revolution (Sadeghi, Saribagloo, Samad, & Mahmoudi, 2014). This societal transformation has been given many names including information society, information economy, and modern economy (Sadeghi et al., 2014). To keep pace with these changes, in this technology age society, education needs to effect changes that will be suitable and relevant to prepare students to be ready for this information society (Sadeghi et al., 2014). This perspective is also shared by Neo, Park, Lee, Soh, and Oh (2015) and Scherer, Ronny, Siddiq, and Tondeur (2019), who suggested that today, educators are pushing to make educational technology ready and suitable for modern

students, who need to move away from the traditional teacher-controlled classroom to more interactive lessons. McKinney, Yous and Snead (2017) argued that teachers are concerned with the effect that they will ultimately have on incorporating technology into their instruction. Mahajan, (2012) noted that as technologies have evolved, they have direct impact on the teaching and learning environment in schools by changing the roles of the teacher and the student as teaching and learning occurs. Several studies were evaluated to discover the stance regarding technology adoption and use among teachers.

The TAM is concerned with how individuals adopt and apply innovations and can extend to how teachers use educational technology (Holden & Rada, 2011). Scherer, et al. (2019) shared a similar perspective on the topic and argued that despite controversies surrounding the TAM, consensus still prevails about the effectiveness of the TAM in predicting teachers' adoption and use of technology in their teaching. One of the primary elements coming out of TAM studies detailing teachers and how they adopt and use technology is how teachers' attitudes contribute to technology adoption among them. McCallum, Jeffery, and Kinshuk (2014) studied the factors that that impact teachers' adoption of mobile learning and found that attitudes and beliefs were major considerations for teachers to adopt and use technology in their classrooms. Lopez-Perez, Ramirez-Correa, and Grandon (2019) conducted a study on primary teachers in Chile and arrived at a similar conclusion regarding teacher adoption and use of technology in their teaching. Fathema, Shannon, and Ross (2015) arrived at a similar conclusion when they studied the behavior of faculty members toward adoption and use of Learning Management Systems in their teaching. Fathema et al. indicated that a TAM survey

revealed that the faculty attitude played a key role in determining whether they adopted technology in their teaching as well as how much they used the technology. A study by Ursavas et al. (2014) identified the TAM as an important guide to ascertain users', in this case, teachers, perceived ease of use and perceived usefulness of technology in the classroom and what attitudes they display.

In keeping with the elements of the TAM, perceived ease of use and perceived usefulness, Motshegwe and Batane (2015) researched the circumstances surrounding instructors' attitude toward technology acceptance and use. They discovered that perceived ease of use and perceived usefulness have favorable impacts on teachers' attitudes toward technology acceptance and use. Lopez-Perez et al. (2019) added that performance expectancy, social influence and facilitating conditions were important factors in determining teachers' acceptance and use of technology, Holden and Rada (2011) studied how teachers adopt and use technology and found that, like Ursavas et al. (2014) and Motshegwe and Batane (2015), perceived ease of use and perceived usefulness were important elements to predict attitude to adopt and use technology in teaching.

Another element of teachers' technology adoption that was revealed from the TAM studies was self-efficacy and how it guides teachers' adoption and use of technology. Holden and Rada (2011) used the TAM to measure teachers' perceived usability and self-efficacy in relation to technologies being used. Holden and Rada suggested that in addition to assessing usability and attitude toward technology use, teachers' level of self-confidence relative to their technology use is very important in

their adoption and use of technology. As well as expressing similar points of view, Khlaif (2018) added that teachers display a variety of attitudes toward technology adoption and use, but there were other variables that contributed to forming these attitudes such as previous experience, technical support, training support, and availability of technology. Contrary to other researchers, Motshegwe and Batane (2015) found that although self-efficacy was important in determining perceived usefulness, perceived ease of use, and attitude, it was an external component of the TAM. This perspective was not expressed by other researchers.

Fathema et al. (2015) studied the challenges faced by faculty in in adopting Learning Management Systems and behaviors that they exhibit. The results revealed that self-efficacy and facilitating conditions were important determinants of faculty attitudes toward innovation, once again signaling that self-efficacy is a very important consideration in how teachers adopt and use technology as a teaching tool. McCallum et al. (2014) had similar findings in their exploration of the approaches to mobile technology use among teachers. Once again, self -efficacy is named in the list of variables responsible for teacher adoption and use of mobile technology in their teaching. McCallum et al. found that self-efficacy was an important element for determining teachers' behavioral intention to use technology.

Outside of the usual perceived ease of use and perceived usefulness, and teachers' beliefs and attitude, a few other variables have been identified as impacting teachers' intention to adopt and use technology. Fathema et al. (2015) noted that finding was teachers voicing their need for in-depth training and professional development to gain

familiarity with technologies. Khlaif (2018) similarly argued that training was an important factor in whether teachers would adopt and use technology in their teaching. Ursavas et al. (2014) presented a similar case, suggesting that teachers' perspectives about the use of technology in their classroom will determine what they promote in their teaching. Fullan (2007) wrote about teachers' expertise in in determining their level of adoption of the technology.

It is therefore evident that teachers' adoption of technology is not a straightforward undertaking; neither can it be decided using single variables. Many different factors contribute to how teachers adopt and use technology in their teaching.

Findings From Technology Acceptance Model Studies in Education

Some researchers present key findings about the use of the TAM in educational settings. Durodolu (2016) conducted a study to ascertain how individuals interact with technology and to predict how they make decisions to adopt technology. The findings showed that one of the major reasons for failure to adopt and use technology is fear and resistance to the technology. The author recommended that appropriate training be provided in real life environments to derive better attitudes to technology adoption. Ngafeeson and Sun (2015) carried out a study to ascertain how students accept e-books. From the findings of the study, it was deduced that when individuals display willingness to test technologies, positive results accrue in addition to incidentally affecting the user's intention to use the technology. The results also revealed that technology creativity and originality can be used with the TAM to study the process of technology adoption. Finally, Ngafeeson and Sun also suggested that technology can affect acceptance,

adoption, and the use behavior of the specific technology. Van de Bogart and Wichadee (2015) in a study to determine how users accept technology as an academic tool and the elements that could influence intention to use technology, discovered that perceived usefulness and attitude to use formed a positive bond with intention to use, while perceived ease of use bonded with perceived usefulness.

Kelly (2014) used the TAM to trace a path analysis and create an understanding of the adoption process of open educational resources with a concentration on self-efficacy. According to the findings of the study, self-efficacy had a profound effect on perceived usefulness. Additionally, like in Van de Bogart and Wichadee's (2015) study, perceived ease of use was found to have a profound effect on perceived usefulness. The effect of self-efficacy on acceptance on innovation was studied by Fathema et al. (2015) who found, like Kelly (2014) that self -efficacy was important in deciding whether the user will adopt the innovation increasingly easier and with more confidence. Fathema et al. (2015) suggested from the findings that when individuals are aware of the features and functions of a technology, they display self -efficacy as their perceived ease of use and perceived usefulness will be improved. Taherdoost (2018) studied user acceptance of new technologies as he posited that it is important to learn users' response to new technology and the factors that triggered their decisions. One important finding was that the focus of the TAM surrounded beliefs of the individual about technology. The findings also revealed that beliefs affected attitudes and behaviors toward technology adoption and use.

Technology Adoption in K-12 Education

Technology integration is when different technologies such as computers, interactive media, satellites, teleconferencing, and other technological innovations are used to support and enhance the learning environment (Larson, Miller, & Ribble, 2010). Technology integration is influenced by how the technology is adopted and diffused. Diffusion of technology in educational environments can influence the adoption and use of technology among individual teachers but can be a lengthy process lasting for 10 years (Kershaw, 1996). Greenhow and Askari (2017) noted that with technology being ubiquitous and social network sites becoming increasingly pervasive, it is important that it becomes clear as to what effect these technological developments have on K to 12 education. The authors added that it is important to ascertain how these technologies are perceived and used by both the teacher and the student in the classroom. Kershaw argued that diffusion of technology in education will depend a great deal on the teachers and how quickly they decide to adopt and integrate technology into their classrooms. The direction of this situation will be guided by the level of support that staff receives, the amount of training that they receive and the time that they have. This could be of a short duration, or it may take a long time to be diffused.

Barriers to Technology Adoption

Schools have been urgently trying to place more technologies within K to 12 classrooms, but they have been facing many barriers that inhibit incorporating technology into the curriculum (Grant et al., 2015). Chouk, Talea, Okar, and Chroqi (2020) stressed that despite the phenomenal growth of information technology, sparse attention has been

given to the barriers to the adoption of the technology. Shah (2012) argued that it is now very important that educators shift focus to increasing the amount of technology available to the education sector. A range of technology studies have highlighted a number of challenges in adopting and using technologies in the K-12 education (Basham, Smith, Greer, & Marino, 2013; Grant et al., 2015; Lee, Messom, & Yau, 2013; Lo & Hew, 2017; Tondeur, van Braak, Ertmer, & Ottenbreit-Leftwich, 2017).

Technology integration is far more than acquiring technological skills. It is mainly concerned with manipulating the technology to create effective teaching and learning (Sun, 2012). Bergman (2016) argued that with the vast sums of money invested in educational technology, it is important to consider whether these technologies are being used by their end-users and whether they are affecting teaching and learning. Admiraal, et al. (2017) suggested that the level of adoption and acquisition of technology skills in teachers is dependent on how the teachers apply the technology in their schools after they graduate. Barriers to technology adoption can be placed in two categories; first order barriers and second order barriers (Atkin, Chaudhry, Chaudry, Khandelwal, & Veerhoogen, 2017; Hechter & Vermette, 2013). First order barriers are also labeled as environmental or external barriers, while second order barriers are more intrinsic and are focused on the teachers' beliefs regarding the teaching and learning situation in their classrooms (Burden & Hopkins, 2016).

External or environmental barriers as noted above are considered first order barriers. As teachers attempt to make technology an important tool in the classrooms, they will inevitably encounter external challenges (Bergman, 2016; Chouk et al., 2020;

Grant et al., 2015). External barriers include lack of training and support, lack of certain resources such as equipment, and lack of time. These entities could be absent from the classroom, or not available in sufficient quantities to be effective (Chouk et al., 2020; Ertmer, 1999). Teachers will not be successful in integrating technology into their teaching if they are not provided with ample hardware and software (Burden & Hopkins, 2016; Hew & Brush, 2007). But hardware and software are not the only external barriers that teachers should overcome, but also having enough time to access websites and relevant applications and a number of activities (Ertmer, 1999). Lack of training for teachers is also a barrier to consider. Teacher training – for teachers to successfully infuse technology into their and learning, they need to be trained to improve their technological teaching skills (Atkin et al., 2017; Clarke & Luckin, 2013). Teachers must be armed with the skills to make them technologically competent to present lessons in a technologically sound manner (Burden & Hopkins, 2016; Chen, Looi, & Chen, 2009). Moursand and Bielefeldt (1999), in their seminal work, reported that the major reason teachers lag in their technology in the classroom amounts to them not having a comprehensive grasp of how technology is to be used in teaching. Gray, Thomas, and Lewis (2010) who substantiated this premise found that only a small number of teachers knew how to use a computer in university classes. They stated that a substantial number of teachers admitted that they still could not use a computer independently as a teaching tool. To be adept adopters and users of technology in the classroom, teachers need exposure to both in-service training and continuous curriculum guidance (Atkin et al., 2017; Ertmer, 1999). Atkin et al. (2017) stated that one way to overcome the barrier of training is to offer

tangible incentives so that they will put more effort into gaining competence in technology adoption and use.

Significantly, one major barrier to technology adoption in K-12 is that in many schools, mobile devices are prohibited. Project Tomorrow (2012) reported that more than half of some school districts in the US place restrictions on students using their mobile devices in school. Additionally, some these mobile devices and their data plans are very expensive and so would not be sustainable in a school setting. Brenner and Brill (2016) in a study to identify ways in which teachers integrate technology into their teaching and what challenges they experience, discovered that mentoring by colleagues who did not possess expert knowledge was a main issue among teachers. Teachers suggested that a training program should include practical aspects combined with theory, as they were inhibited by the lack of multiple occasions for getting hands on experience in applying the technology (Brenner & Brill, 2016).

As well as extrinsic barriers, which are more tangible, easier to quantify and remove, internal or intrinsic barriers also affect teachers' adoption and use of technology in their teaching. Burden and Hopkins (2016) conducted a study on barriers and challenges that face pre-service teachers in using mobile technologies as part of their teaching toolbox. Their findings suggested that the major factors affecting student-teachers were the extent of their belief in their abilities and their attitudes toward the technology, which is considered a second order barrier or intrinsic. Intrinsic barriers are intangible and include teachers' underlying concepts about their role in the student - teacher interaction, the elements of the curriculum that should be given priority and the

most effective assessment strategies to employ for their students (Ertmer, 1999). Teachers' beliefs are fundamental to their adoption and use of technology (Burden & Hopkins, 2016; Kearney, Schuck, Aubusson, & Burke, 2018).

Sun (2012) noted that research about teacher beliefs about technology adoption falls under three headings: attitudes toward technology and technology uses, self-efficacy, and pedagogical beliefs. Attitude toward technology and technology use is an important indicator of teachers' decision to adopt and use technology in their teaching. Christensen (2002) conducted a study to determine the attitudes of a group of elementary school teachers and found that teachers feared that they would not be able supersede the technology skills of their students, and this impacted their negatively on teachers' tenacity in adopting and using technology in their classrooms. Burden and Hopkins (2016) noted that the literature suggests a decline in the barriers of access, training, and infrastructure, their findings revealed otherwise. The findings indicated that first order barriers are still proving challenging in teachers' adoption and use of technology.

Another tenet of teachers' beliefs about technology adoption and an intrinsic barrier, is teacher self-efficacy beliefs, which Bandura (1997) described as the extent to which teachers believe they are equipped to work with technology as a teaching tool. In a study to survey a group of secondary and elementary teachers, Piper (2003) concluded that self-efficacy was instrumental in how teachers decide to adopt and use technology in their teaching. Mueller, Wood, Willoughby and Cross (2008) conducted a similar study of elementary and secondary teachers' self-efficacy about technology adoption and use and found that teachers who actively interacted with the technology displayed high self-

efficacy, while low self-efficacy was evident among those with less interaction with technology.

Similar to teacher attitude and self-efficacy beliefs toward technology adoption and use as intrinsic barriers, teacher pedagogical beliefs can also impede effective technology adoption and use. Researchers have advocated that teachers' pedagogical belief aligns with how well they use technology (Kiili, Kaupinnen, Coiro, & Utriainen, 2016; Nihuka & Voogt, 2012; Pynoo et al., 2012). Pynoo et al. (2012), after studying a group of elementary teachers, found that conventional teacher beliefs appear to create negative effects on how teachers integrate technology into their classrooms. Kiili et al. (2016) also found that when hands-on training is provided for teachers, they are more likely to improve in self-efficacy and confidence. Kisanga and Ireson (2015) carried out a study to examine the barriers to technology adoption among teachers and ways to remove these barriers. They found that teachers' attitudes to technology adoption and use of technology was instrumental in their acceptance and use of technology in their teaching. This is a perspective also discussed by Teo (2012) who argued that teachers' attitude to technology adoption and use figure considerably in their decision to accept or reject technology.

Pressure to Adopt Technology

Developing countries are coming under increasing pressure to emulate developed countries to incorporate technological innovations into their curricula, and ultimately into their classrooms as technology become increasingly important in society (Al-Adwan et al., 2013). Thus, teachers are under immense pressure to change their approach to

teaching and learning to try new methods of teaching, which are framed by technology infusion (Choy, 2014; Kearney et al., 2018). Kearney et al. (2018) argued that teachers face mounting pressure from a variety of external stakeholders to use technology in their teaching, despite provisions of professional development and support. In an earlier study, Christensen (2002) studied the attitudes of primary school teachers to technology and found that teachers were fearful of not being effective in attaining superior technology skills than their students. According to Christensen, the attendant pressure negatively impacted how the teachers incorporated technology into their teaching.

But pressure to adopt and use technology in the twenty-first century classroom is not placed on just teachers. Gentry, Baker, Thomas, Whitfield, and Garcia (2014) explained that, regrettably, many school districts in the US face constant pressure in financing and providing teachers with adequate technologies to impart twenty-first century skills and content to their students. Lim, Zhao, Tondeur, Chai, and Tsai (2013) and Alanezi (2017) note that technology is rapidly changing the way that society functions as digital resources become more available to carry out an inordinate number of daily activities. Alanezi (2017) argued that teachers, especially in the case of Saudi Arabia, are not well trained to take on the role of technology adopters and users. This lack of training adds more pressure on the education system to provide adequate training for the teachers as well as the right technology tools to enhance education. Lim et al. further stated that education has not caught on to this phenomenon, considering the extent to which students interact with various technologies outside of school. This situation puts school administrators under pressure to provide adequate and relevant technology at the

disposal of teachers (Lim et al., 2013). Henriksen, Mishra, and Fisser (2016) argued that educational administrators are under pressure to reconcile technology rich learning environments with the plethora of mobile technologies available to teachers to enhance teaching and learning.

Educators in general, and teachers in particular are under pressure to align technology adoption and use in the classroom with what obtains in the business sector which suggests that the education system is responsible for providing students with the necessary training to become productive members of society and by extension the workforce, by infusing technology into the school curriculum (Kervin, Verenikina, Jones, & Beath, 2013; Webster, 2017). Gentry et al. (2014) espoused a similar perspective, indicating that technology is an important component of modern society ad teachers should harness the skills. Webster (2017) noted that this is also a premise shared among K-12 leaders.

Culture, Teaching, and Technology

The public-school system is getting increasingly diversified yearly and those served in education come from a wide cultural and language background, but the variety in teacher backgrounds remain static (Oh & Nussli, 2014). In many cases the teacher's cultural background is used as the basis for the classroom culture created, and this is likely to lead to cultural conflict (Oh & Nussli, 2014). When making teaching and learning decisions, it is important to consider the cultural effects that the teaching and learning situations could have on the teaching and learning environment (Findayatini, Hawthorne, McColl, & Chivaroli, 2016). Despite Western education's increasing

presence in international markets, not much thought has been given to the suitability and attainability of this brand of education for its international clients (Prowse & Goddard, 2010). Researchers such as Feast and Bretag (2005) argued that Western curricula and styles of teaching are especially relevant for seamless access to education spanning different cultures. Prowse and Goddard (2010) noted that it is necessary to incorporate cultural expectations in the curriculum to enhance learning. This premise was discussed by Abayadeera, Mihret and Dulige (2019) in their study of cultural integration in an Australian university. According to Prowse and Goddard, this is particularly noticeable in situations which require Western course facilitators to migrate to transnational campuses where they are out of touch of their culture while making their Western curricula available to culturally diverse student populations.

Culture is a concept that is not easily defined as culture can mean different things depending on the context of the discussion (Mahmoudi et al., 2015). Culture can mean the way a people live and what behaviors, principles, and concepts drive their behavior as well as the habits that they practice daily (Liddicoat, Scarino, & Kohler, 2018; Mahmoudi et al., 2015). Recent definitions of culture present culture as a network of information, (Gudykunst & Lee, 2003; Spencer-Quatey, 2012). Other definitions, however, highlight it as resolving issues because culture drives and directs people's behavior (Lustig, & Koester, 2003). Spencer-Quatey (2012) presented culture as, "Belief, art, morals law, custom, and any other capabilities and habits acquired by one in someone as a member of society" (p. 1). However, apart from these general definitions, there is a specific culture as it relates to education. Grant et al. (2015) stated that culture in education should not be

confined to training and routines that impact the pedagogical environment. Culture in education should also encompass the individual, knowledge acquisition, and learning styles (Grant et al., 2015). Liddicoat et al. (2018) stated that culture should not be a confining phenomenon, but rather it should an entity that draws on the wider community in which it occurs and is ultimately guided by school participants as they interact in their environment. Thomas (2003) suggested that in teaching, culture is passed on, and this includes displays of knowledge, skills, and attitudes. Thomas (2003) added that education is a system that is primarily a sociocultural phenomenon. Next, we will discuss differences in teaching practices across cultures, followed by a review of literature related to differences in technology adoption and use across cultures.

Difference in teaching practice across cultures. A definition of effective teaching will reveal numerous perspectives guided by the culture of the teaching environment (LeGros & Faez, 2012). Chavez and Longerbeam (2016) and Prowse and Goddard (2010) noted that teachers are best advised to use their perception of students' culture to plan and implement their pedagogical strategies to ascertain high attainment in students. They posited that cultural characteristics and tendencies affect the classroom environment and fosters learning among students. The definition of effective teaching is dependent upon the cultural origin of the teacher, or the cultural mix of the organizations (LeGros & Faez, 2012). Chavez and Longerbeam stated that the teaching and learning environment, especially the interaction between students and staff, is underpinned by culture. LeGros and Faez noted that what constitutes productive pedagogy mirrors the behaviors and beliefs of the culture and language where the teaching and learning takes place. This is a

similar perspective to that presented by McIntyre, Mulder, and Mainhard (2020) in their study on teacher gaze that found teacher eye contact conveyed greater dominance.

Prowse and Goddard (2010) carried out a study of teachers' approaches to pedagogy in a Canadian college and its sister campus in Doha, Qatar. They studied how the Canadian teachers adapted their Western style teaching to suit the needs of the Qatari students. The findings of the study demonstrated that Western teachers in Qatar adjusted their teaching and learning to suit their students' cultural needs, while in Canada, the teachers were less evaluative of their teaching approaches and the cultural needs of their students (Prowse & Goddard, 2010). LeGros and Faez (2012) argued along similar lines, stating that the idea of knowledge and teaching characteristics is based on the premise that all cultures have different notions of the concepts of culture. LeGros and Faez (2012) expressed a similar point of view when stating that ideas about effective teaching should mirror the expectations and merits of the culture where the teaching is taking place. This is a point of view supported by Aggarwal and Zhan (2017) who argued for the importance of culture in teaching, adding that it is deeply affected by the way the group interacts. LeGros carried out a study on the impact of intercultural communications on a group of International Teaching Assistants and their interaction within a teaching environment in Canada. The study revealed that the International Teaching Assistants' intercultural competent teaching behaviors enhanced their pedagogical experiences in the classroom. Chavez and Longerbeam (2016) substantiated this premise by suggesting that staff bring their own idea of culture and learning to the classroom, so when their culture is tied to existing cultures in the classroom, teaching and learning is enhanced.

Ozman (2011) studied the phenomenon of non-Verbal Immediacy Behavior as it relates to a cross cultural group of teacher trainees. The study revealed that non -verbal immediacy behavior is invaluable in augmenting and contributing to effective pedagogical practices and teaching and learning environment. Ozman stated, however, that like components of communication, non-verbal immediacy could be construed differently in different cultures.

Within the United States the provision for cross-cultural education varies depending on many factors which are unique to each state (Morrier, Irving, Dandy, Dmitriyev, & Ukeje, 2007). If teachers are interested in bridging the cultural learning divide, they might begin with discourses with students who spend hours conversing with their peers in the many cross-cultural exchanges (Chavez & Longerbeam, 2016; LeGros & Faez, 2012).

Rajaram (2013) discussed the plight of Chinese mainland students who enrolled in overseas Western style courses but were isolated from their culture. Rajaram argued that curriculum and course designers need to be mindful of the best approaches to effectively teach Western – based education across cultures. The author found that effective learning for mainland Chinese students pursuing Western-style education was supported by effective instructional strategies. Tan (2011) posited a similar perspective by arguing that the primary problem for studying international business is ascertaining the availability of relevant pedagogical approaches that facilitate student progress. Aggarwal and Zhan (2017) conducted a similar study and concluded that culture affects

the way business decisions are made based on individuals' beliefs and values inherent in the individual.

Rhodes (2013) researched culturally responsive teaching practices that impact the teaching of English as second language students and English for Academic Purposes. The author wanted to discover how teachers in Florida responded to the cultural needs of their students and the level of importance attached to their culturally responsive practices and found that when ESL teachers cater the students' native culture as a primary inclusion in their instruction, it makes learning more effective and meaningful. Rhodes also unearthed the fact that one major problem among a number of cultures is planning and delivering learning that meets the needs of their students' various cultures.

Similar concerns governed the study of non-Native teachers who teach First Nation communities in Canada. Kurniawati and Rizki (2018) and Oskineegish (2015) studied concerns about whether culturally relevant teaching was taking place among the First Nation communities and how non-Native teachers could improve their approach to teaching and self-evaluation. Findings from Oskineegish's (2015) research showed that most teachers recruited to teach First Nation and Inuit schools are non-Native teachers with varying levels of experiences in remote areas. Oskineegish (2015) also uncovered a raft of difficulties that non-Native teachers face derived from a deficient training and preparation about the best and most suitable cultural practices needed for success within these schools. Kurniawati and Rizki also supported these ideas. They advocated that non-Native teachers bring varied experiences to the classroom that could be ultimately beneficial to the First Nation students. These ideas are like those posited by Hilburn,

Rong, Parkhouse, and Turner (2015) who argued that the onus is on the teachers to be aware of their approach to pedagogy and how it impacts the less experienced students as well as how school culture impacts the students. Both studies stated that in many instances, teachers of multicultural student groups usually take up teaching positions with very little preparation in in incorporating the students' culture into their teaching and learning strategies. According to Hilburn et al. (2015), the best approach to a culturally diverse curriculum is to engage in cross-disciplinary studies that suit the styles of the culture of students.

The idea of teachers getting fully prepared to take up cultural teaching assignments is further supported by Zenkov et al. (2014) who stated that, "Culturally relevant pedagogy (CRP) empowers ethnically diverse students and youth from under-resourced communities who struggle to engage with school due to societal perceptions their deficiencies" (p. 3). Zenkov and his colleagues maintained that the thrust of the CRP has been to raise awareness of the characteristics of teachers and their curricula, while keeping in mind the cultural attributes which contribute to students' attainment.

Rajaram (2013) noted that the rapid influx of Chinese learners into the Anglophone countries such as Australia, New Zealand, the UK, the United States, and Canada has caused their modes of learning to be a key concern. Schenk (2020) argued from a similar perspective regarding South Korean situation. This situation created a similar concentration in East Asian countries such as Singapore, Japan, Hong Kong, and Macau, known as developed and modernized countries, and China and Taiwan, known as developing countries. Education systems based in Asia liaise and plan with their Western

counterparts to develop a potential workforce and for teachers to eventually arm students with a multicultural skillset that will fit them into a global workplace. However, as discussed previously by Schenk (2020), Zenkov et al. (2013), Hilburn et al. (2015), and Oskineegish (2015), the responsibility for students developing multicultural mindsets rest with the teachers providing appropriate cultural teaching and learning environment which are suitable for cultural teaching and learning.

The influence of culture on teacher practices has been studied by authors including Schenk (2020), Kurniawati and Rizki (2018), McVee (2014), Oskineegish (2015), Bradshaw (2015), and Jovel and Lucas (2015). McVee conducted a study about the different stances of teachers regarding the cultural mix of students within the United States situation and presented three recommended paths for teachers and educators to follow when incorporating cultural considerations into teacher training courses. Oskineegish (2015) studied culturally focused pedagogical practices among non-Native teachers in First Nation enclaves, found that to be successful among native First Nation students, non- Native teachers it is vital that they create a habit of self-reflection on how culture fits into their teaching practice and to bolster their teaching approaches to as well as develop a fitting attitude toward cultural integration.

Levis, Sonaat, Link, and Barriuso (2016) conducted a study to compare the teaching style of a non-Native teacher and a Native teacher and to study whether the effect on students was different for either teacher. The findings indicated similarity between the approach and results of both teachers. Bradshaw (2015) examined the association of observed and self-respected culturally proficient teaching practices.

Bradshaw examined the cultural capability of K to 8 grade teachers in six schools who self-reported about their cultural competencies and pedagogical applications and discovered that even with increased diversity here remains general absence of the means and capacity of teachers that could alleviate cultural issues in the classroom. Bradshaw added that there is a need for more of a concerted effort among teachers, so that they can alleviate cultural issues within the classroom.

Jovel and Lucas (2015) surveyed the occurrences and encounters of three teachers in a California high school that was transitioning from being a public school to a Jesuit school and how these teachers contributed to the changes by incorporating cultural responsiveness into their practices. The researchers found that when the principles of cultural responsiveness guided their teaching strategies, through a Corporate Work Study Program the results were favorable in enhancing the success of teachers.

Differences in Technology Adoption Across Cultures

Despite the increased use of educational technology in multicultural environments, educational technology users across various national and professional experiences are likely to display unique attitudes and behaviors toward technology (Berkowsky, Sharit, & Czaja, 2018; Nistor et al., 2014). Nistor et al. (2014) presented Hofstede's (2001) perspective of culture as the different ways that people think, feel, and behave based on a lifetime of experiences doubtful to be changed by the person. Culture discussed in this section is mainly about national culture, but professional culture will be mentioned periodically to clarify concepts.

The UTAUT as a major determinant of educational technology acceptance has been confirmed across few cultures (Almaiah, Alamri, & Al-Rahmi, 2019; Gogus, Nistor, & Lerche, 2013). Asher and Gao (2018) conducted a study to ascertain the relevance of the UTAUT model to measure student acceptance of Learning Management Systems in Saudi Arabia. The UTAUT is a reasonable measure of students' decision to adopt and use the technology as a study tool. Gogus et al. (2013) carried out a study to extend the use of the UTAUT to a Turkish culture, while exploring cross-cultural differences between regions as well as professional cultures. The results of the study indicated that regionally, Istanbul led the other Turkish regions in performance expectations, displayed less computer anxiety, and were more inclined to evaluate their use educational technology. Gogus et al. reported that the Turkish technology users registered considerably higher ratings than German and Romanian users in performance expectancy and effort expectancy but were overtaken in perceived facilitating conditions. Turkish computer literacy was adjudged to be on par with that of German and Romanian users, the main explanation of their usage behavior.

Thomas et al. (2013) also, conducted a comparative study of different versions of the UTAUT to explain mobile learning (MLearning) adoption in a developing country, Guyana, and determine the extent of the effects of the aspects of the UTAUT on behavior intention to adopt mobile technology in higher education. The authors used a web survey of university students to gather data. Thomas et al. found that culture and country level differences diminished the influence of the UTAUT making a direct application of the model lead to important relationships being missed. Gaffer, Singh, and Thomas (2011)

found that MLearning was not a formal fixture in the curricula of higher education institutions in Guyana. A similar situation applied to using e-learning technologies which have been adopted by teachers and students, but not formally integrated into university teaching and learning plan (Gaffer et al., 2011). In a study to investigate some of the important factors that contributed to or impeded the adoption of e-learning innovations by a university in a developing country (Qatar) and a developed country (the United States), El-Masri and Tarhini (2017) discovered that social influence and effort expectancy are instrumental in more students deciding to adopt technology in their studies. Also, the results indicated that facilitating conditions enhances e-learning in developed countries and not in developing countries. Thomas et al. (2013) argued that the infrastructure is important in adoption of MLearning, but human attributes such as attitude and culture are equally important in adoption of technology. Two important elements that drive the success of MLearning are the openness of the individual to using technology and how intellectually involved the user becomes in using technology (Sarrab, Al Shibli, & Badursha, 2016). MLearning projects present novel ways for classroom interaction by fostering positive attitudes toward learning among learners (Manoj & Jayesh, 2014). Ameen and Willis (2015) stressed that challenges will arise as new technologies appear across different cultures. Ameen and Willis argued that if technology adoption is going to be successful, there needs to be more research on how culture affects technology use.

Leklanya (2013) highlighted the need for clarity in the elements that influence the diffusion and adoption of technologies within the rural districts of South Africa. Lekhanya conducted a study to decide what cultural tenets exert influence on how

diffusion and adoption of technology occurs in rural South Africa. The results of the study showed that many of the participants are interested in culture as an important consideration when adopting technologies, especially social media technologies.

Ameen and Willis (2015) analyzed literature based on mobile technology adoption in Arab cultures and found that many cultural elements contribute to the adoption of mobile technology in Arab regions, particularly those cultural factors which are solely related to the Arabic culture. Ameen and Willis added that researchers who concentrate on human-computer interrelation experienced numerous problems as they created new technologies for different cultural situations. They described this situation as particularly acute in bridging the gap between developed countries and developing countries. Lee, Trimi, and Kim (2013) and El-Masri and Tarhini, (2017) highlighted the important part played by culture in predicting technology adoption in developing countries. Briscoe, et al. (2010) argued that adoption of new technology is influenced by users' cultural experiences. This is a perspective that parallels Leklanya's (2013) premise that cultural precepts influence adoption of technology. Similarly, Ameen and Willis (2015) and Alsheri, Rutter, and Smith (2019) stated that it is important that designers of new technologies are cognizant of the cultural implications of new technology and align their designs with appropriate cultural beliefs.

Teaching and Technology in the United Arab Emirates

The UAE is reported to be implementing policies in education to foster sustained growth and development in a society that is seeking to raise education levels throughout the education sector (Alzouebi & Isakovic, 2014; Dorsey, 2018). The government

implemented the Etiselat Educational Technological Center to facilitate smart education and enhance research and development initiatives (Weber & Hamlaoui, 2015). One major aspect of the UAE education school policy is that students are to be taught in a technology driven ethos that fosters interactivity and technology adoption to aid ESL instruction (Al Awidi & Ismail, 2014).

Over more than a decade the UAE has been experiencing pivotal and rapid transformations in its education system by switching educational domains to eventually follow Western style teaching and learning models (Dorsey, 2018; Pennington, 2015; Ridge et al., 2017). The UAE has made technology integration a major element of educational change and advancement. There have been no recent research studies on the effect of this change in education policy since its inception, although there have been more recent articles and reports that describe the impetus for the changes and the policies that were adopted such as Dorsey (2018), Pennington (2015), and Ridge et al. (2017)

There has been a proliferation of various technology tools in the UAE and they are important in the teaching and learning situations (Alzouebi & Isakovic, 2014). Alzouebi and Isakovic noted that technology in the Arab region, which includes the UAE, has an influential role in both formal and informal educational contexts. Bindu (2017) stressed that it is important that teachers are provided with the necessary skills to master technology as a teaching tool. Hopkyns (2014) argued that the UAE does not possess the cadre of native teachers to fill their teaching needs which leads them to employ native English speakers to help to facilitate the program of growth and development.

There are various reactions to change in educational institutions in response to paradigm shifts in technology and culture with heightened expectations from stakeholders to have technology as a ubiquitous tool within education (Liu, Rotzhaupt, & Cavanaugh, 2012; Weber & Hamlaoui, 2015). The UAE education system has traditionally operated with a teacher -focused application of the curriculum (Tamim, 2013). Mobile learning has become an integral part of the teaching and learning environment of the UAE so mobile technology cannot be disregarded as a viable teaching tool (Engin, 2014). The Ministry of Education has advocated for new approaches that fall under the aegis of the Vision 2020 initiative, a project that was initiated in 2000 to improve the performance of schools in the nation (Tamim, 2013). The UAE government is eager for the education system to excel and keep pace with the universal pace of technological development, so they commissioned a re-organization of the teaching and regulatory bodies in the education system (Al-Taher, 2012). Although the leaders of the UAE have been supportive of technology integration in education, increased availability in schools does not convert to adoption and effective use (Tamim, 2013).

Summary and Conclusions

This chapter was a review of literature focused on teachers' perceptions, attitudes, beliefs, and behaviors regarding the adoption and use of technology and how culture contributes to technology adoption and use. The TAM was explored as a suitable theory to explain how teachers adopt and use technology in their teaching. The chapter included a review of the TAM and its ability to measure the level of ease that teachers experience in incorporating technology into their teaching and learning as well as how useful they

find the different technologies in enhancing their teaching toolbox. The research indicated that educational managers and leaders need to be cognizant of the barriers that inhibit teachers' adoption of technology in their teaching and what are their perceptions, attitudes, beliefs, and behaviors regarding technology adoption. Learning about teachers' beliefs and approaches to technology adoption could lead educational leaders and managers to provide the best technologies for their teaching experiences.

This literature review was helpful in unearthing the situation of technology acceptance in K to12 schools and factors that hamper or enhance technology use within K to 12 groups. There was the need for educational leaders to measure the effect of culture on the adoption and use of technology in the classroom. Arising from the literature was the need to for teachers and managers to be aware of the role culture plays in technology adoption, with a specific focus on technology adoption and use in Abu Dhabi schools. Chapter 3 will detail the proposed design of the study employed in answering the research questions.

Chapter 3: Research Method

The purpose of this mixed-methods study was to discover how teachers at one secondary school in the ADEC in the UAE from different cultural backgrounds adopted and accepted technology in their teaching. Despite the extensive body of knowledge that is available about adoption, acceptance, and use of technology in education, few researchers have examined technology adoption in the context of different cultures, and a search of the literature did not yield any articles regarding technology adoption and use between NAS and NES. Understanding how cultural differences might influence adoption and use of technology can inform decisions about technology support and professional development in schools.

Six areas frame this chapter to outline the methodology used in this study. First the setting is described. The research design and rationale are justified with respect to research questions, the central phenomenon, and the research process. The role of the researcher is explained, including possible biases. The methodology section includes the data collection and analysis process that was used in the study and how participants were selected. The methodology section is followed by a discussion of threats to validity and issues of trustworthiness, which addresses credibility, transferability, dependability, and confirmability, and concludes, with a summary of the chapter.

Research Design and Rationale

With the influx of Western teachers into the ADEC system, it became important to understand how Western, non-Native teachers adopt and use technology in their teaching, compared to the Native teachers. Differences between the groups might have

implications for professional development and technology support. The purpose of this explanatory sequential mixed-methods research was to better understand how teachers from two different cultural groups (Western and Arab) teaching in a secondary school in Abu Dhabi adopt and use technology in their teaching. The levels of technology acceptance and use among the two groups of teachers in the school was measured by the TAM; I then used observations and interviews with a smaller sample selected based on TAM results to more deeply understand cultural differences in technology acceptance and practice. In this mixed-methods study, the quantitative analysis had less emphasis than the qualitative portion. Explanatory sequential designs are used when a researcher wants to identify appropriate participants to study in more depth qualitatively (Ary et al., 2019). In this research study, I sought to better understand the relationships between technology acceptance, culture, and classroom practice with technology. Using the explanatory sequential design allowed me to select teachers with differing levels of technology acceptance from two different cultures whose classroom technology practices could then be studied in more depth.

The choice of an explanatory sequential mixed-methods approach to this inquiry was focused on discovering how teachers from different cultures perceive the usefulness and ease of use of technology (their level of technology acceptance) and how that might, in turn, influence their decisions to use technology and their practices in incorporating technology intro instruction. More particularly, I sought to understand potential similarities and differences between teachers from these two cultures who scored low and high in terms of technology acceptance. I wanted to learn the interaction between culture,

technology acceptance, and classroom decisions about technology use. This context was unique as it allowed me to examine technology adoption in a context where there was external governmental pressure and a teaching sector that included both native Arab-speaking (NAS) teachers from Arab cultures and native English-speaking (NES) teachers from Western cultures. I used interviews, observations, and the TAM survey to unearth attitudes, behaviors, perceptions, and cultural implications of technology adoption and acceptance in teaching.

The research questions that framed the study were:

RQ1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitudes toward technology adoption between NES and NAS teachers at a secondary school in Abu Dhabi?

$H_0$1: There are no statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

$H_1$1: There are statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

RQ2: How do NES teachers and NAS teachers in a secondary school who exhibit differing levels of technology acceptance use technology in their classrooms?

RQ3: How do NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about adoption and use of technology in their classrooms?

The design of this mixed-methods study was informed by Teddlie and Tashakkori (2008). The focus of this inquiry was to gather data about how NES teachers adopt and use technology, compared to NAS teachers and to compare the cultural implications of their perceptions, attitudes, and behaviors and use of technology in an Abu Dhabi secondary school. A mixed-methods study was suitable for looking at both potential general differences in technology acceptance among participants within their work environment as well as more deeply examining how teachers with different levels of technology acceptance and from different cultures interacted with technology in their classroom. In this research study, I analyzed technology acceptance at an Abu Dhabi secondary school with NES and NAS teachers integrating technology in the school by mandate in Phase 1 of the study. In Phase 2, I more deeply explored decision making and use of technology among teachers from each culture who scored low and high in terms of technology acceptance. I integrated the results from both phases to develop a richer understanding of the role of culture and technology acceptance levels in teacher decisions to use technology in instruction. This study involved a two-layered analysis of a real-world circumstance within classrooms in the UAE. This mixed-methods study was used to unearth vital, rich data that explained the perceptions and approaches of NES and NAS teachers about adoption and use of technology in their classrooms.

Before selecting a mixed-methods approach to the study, I considered some other options. Initially, I saw a qualitative case study as the best approach to answer the research questions, as I was looking at a specific real-life environment with some depth. However, rather than focusing on a more holistic understanding of the context as a case

study would do (see Yin, 2009); my interest was more specific to understanding the role of culture in technology adoption. I considered some other seemingly feasible options. Ethnographic research was considered. Ethnography focuses on the exploration of cultural interactions within groups to derive meaning and cognizance (Patton, 2002). This study is not aimed at studying cultural interaction, but cultural influence on practice; therefore, an ethnographic approach would not yield the best information to look at practice.

Grounded theory was considered as a possible approach to answer the research questions. Grounded theory entails forming new theories from gathered data. The data analysis is used to construct a new theory from the findings. This study is framed by the TAM theory, which precludes it from creating new theories from the data gathered; therefore, the grounded theory method was rejected.

I considered the phenomenology approach, which derives meaning from the lived experiences of individuals regarding a phenomenon (Creswell, 2007). Phenomenological researchers do not ponder the way that something is done, but rather investigate the essence of the lived experiences (Van Manen, 1990). In this study, I sought to understand the way something is done: how and why teachers from different cultures incorporate technology into their teaching. Phenomenology was therefore not a suitable method for this inquiry.

The narrative method was another potential consideration for conducting this study. In a narrative study, oral or written texts are used to offer recounts of specific phenomena or a series of events that are chronologically connected (Czarniawska, 2004).

The focus of narrative methodology is to collate the stories of a few who share their story in a chronological order (Creswell, 2007). Despite this study requiring individuals to share their experiences, narrative research was not suitable for answering the research questions because this study does not require participants to recount their experiences in any specific time order. Narrative research was therefore rejected as the method for conducting this study.

I revisited the research questions and thought about the purpose of the study and subsequently concluded that a mixed-methods study, specifically an explanatory sequential design was a more viable option and would yield more relevant data to answer the research questions. Mixed-methods research was chosen because the intent of this study aligned with description of mixed methods that employ various tools to collect both quantitative and qualitative data. Teddlie and Tashakkori (2008) discussed how mixed methods designs use both inductive and deductive logic in a distinctive sequence. In an explanatory sequential design, such as in this study, with quantitative data collected and examined in one stage to inform qualitative data collection in the next phase. Onwuegbuzie and Teddlie (2003) described how mixed-methods data analysis ends with data integration, in which both the quantitative and qualitative data and interpretations are integrated into a coherent whole. Mixed methods can enhance insights and produce a more complete understanding (Johnson & Onwuegbuzie, 2004). Based on the research questions and the purpose of the study, I chose an explanatory sequential mixed-methods study as the most suitable method to answer the research questions and the purpose of the study.

The purpose of the study was to ascertain the attitude, behavior, perspectives, and approach to mandated technology adoption and use among teachers with differing cultural backgrounds in a single school in Abu Dhabi. For this reason, narrative study, grounded theory study, phenomenology study, case study, and ethnographic study were all rejected as possible choices for this study. Use of the mixed methods allowed for in-depth explanation of a phenomenon.

Role of the Researcher

My role as researcher included collecting data by conducting interviews with teachers, observing their use of technology in the classroom, as well as distributing the TAM survey to ascertain the attitude of teachers about the use of technology. I also selected the participants to participate in Phase 2 of the study and was responsible for transcribing my observation notes and interview recordings and analyzing the data. My position as an educator was made known to the participants as they are my colleagues at the ADEC. The participants were normal classroom teachers like me. My relationship with the participants was that they were my colleagues working for the same organization, but I had no supervisory relationship with any teacher. Participants were informed that my role in this study was as a doctoral student at Walden University and not in any role related to my work in the ADEC.

Methodology

In this section, the process to select participants, instruments used, procedures followed for data collection, and data analysis plans are described. Following a description of the methodology, issues of trustworthiness and ethics are reviewed.

Participant Selection Logic

One school in Abu Dhabi, a boys' secondary school that has a mix of native English speaking and native Arab speaking teachers was the site of the study. This school was typical of other boys' secondary schools in Abu Dhabi but was selected since the researcher had access to this school. The school was relevant to this study as it had a mix of teachers from two different cultures, Western and Arab. In the UAE, schools for boys and girls are separate and it is inappropriate for a male teacher to talk to a female teacher. As I was a male researcher, it was appropriate for me to conduct this research in a boys' school. Only male teachers were observed and interviewed. As a male teacher in an Arab culture, I am not allowed to visit a female school and female teachers cannot visit a male school as it is illegal. The genders are segregated, so I was able to only conduct this survey in a male school and observe and interview male teachers only

In Phase 1 of the study, all 75 teachers at the school, both NAS and NES teachers, were asked to voluntarily complete the TAM survey (52 eventually responded). I assumed that not all teachers would participate; however, surveying all provided the best possibility of ensuring that teachers at a variety of levels of technology acceptance in both groups were represented. In Phase 2 as the intent was to more deeply study teachers from different cultural groups who had differing levels of technology acceptance. The teachers were told that all responses would be confidential, that their names would not be used in any study reports and would not be shared in any way. They were told that contact information would only be used to contact potential participants for Phase 2 of the study and once Phase 2 data had been collected, all identifying information would be

stripped from the data. The survey was distributed to the teachers' school email addresses using SurveyMonkey. The email addresses were later used to contact participants selected for phase two of the study. Four teachers participated in Phase 2. Once Phase 2 data were collected, the email addresses were stripped from the file.

Following analysis of the TAM survey data, teachers from the two cultural groups were purposively selected to participate in the observation and interview portions of the second phase of the study. Van Manen (1990) suggested that to reveal the meaning of an event, those involved in the event should be thoroughly interviewed to allow meanings to emerge. Selecting participants using predefined logic, while ensuring their confidence by protecting their rights, were both equally important to consider (see Moustakas, 1994).

Based on the TAM results, I initially sought four teachers to participate in the observation and interview phase. I assessed whether data saturation was reached after data from these four teachers were collected. Two teachers were native English speakers (NES) and two were native Arab speakers (NAS). The following criteria were used for phase two participant selection: (a) teachers were either native-Arab speakers or Native-English speakers, (b) teachers scored in the highest and lowest quartiles on the TAM to allow for a range of teachers in the sample, and (c) teachers had taught at the school for at least three years and were not considered novice teachers.

The sample size was in keeping with Teddlie and Tashakkori's (2008) description of mixed-methods sampling where there was a tradeoff between representativeness (quantitative tradition) and saturation (qualitative tradition) with basic sampling approaches following the specific mixed-methods design, in this case sequential

sampling, one sample selected based on findings from earlier phase. The selection in Phase 2, the qualitative portion, was based on criteria described earlier, but was also based on willingness to participate and by the availability of participants, time and available resources. These teachers represented two major cultural groups working in the school with differing levels of technology acceptance. The bank of potential participants for Phase 2 was limited based on the selection methods used. Starting with the highest and lowest scores in each group, teachers were asked to participate in the interview and observation portion of the study. Every effort was made to recruit one high and one low scoring teacher from each cultural group. Upon completion of the Phase 2 data collection for these four teachers, I determined whether saturation had been reached.

Instrumentation

Three types of instrumentation were used in this study: survey, interviews, and observations. The first research question focused on perceptions of usefulness, ease of use, and attitudes toward technology adoption based on data from the TAM and on differences in the responses between the two cultural groups. Research Question 2, which asked about how technology was used in the classroom, was primarily answered using observation data. Research Question 3, which asked about how teachers made decisions about adopting and using technology in the classroom, primarily used interview data. Based on observations and interviews, the latter two questions focused on understanding how teachers used technology in the classroom and how they made decisions regarding technology use.

A tripartite method of data collection was carried out. First, TAM surveys were administered to all 75 NAS and NES teachers. Second, I used classroom observations of teachers to gather firsthand information about the use of technology in the classroom. Third, audio -recorded face-to-face interviews took place during school hours, when the teachers had non-contact periods, to understand how teachers decided to adopt and use technology in the ways they did. Data collection lasted about 3 months.

The TAM survey (Davis, 1989) as adapted for this study can be found in Appendix A. The TAM surveys took approximately 10 minutes in response time. An observation schedule (see Janesick, 2004) was used for the classroom observations (see Appendix B). A semi structured, flexible interview protocol following the format suggested by Smith, Flowers, and Larkin (2009) was used for the interview portion of the study (see Appendix C). More detailed discussion of these measures follows.

TAM measure. Iqbal and Bhatti (2015) confirmed that information systems researchers over the years have established the TAM as a valid theory operating from two key constructs, perceived ease of use and perceived usability in anticipating how individuals adopt and use different technologies. Davis (1989) and Davis, Bagozzi, and Warsaw (1989) described the TAM as measuring why individuals accept or reject technology, and outlined environmental factors related to attitude, belief, and intention to use technology. The TAM consists of 15 items on a Likert scale organized as (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, and (5) strongly agree. Likert scales are often treated as continuous data in analysis. The TAM has been used in a variety of settings both within the United States and internationally, including K-12 (Gellerstedt,

Babaheidari, & Svensson, 2018), higher education (Saroia & Gao, 2018), corporate (Bach, Celjo, & Zoroja, 2016), and medical fields (Rahimi, Nadri, Lotf, & Timpka, 2018).

The TAM can be found in Appendix A. Davis (1989) reported on the reliability and validity of the TAM. Reliability of the constructs was tested by Davis using Cronbach's alpha. The results indicated Cronbach alpha reliability as follows: perceived ease of use (.91), perceived usefulness (.97) and attitude towards use (.96). Construct validity was assessed using a multitrait-multimethod technique with high levels of convergent and discriminant validity (range from .58 to .96) found for the scales (Davis, 1989). Davis also tested the hypothesized relationships between the constructs in the model using regression and relationships were confirmed.

Table 1 shows how the TAM aligned with RQ1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitudes toward technology adoption between NES and NAS teachers at a secondary school in Abu Dhabi? The proliferation of technology tools in society has placed the onus on educators, including teachers to incorporate technology into every classroom to keep in line with developments and demands in society. Consequently, teachers need to become proficient in applying technology as an important learning tool.

Table 1

Alignment of RQ1 Components With TAM Survey Items

RQ 1 components	TAM survey items
Are there statistically significant differences in perceptions of technology **usefulness** between NES and NAS teachers at a secondary school in Abu Dhabi?	• I find technology tools useful in my course work • I find technology tools to be flexible to interact with • Using technology tools in my teaching would enable me to accomplish tasks more quickly • Using technology tools would make it easier to complete my teaching • Using technology enhance my effectiveness for instructional activities • Using technology tools would improve my instructional performance for my classes
Are there statistically significant differences in perceptions of technology **ease of use** between NES and NAS teachers at a secondary school in Abu Dhabi?	• I find technology tools easy to use • I would find it easy to get technology tools to do what I want them to do • It would be easy for me to become skillful at using technology tools • Learning to use technology tools would be easy for me • My interaction with technology tools would be clear and understandable • Using technology tools would make it easier to do my instructional work
Are there statistically significant differences in perceptions of **technology adoption** between NES and NAS teachers at a secondary school in Abu Dhabi?	• I plan to use technology tools in the future • I intend to continue using technology tools in the future • I expect my use of technology tools to continue in the future

In the observations (Research Question 2), I looked at how NAS and NES teachers applied technology in their teaching. The observation schedule informed the process of the classroom observations. The observation was conducted to ascertain the practices of technology use by the participants. First, I described the physical space where the observation took place, including the date and the time of the observations. Two columns facilitated descriptions of the events as they unfolded during the lessons. This action allowed for separation of the descriptive elements from the interpretations and conclusions. The descriptive and reflexive details included the precise event observed, and any impressions, thoughts, or queries that I had. Space was provided to record any pictures or diagrams that I thought would add clarity to the observation notes, and later the data analysis (see the observation protocol in Appendix B). Table 2 shows the alignment of the observation protocol with Research Question 2: How do NES teachers and NAS teachers in a secondary school who exhibit differing levels of technology acceptance use technology in their classrooms?

Table 2

Alignment of RQ2 With Observation Schedule

RQ 2 components	Observation schedule columns
How do NES teachers and NAS teachers in a secondary school who exhibit differing levels of technology acceptance use technology in their classrooms?	Observation: What technology is being used, who is using it, how are they using it, for what purpose are they using it, what is the teacher's role, etc. Inference: What do I think is happening, why do I think this is happening, how do I think students are reacting, how do I interpret the teacher's actions.

For Research Question 3 interviews, I asked teachers to share their experiences, perspectives and attitudes toward using technology in their teaching as a way of understanding their decision-making processes in deciding to use technology and in how they used it in classroom practice as well as any problems that they encountered as they attempted to incorporate the technologies into their teaching. Teachers shared how they decided to use technology in their teaching initially. I asked teachers to explain their roles in deciding to use technology in their teaching and how they decided which technologies were most suitable for their particular teaching situation. The interview protocol can be found in Appendix C. Table 3 shows the alignment of the interview questions with Research Question 3: How do NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about adoption and use of technology in their classrooms?

Table 3

Alignment of RQ3 Components and Interview Questions

RQ 3 components	Interview questions
How do NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make **decisions about adoption** of technology in their classrooms?	• How do you perceive your role in technology adoption and use in your teaching? • What are the advantages and disadvantages you perceive in adopting technology in your teaching? • What things do you consider when deciding whether or not to use technology in the classroom? • What factors help you to make decisions regarding adopting technology in your teaching? • In what ways, do you believe your culture influences your decisions to use technology in your teaching?
How do NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about **use of technology** in their classrooms?	• What role do you see for technology in the classroom? • What is your perception of the ease of use of technology in your teaching? • When designing your classroom activities, how do you decide which technologies are most suitable to attain your objectives? • Can you give me examples of when you felt technology was successfully used in your classroom? • Can you give me examples of when technology was used unsuccessfully in your classroom? • What factors do you think influence the success or lack of success in integrating technology in the classroom? • Are there any other thoughts you would like to share about integrating technology in the classroom?

Data Collection Procedures

First, I got the permission of the Walden University Institutional Review Board (IRB; IRB Approval No. 10-03-17-0284155) before proceeding to inform participants about the study. Next, I acquired a Letter of Cooperation to carry out the study from the ADEC, the organization that oversees education in the UAE (Appendix D). After ADEC granted permission, I contacted the teachers via email and informed them about the study (Appendix E). At the end of the email was a link that they clicked to continue to the consent form for participation in the study. If the teacher clicked on the link, it took them to the consent form that explained in more detail the scope of the study, including the second phase of the study, and asked them to click on the survey link to take the survey.

Once the TAM results were analyzed, a subgroup of teachers was chosen based on the criteria noted above, including their TAM survey scores. These teachers were contacted via email and asked to respond if they were willing to participate in Phase 2 of the study. Starting with the highest and lowest scoring teachers on the TAM for each of the two cultural groups, teachers were sent an invitation to participate in the interview and observation portion of the study and asked to contact me if they agreed to participate. Once they indicated agreement to participate, I arranged to meet at a conducive time and place for the participants' comfort. At the meeting, a consent form was provided, verbally reviewed, and the participants were asked to sign. At this meeting, mutually agreeable times for the observations and the interview were arranged. I gave the participants the interview questions and a copy of the observation schedule at this time so that they could

have an idea about what I was to be observing and think about their experiences as recommended by Patton (2002).

Classroom observations occurred next. I observed the participants during three classroom instructional periods (45 minutes each) over a period of 2 weeks. During the observation, I sat in the back of the classroom to be as unobtrusive as possible and used the observation schedule to record notes.

Interviews were conducted during classroom planning time, on a date, and at a school location convenient to the participating teachers. An additional check for permission to record was reviewed at the beginning of the interview (see interview protocol in Appendix C). A semiformal approach was used in conducting the interviews so that there was a smooth flow of communication and allowing participants thinking time as recommended by Smith et al. (2009). Preparatory to initiating each interview and the observation, I developed a cordial atmosphere to dispel apprehension and reassure participants to be comfortable sharing their perspectives as described in (Smith et al., 2009).

As a teacher and educational technologist, I used a reflective journal to record my thoughts and sentiments as the data collection process proceeded. Reflective journaling is a process that is used to record biases throughout the study instead of concealing them (Van Manen, 1990). The reflective journal was instrumental in decreasing bias in the study, as it made me more aware of my own thinking during data collection and analysis phases.

My position as an educator was made known to the participants, as they were my colleagues at the ADEC. The participants were normal classroom teachers like me. My relationship with the participants was as a colleague working for the same organization but having no supervisory relationship with any teacher.

Data Analysis Plan

The TAM survey data were analyzed using descriptive and inferential statistics and scores for the TAM calculated per the TAM instructions. The Statistical Package for the Social Sciences (SPSS) was used for TAM analysis. I entered the data into SPSS. I reviewed the data to determine that all items had responses and there were no data that were outside the parameters of the scales used, thus verifying data completeness and accuracy. Responses were identified by school email addresses so that I could verify that all email responses received were from teachers in the school and that no data were duplicated. Descriptive statistics were first reviewed prior to any inferential statistics. This review included looking at percentages (frequency tables), means, medians, modes, and standard deviations. In deciding to conduct independent *t*-tests, I ensured that my data was measured using a continuous scale. Likert-scales are considered appropriate for use in tests requiring continuous scales (Ary et al., 2019). Second, the two groups to be compared (NAS and NES teachers) were independent from one another. During the analysis phase it was also necessary to test other assumptions related to independent *t*-tests, including normal distribution, checking for outliers, and testing for homogeneity of variance. These assumptions will be reviewed in Chapter 4.

I only performed statistical analysis for the first research question to test each of the hypotheses:

RQ1- Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitudes toward technology adoption between NES and NAS teachers at a secondary school in Abu Dhabi?

H_0 There are no statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

H_1 There are statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

For each of the three constructs (perceptions of usefulness, ease of use, and attitudes toward technology adoption), I performed independent samples *t* tests to determine if there were differences between the two groups (NAS and NES teachers). An independent *t* test is an inferential statistic used to determine the probability that results did not occur by chance when the null hypothesis is true. I used a probability level of .05, indicating that the probability of any findings being due to chance was 5 in 100 chances.

For the observations, all observation notes were transcribed into a Word document by a transcriptionist and then uploaded into NVivo, a computer assisted qualitative data analysis software program. Using NVivo allowed me to gain perception and allowed me to demonstrate trustworthiness by having other researchers audit the

data. Securely storing the data was paramount. All data were saved on a password protected computer, accessible only to me.

I analyzed both observation data and interview data using qualitative coding techniques. I followed the three stages of analysis recommended in Ary et al. (2019) that included (a) familiarizing and organizing, (b) coding and reducing, and (c) interpreting and representing. Stage 1 included transcribing the data and reading through the transcribed information multiple times. Organizing included keeping the reflective log, organizing the files by research question for analysis, and developing a data log.

I applied the basic interpretive process for analysis, which allows researchers to get deep insights into the research subjects within a specific situation. The basic interpretive process operates through naturalistic methods such as interviewing and observation, similar to what was obtained in this current study. Miles and Huberman (1994) recommended beginning with pre-coding structure to identify ideas as they emerge from the data. I coded the original data as I read the transcripts and observation notes, first coding the observations and then the interviews. I used an inductive coding process. I first developed initial coding, also called axial, open or preliminary coding (see Ary et al., 2019). Codes were applied to units of meaning (i.e., words, phrases, sentences, patterns in the observation data) using the actual words of the participants (in vivo codes) or using names that reflected the underlying concepts. I used some a priori codes (codes determined before the fact from the literature). Once the initial codes were developed, I reviewed the data again using focused coding to eliminate, combine, or subdivide initial codes and looking for repeating ideas. Once coding was completed, I grouped similar

codes together to develop emerging categories. Once the categories were developed, I looked for relationships between and among the categories, linking categories. These categories reflected what I saw in the data, the big ideas that emerged to help answer the research questions. During the analysis process, I looked for negative or discrepant data. Discrepant data provide a different perspective to explore.

Once the qualitative data were analyzed, I considered and integrated the data from the TAM surveys and the observations and interviews. In other words, I specifically considered how the observation and interview data from the teachers with higher and lower TAM scores were similar or different, whether the observation and interview data revealed different patterns among NAS and NES teachers, and how technology acceptance (TAM) may have influenced technology decision making and classroom use for these different groups.

Threats to Validity

Internal and external threats to validity are typically associated with pre-experimental, experimental, quasi-experimental, and ex post facto research and not with survey research (Ary et al., 2019). For example, in a one-time survey study, there are no external threats to validity such as testing reactivity, interaction effects, reactive effects, or multiple treatment interference, and no internal threats such as history, maturation, experimental mortality, statistical regression and more (Ary et al., 2019). The validity and reliability of the TAM instrument itself was discussed earlier. Davis (1989) using Cronbach's alpha to test reliability of the constructs with the following results: perceived ease of use (.91), perceived usefulness (.97) and attitude towards use (.96). Construct

validity was assessed using a multitrait-multimethod technique with high levels of convergent and discriminant validity (range from .58 to .96) found for the scales (Davis, 1989).

There are some issues that can influence score validity in a survey, but these are mostly related to reactions of the respondents. For example, respondents may report what they think is true which may not be the reality, they may give more socially acceptable responses, they may respond in ways they think the researcher wants them to respond, they may give safe responses if they fear the survey is not anonymous, or they may have response bias (always rating low, always rating high, or always rating moderate). These factors may influence survey results.

Issues of Trustworthiness

In any research study, it is important to address issues of trustworthiness. In this section, I describe strategies used in this study to enhance dependability and confirmability. Qualitative approaches to research rigor are the qualitative equivalents of validity and reliability factors. I also address credibility and transferability.

Dependability

Dependability is a strategy that I needed to be aware of in ensuring qualitative rigor in my study. Dependability refers to the premise that the researcher applies techniques that would yield similar results if the context, methods, and participants remained the same and the study was repeated (Guba, 1981). Guba suggested that the dependability strategy aligns with the consistency in findings. My first consideration for achieving dependability was to give detailed accounts of the process within the study so

that later, another researcher could duplicate it. I therefore carefully described what I planned and applied during the process. Additionally, I addressed the small precise details of all the fieldwork that I did. This information was evident in the interview and observation protocols. Finally, I effectively evaluated the effectiveness of the process in a reflective journal. To achieve dependability, I ensured that my record keeping was accurate with dates and times and any other pertinent details.

Confirmability

Confirmability refers to efforts by the researcher to present accurate representations of the findings of the study in reflecting the perspectives of the participants rather than proclivity of the researcher. Confirmability in qualitative research can take many forms. Lincoln and Guba (1985) noted that confirmability is synonymous with objectivity because the results of a study do not come from the researcher's influence, but the conditions of the research. I ensured confirmability by bracketing emerging or observed feelings and biases during the interview. I recorded my accounts as the study progressed and the various perspectives revealed. I also used a personal research journal to record the progress of the research process. Lincoln and Guba (1985) suggested that the researcher include decisions he made about methodology, why he made them, and how his values and interests are dealt with in the study.

I implemented confirmability by acknowledging the role of triangulation in the process to minimize bias. Next, I followed the advice of Miles and Huberman (1994) to include my predispositions in the research reports. I included the beliefs underlying the decisions that I made during the research process and reasons for choosing the method I

used to the exclusion of other seemingly suitable methods. I created a reflective commentary that explained my choices in the research.

Credibility

Credibility relates to the idea that the researcher ensures that the findings of the study align with reality (Guba, 1981). Lincoln and Guba (1985) argued that one of the most important aspects of ascertaining trustworthiness in research is to ascertain credibility. I made several provisions to ensure credibility. First, I employed clear-cut research methods described in depth. I also included a triangulation of different research methods, including surveys, interviews, and observations which formed the major data collection strategies of the research.

Transferability

Merriam (2009) posited that transferability is the extent to which a qualitative study can be transferred to another situation. My first approach to ensuring transferability was to provide a comprehensive description of the research context, the assumptions that guided the research and the general characteristics of the sample, all strategies suggested by Merriam (2009). One strategy that I applied to enhance transferability was to identify emerging concepts in the study as I proceeded and explained what data applied to participants' responses and their relationship to other responses from other participants' responses in the study. Denscombe (1998) and Stake (1995) suggested that despite each case being unique, transfer can be an example within a larger group setting.

Ethical Procedures

Miles, Huberman, and Saldana (2014) stressed the need for the researcher to be aware of what errors their actions are likely to unearth in the study, given that there are guidelines for protecting the rights of the participants. The researcher is responsible for forging an ethical relationship between the researcher and the participant. Thus, several measures were employed to safeguard the moral and ethical standards of the study.

The first step in the study was to obtain permission from the Walden University IRB to conduct the study. After approval from the IRB, ADEC was sent a letter requesting their agreement that I be allowed to carry out the study within their school system. In a bid to protect the rights of participants, a request to participate and an informed consent form related to the TAM were sent to teachers in the school, giving them an overview of their role in the study, what the study was about, and that they could choose to participate or not and to withdraw from the study at any stage in the process, a process recommended by Moustakas (1994). Participants were informed that there would be no compensation for participation and contact information for my dissertation chair, and the chair of the IRB. IRB protocol was provided. Confidentiality was explained. A second informed consent form was provided for those asked to participate in the interview and observation portion of the study.

All data collected were stored in an electronic format in an external password protected storage device and I was the only one with direct access to the information. A professional transcriptionist was employed and asked to sign a letter of confidentiality (Appendix F) to ensure confidentiality. Participants were assured that every copy of the

data in all formats would ultimately be shredded per university IRB rules. I stored consent forms and all other data files in a safely locked storage facility at my home. All data will be destroyed after 5 years.

Summary

This chapter provided an overview of the rigorous and in-depth process implemented in this study consistent with mixed-methods studies. The chapter summarized the purpose of the study, a rationale for the mixed-methods approach used as well as data collection procedures and data analysis plans. The role of the participant was outlined as well as trustworthiness issues that could potentially influence the study and the methods that were used to tackle the problem. Chapter 4 will present findings from the study.

Chapter 4: Results

The purpose of this sequential mixed-methods study was to gain an understanding of the ways teachers from two different cultural groups (Western and Arab) who teach in a secondary school in Abu Dhabi adopt and use technology in their teaching. The focus of the study was to examine the teachers' level of technology acceptance and use, their applications of technology in the classroom, and whether their cultural backgrounds affected their adoption and use of technology. The TAM was used to measure perceived usefulness, perceived ease of use, and attitudes toward technology adoption and use in an Abu Dhabi boys' secondary school. The observations and interviews were used to better understand how teachers used technology in the classroom and their reasons for adopting technology. Three research questions guided this study:

RQ1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitudes toward technology adoption between NES and NAS teachers at a secondary school in Abu Dhabi?

$H_0$1: There are no statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2) and attitudes toward technology adoption (DV_3).

$H_1$1: There are statistically significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2), and attitudes toward technology adoption (DV_3).

RQ2: How do NAS and NES teachers in a secondary school in Abu Dhabi who exhibit differing levels of technology adoption use technology in their classrooms?

RQ3: How do NAS and NES teachers who exhibit differing levels of technology acceptance make decisions about technology adoption and use in their classrooms?

This chapter is organized into sections beginning with the research setting. Next, results from Phase 1 of the mixed-methods study will be presented, including the demographics of the participants, data collection procedures, analysis of the data collected, and the Phase 1 results, including answering RQ1. Phase 1 was the quantitative phase of the study. Phase 2 qualitative results will then be reported, including descriptions of participants, data collection procedures, data analysis, and results. Evidence of trustworthiness of the study will then be reviewed.

Research Setting

One school in Abu Dhabi, a boys' secondary school that has a mix of NES and NAS teachers was the site of the study. This school was typical of other boys' secondary schools in Abu Dhabi but was selected because I had access to this school. The school was relevant to this study as it has a mix of teachers from two different cultures, Western and Arab. In the UAE, schools for boys and girls are separate and it is inappropriate for a male teacher to talk to a female teacher. All study participants were therefore male.

Demographics

Demographics regarding participants are described in this section. A survey for all teachers in one secondary school was used to collect demographic information in Phase 1. Those results were used to guide selection of teachers for Phase 2, which was through purposive selection.

Phase 1 Participants

All 75 teachers in the school were surveyed, but only 52 provided survey responses. The first requirement of the survey was respondents' demographic information. Demographic information was in four categories: (a) age range, (b) educational level, (c) subjects taught, and (d) years using technology. The survey respondents consisted of 52 male teachers: 41 NAS teachers accounted for 79% of respondents, and 11 NES made up the other 21%. The age range for the participants was between 21 and 65-plus years. Sixty-three percent (n = 33) of participants held a bachelor's degree and one third (n = 17, 33%) held a master's degree. One participant had a doctorate degree and one participant did not respond to that question.

Science was the content area with the highest number of participants (n = 15), language arts had 11, mathematics had 8, and social studies had 5 participants. The remaining 13 participants were distributed in a few content areas. Table 4 provides demographic information about the respondents. As can be seen in Table 4, there were some demographic differences between the two groups. These differences will be further explored to gain a better understanding about those who participated. There were more NAS teachers in the 35 to 64 age group (95%) compared to the NES teachers (55%), and there were more younger teachers (21–34) among the NES group (45%) compared to NAS teachers (2.5%).

Table 4

Demographic Information About Participants

Variable	All participants *n* = 52	Native Arab speakers *n* = 41 (79%)	Native English speakers *n* = 11 (21%)
Age			
21-34	11%	2.5%	45%
35-64	87%	95%	55%
65+	2%	2.5%	0%
Degree			
Bachelor's	64%	79%	9%
Master's	34%	19%	91%
Doctorate	2%	2%	0%
Subject taught			
Science	28%	36%	0%
Mathematics	19%	24%	0%
Social Studies	13%	17%	0%
English/Language Arts	21%	0%	100%
Other	19%	24%	0%

Distribution of degrees also varied, with 79% of NAS teachers holding a bachelor's degree compared to only 9% of NES teachers. Nearly all NES teachers held a master's degree (91%), while only 19% of NAS teachers held a master's degree. All NES teachers taught English or language arts courses, whereas no NAS teachers taught those subjects and were distributed among other subjects. Finally, in terms of teaching experience, in the overall group, experience ranged from 5 to 32 years, with the median number of years at 15 and the average at 16.5 years. Among NAS teachers, years of teaching experience ranged from 5 to 32 years with a median of 15 and an average of 10 years of teaching. Among NES teachers, years of teaching experience ranged from 6 to

20 with a median of 10 and a mean of 11 years of experience. So overall, the NAS teachers had more teaching experience and a wide range of years.

Phase 2 Participants

Participants for Phase 2 were selected based on the data from Phase 1. Two NAS and two NES teachers were selected based on their TAM scores. From each cultural group, one teacher scored in the highest quartile on the TAM and one scored in the lowest quartile on the TAM. Teachers were given pseudonyms.

- Participant 1 was an NAS teacher with low technology acceptance. Participant 1 taught Grade 12 and had been teaching for 30 years.
- Participant 2 was an NAS teacher with high technology acceptance. Participant 2 had been teaching for 28 years. He taught Grades 11 and 12.
- Participant 3 was an NES teacher with low technology acceptance. He was a Grade 11 teacher who had been teaching for 12 years.
- Participant 4 was a NES teacher with high technology acceptance. Participant 4 was a teacher of Grades 10 and 11 who had been teaching for 10 years.

Data Collection

Data for this study were collected in two phases. First quantitative data were collected and analyzed followed by qualitative data collection in Phase 2. Data collection procedures for both phases are described here.

Phase 1 Data Collection

The first phase, the quantitative phase, was an online survey facilitated online using the SurveyMonkey website. After obtaining approval from the Walden University

IRB (Approval No. 10-03-17-0284155), I met with the school principal to inform him that I had received approval and was ready to conduct the survey. The principal gave me access to the teachers' school email addresses and I sent an email to the teachers explaining the study and their rights. I also included a link to the survey. Clicking on the survey link signaled their willingness to participate in the survey as well as gave them access to the survey.

The first emails were sent on October 10, 2017, with an expectation that most responses would be completed and returned within 2 weeks. This was especially promising as all the NES participants reported that they had completed the survey within days. After 2 weeks, only a few additional surveys were competed; thus, on October 24, 2017, an email was sent as a reminder, still hoping to meet the 6-week deadline set. Another reminder was sent on November 1, 2017. By November 16, 2017, there were 52 responses completed of the 75 emails sent out. Of the 52 teachers who completed the survey, 41 were NAS and 11 were NES teachers all from the same boys' secondary school, one of ADEC's Cycle 3 schools. Thus, there was a response rate of 69%.

A number of issues prevented the NAS participants from completing the survey as quickly as planned. One issue that affected data collection was that all departments received a directive to relocate to another area in the school that the senior leadership team designated. While the relocation exercise was taking place at school, it was difficult for teachers to access computers to complete the surveys as computers had to be detached and transported to new department offices. After 2 weeks, when most departments had settled in their new location, a directive came from the ADEC head office for all

departments to administer diagnostic exams to all students. Teachers therefore shifted their focus to administering exams by the end of that week, which again prevented most remaining participants from accessing the survey in a timely manner.

During this time, few NAS teachers could access and complete the survey. By the last week of October, exams had to be graded and recorded making most of the teachers too busy to attempt anything outside of their official duties. By the beginning of November, exams were completed and recorded. Preparations for the UAE National Day, one of the biggest celebrations in the UAE, began from the first week of November. By November 16, 2017, 52 of the 75 teachers had completed the survey.

Phase 2 Data Collection

Fifty-two respondents completed the survey, after which the data were disaggregated to derive the different quartiles to identify two respondents from each group (NAS and NES) from the upper and lower quartiles on the TAM. From the TAM results, I chose four teachers to participate in the interviews and observations. Two teachers who scored in the upper quartile of the TAM survey and two who scored in the lower quartile were selected for the interview and observation phases of the data collection. Two of the teachers were NAS and two were NES. Each of the four participants was sent an email in December 2017 for their agreement to participate in the interviews. However, because school exams began that week, the interviews were not completed until January 2018, after the school holidays. On returning to school in January, appointments were quickly arranged, and during a professional development week, three of the participants were interviewed. The fourth participant was not available

the first week back, and we had to repeatedly reschedule. I was not able to conduct his interview until the end of January. Participants were given the pseudonyms Participant 1, Participant 2, Participant 3, and Participant 4.

The first interview with Participant 4 was conducted in a vacant conference room; Participant 3 and Participant 1 did their interviews in their respective classrooms. At the end of January, when Participant 2 was not as busy as earlier in the month, we did his interview in the vice principal's office, which was quiet and conducive. Interviews were audio recorded and the audio files were then downloaded on my password-protected laptop. After each interview, the audio file was sent to the transcriptionist after I listened to it.

After transcribing the interviews, the transcriptionist returned the audio file and a Word document file of the transcription via email. I then checked the audio files against the Word document files to ensure accuracy and thoroughness of the transcription. Following the check on the files, after I was satisfied that everything was done correctly, I contacted the transcriptionist to ensure that all the files were immediately deleted from their computer. I used a reflective journal to record my thoughts, queries, and observations as the process progressed.

Observation of technology use among the teachers was the next data collection exercise. Scheduling appointments to observe lessons posed a challenge as it meant I had to visit their lessons when I had non-contact slots on my timetable. A major problem was that teachers were occupied with preparing for content area exams in March and licensing exams for teacher licensure in April. There were sweeping changes as a merger between

ADEC and the Ministry of Education was imminent. These activities made it difficult to schedule observations. Despite scheduling challenges, I completed the observations before the end of March. Each teacher was observed three times over the months of February and March. I was able to see how each teacher incorporated technology into their lessons. Each observation lasted 45 minutes, the duration of a lesson.

Data Analysis

Data for this study were analyzed sequentially. The Phase 1 quantitative data were analyzed first, and findings used to guide participant selection for Phase 2. Qualitative data were then collected and analyzed. Data analysis procedures are described here.

Phase 1 Data Analysis

I used SPSS to analyze the quantitative data. Descriptive statistics were used to look at the overall pattern of responses for the items and constructs in the survey. An independent samples *t*-test was conducted to compare the means of NAS and NES teachers and their perceptions about adoption of technology in their classroom (see further description of specific analysis procedures in Chapter 3). The independent samples *t* test was used to determine whether there was a significant difference between NAS and NES teachers in their perceived usefulness, perceived ease of use, and attitude toward adoption of technology in their classroom. Prior to conducting the test, the following assumptions were reviewed and determined to be met. As noted in Chapter 3, the dependent variables were measured on a Likert scale, considered to meet the assumption of a continuous scale. The independent variable (NES or NAS teacher) was a dichotomous variable identifying two independent groups and the observations were

independent. The assumptions that were tested during analysis were related to outliers, normality of the distributions for the two groups, and homogeneity of variance. To test for outliers, I split the file for the two groups (NAS and NES) and used scatterplots to look for outliers. No outliers were found. Using the same split file, I looked at the distributions of the two groups, and both groups showed normal distributions. Also, in interpreting each of the three independent *t* tests conducted using SPSS, I first determined whether the assumption of equal variance (homogeneity of variance) was violated using Levene's test for equality of variances and found variances were equal across the groups. Therefore, the *t*-test results with equal variances assumed were used and testing was conducted at the 95% confidence interval of the difference. I used a nondirectional *t* test as my hypotheses did not predict the direction of the difference.

An independent samples *t*-test was conducted to test the null hypothesis: $H_0 1$ = There are no statistically significant differences between NAS and NES teachers (IV) in their perceptions of technology usefulness ($DV_{1)}$ ease of use (DV_2), and attitudes toward technology adoption (DV_3). The *t* test was to answer RQ1, "Are there differences perceptions of technology usefulness, ease of use, and attitudes toward technology adoption and use between NAS and NES teachers at a secondary school in Abu Dhabi?"

Phase 2 Data Analysis

Qualitative data were analyzed first from interviews conducted with the participants, then from observation notes gathered while observing participants' classes. After transcribing the interviews, I read through each transcript repeatedly to identify codes and categories that were emerging. Coding "is the search for patterns in data for

ideas that explain why those patterns are there" (Bernard, 2006, p. 452). Coding therefore entails organization of data into relevant groups with similar data categories that share some characteristics.

I based my coding on questions recommended by Auebach and Silverstein (2003). These questions helped the researcher to identify relevant codes from the data during the coding process. While coding the interviews data, I listened to the recording while I perused the transcripts and annotated what I observed emerging from the data. The findings were aligned to categories and codes that came out of the data. It was important to read the interviews multiple times so as not to lose the quality of the respondents' meanings. Familiarity with the data assisted in identifying and extracting relevant ideas.

Participants were assigned aliases Participant 1, Participant 2, Participant 3, and Participant 4, to safeguard their identities. A similar strategy was employed while identifying and extracting codes and categories from the observation notes. I read them multiple times to identify the key ideas from the observation notes as well. Miles et al. (2014) recommended that researchers use more than one coding strategy when necessary, to complete coding. As a result, I employed a descriptive technique and in vivo to compare and contrast the answers of respondents. Descriptive coding is when the data are aligned with short phrases or words. In vivo analysis entails using short phrases to represent the language of the participants (Maxwell, 2013). A number of key ideas emerged from the data, then Microsoft Word and NVivo were used to organize and store the data for ease in manipulating the data.

A recommended useful practice to present findings is to review the data to identify patterns, as one effective way to the present findings (Hatch, 2002). A computer-assisted qualitative data analysis software (CAQDAS) was used to analyze data collected in the interviews and observations. Analysis of the data aligned with recommendations from Ary et al. (2019) where analysis includes (a) familiarizing and organizing, (b) coding and reducing, and (c) interpreting and presenting. Two instruments were used to collect qualitative data, face-to-face, semistructured interviews and lesson observations. After collection, these data were uploaded into NVivo where nodes were used to store the data and facilitated easier data manipulation. Following transcription of the data from interviews and observations, I entered the data into NVivo to aid in analysis. I had to be careful to align emerging ideas from the interviews with the TAM and the research questions. Key ideas emerging from the data were aligned with how NAS and NES teachers make decisions about adopting and using technology in their classrooms. Similarly, I had to be mindful of concepts emanating from the observation notes as they lined up with how NAS and NES teachers accept and use technology in their classrooms.

Results

In this section I will review the results from this study. First the results will be presented from Phase 1. Second the results from Phase 2 will be presented.

Phase 1 Results

In Phase 1 SPSS was used to analyze the data. First, I will describe the overall findings for each group of teachers regarding their perceptions of usefulness, ease of use, and technology adoption, Then I will present the findings comparing the two groups.

Overall attitudes of teachers. The questions on the survey were based on the TAM of Davis (1989) and contained 15 items on a Likert scale organized as (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, an (5) strongly agree. Table 5 shows the overall responses to the items and constructs. In terms of usefulness, more than 90% of teachers either agreed or strongly agreed that technology was useful in their coursework (92.4%), helps them accomplish tasks more quickly (94.4%), makes it easier to teach (90.6%), and improves their instructional performance (94.3%). Only 88.7% indicated that the tools were flexible to use.

In looking at ease of use, more than 90% either agreed or strongly agreed that the learning to use the technology was easy (94.4%), interaction with the technology is clear and understandable (92.5%), and it make instructional tasks easier (96.2%). Over 80% believed the technology was easy to use (89.7%), it was easy for teachers to get the technology to do what they wanted (83%), and it was easy to become skillful at using technology (88.7%).

Table 5

Responses Overall (n = 52)

Overall	% Strongly disagree	% Disagree	% Neutral	% Agree	% Strongly agree	Mean	SD
Usefulness						4.44	.52
Usefulness in coursework	1.9	-	5.7	35.8	56.6	4.45	.77
Technology tools flexible	1.9	1.9	7.4	41.5	47.2	4.30	.85
Accomplish tasks more quickly	1.9	-	3.8	30.2	64.2	4.55	.75
Easier to complete teaching	1.9	-	7.5	26.4	64.2	4.51	.80
Enhances instructional effectiveness	1.9	-	3.8	41.5	52.8	4.43	.75
Improves instructional performance	1.9	-	5.7	41.5	50.9	4.40	.77
Ease of Use						4.35	.54
Easy to use	1.9	-	9.4	45.3	43.4	4.28	.79
Easy to get technology to do what I want	1.9	-	15.1	43.4	39.6	4.19	.83
Easy to become skillful	1.9	-	9.4	32.1	56.6	4.22	.82
Learning to use technology is easy	1.9	-	3.8	49.1	45.3	4.36	.74
Interaction clear and understandable	1.9		5.7	47.2	45.3	4.34	.76
Instructional work easier	1.9	-	1.9	37.7	58.5	4.51	.72
Adoption						4.50	.69
Plan to use technology the future	1.9	-	3.8	45.3	49.1	4.40	.74
Intend to continue use technology in the future	1.9	-	3.8	34.0	60.4	4.51	.75
Expect use of technology tools to continue	1.9		-	32.1	66.0	4.60	.69

In terms of adoption and use of technology, more than 90% planned to use technology in the future (94.4%), intended to continue to use technology in the future (94.4%), and expected use of technology tools to continue (98.1%). For all statements except one, less than 2% disagreed or disagreed strongly. On the item about flexibility of the tools, 3.8% disagreed or strongly disagreed.

Attitudes of NAS teachers. Mean responses for NAS teacher for the main constructs ranged from 4.56 for intended adoption and use, 4.52 for usefulness, and 4.40 for ease of use. Table 6 shows the means and percentages for the NAS teachers. Among the NAS teachers, in terms of usefulness, more than 90% agreed or strongly agreed that technology was useful in coursework (95.3%), they could accomplish tasks more quickly (92.8%), it was easier to complete teaching (90.4%), technology enhanced teaching effectiveness (95.3%), and it improved instructional performance (95.3%). Only 88.1% felt that the technology tools were flexible. In terms of ease of use, more than 90% found technology easy to use (90.5%), it was easy to become a skillful user (90.5%), learning to use technology was easy (95.2%), interactions with technology were clear and understandable (95.2%), and makes instructional work easier (95.3%). Only 83.3% felt that it was easy for teachers to get technology to do what they want it to do. More than 90% of NAS teachers indicated that they plan to use technology in the future (95.3%), they intend to continue using it (95.3%), and they expect use of technology tools in the classroom to continue (97.6%). There were two items where nearly three-quarters (73.8%) of NAS teachers strongly agreed: technology helps them to accomplish tasks more quickly, and they expect use of technology in the classroom to continue.

Table 6

NAS Responses (N=41)

NAS	% Strongly agree	% Agree	% Neutral	% Agree	% Strongly agree	Mean	SD
Usefulness						4.52	.52
Useful in coursework	2.4		2.4	28.6	66.7	4.57	.77
Technology tools flexible	2.4	2.4	7.1	33.3	54.8	4.36	.91
Accomplish tasks more quickly	2.4	-	4.8	19.0	73.8	4.62	.79
Easier to complete teaching	2.4	-	7.1	19.0	71.4	4.57	.83
Enhances instructional effectiveness	2.4	-	2.4	35.7	59.5	4.50	.77
Improved instructional performance	2.4	-	2.4	35.7	59.5	4.50	.77
Ease of Use						4.40	.54
Easy to use	2.4	-	7.1	42.9	47.6	4.33	.76
Easy to get technology to do what I want	2.4	-	14.3	38.1	45.2	4.24	.88
Easy to become skillful	2.4		7.1	28.6	61.9	4.48	.83
Learning to use technology easy	2.4	-	2.4	47.6	47.6	4.38	.76
Interaction clear and understandable	2.4		2.4	45.2	50.0	4.40	.77
Instructional work easier	2.4		2.4	28.6	66.7	4.57	.77
Adoption						4.56	.69
Plan to use in the future	2.4	-	2.4	42.9	52.4	4.43	.77
Intend continued use	2.4	-	2.4	28.6	66.7	4.57	.77
Expect use of technology tools to continue	2.4	-	23.8	23.8	73.8	4.67	.72

Attitudes of NES teachers. Among the NES teachers, the overall means for the constructs appear lower than for the NAS teachers. Means ranged from 4.30 for intent to adopt and use technology to 4.14 for ease of use and only 4.14 for usefulness. There were no individual items where more than 40% of the teachers strongly agreed.

In terms of usefulness, there were only two items where more than 90% of the NES teachers agreed or strongly agreed: technology tools are flexible to use (90.9%) and technology helped them accomplish tasks more quickly (100%). The flexibility of tools was the lowest item in terms of agreement for the NAS teachers on this scale. Just over 80% (81.8%) of NES teachers agreed or strongly agreed that technology was easy to use, it was useful in coursework, it was easy to get technology to do what they wanted it to do, and it was easy to become skillful in using technology.

In looking at NES ratings for ease of use, more than 90% rated three items agree or strongly agree and three items where only 81.9% rated the item agree or strongly agree. The three items over 90% included learning to use technology was easy (90.9%), technology enhanced instructional effectiveness (90.9%), and instructional work was easier with technology (100%).

For NES teachers, the items rated agree or strongly agree by 81.9% included being easier to teach using technology, interactions with technology were clear and understandable, and that technology improved instructional performance. One hundred percent expected technology use in the classroom to continue and 90.9% said the plan to use technology in the future and intend to continue its use.

Table 7

NES Responses (n = 11)

NES	% Strongly disagree	% Disagree	% Neutral	% Agree	% Strongly agree	Mean	SD
Usefulness						4.14	.42
Easy to use	-	-	18.2	54.5	27.3	4.09	.70
Usefulness in coursework	-	-	18.2	63.6	18.2	4.00	.63
Tech tools flexible	-	-	9.1	72.7	18.2	4.09	.54
Easy to get technology to do what I want			18.2	63.3	18.2	4.00	.63
Accomplish tasks more quickly				72.7	27.3	4.27	.47
Easy to become skillful	-		18.2	45.5	36.4	4.18	.75
Ease of use						4.15	.46
Easier to teach using technology			18.2	54.5	27.3	4.27	.65
Learning to use easy	-	-	9.1	54.5	36.4	4.27	.65
Enhancing instructional effectiveness			9.1	63.6	27.3	4.18	.60
Interaction clear and	-	-	18.2	54.5	27.3	4.09	.70
Improved instructional performance			18.2	63.6	18.2	4.00	.63
Instructional work easier	-	-	-	72.7	27.3	4.27	.47
Adoption						4.30	.59
Plan to use in the future			9.1	54.5	36.4	4.27	.65
Intend continued use	-	-	9.1	54.5	36.4	4.27	.65
Expect use of technology tools to continue			-	63.6	36.4	4.36	.50

Comparison of NAS and NES teacher attitudes. To obtain a comprehensible impression of factors that affected the differences in perceptions of the usefulness, ease of use, and attitude toward technology adoption between NAS and NES teachers, the questions in the TAM survey were analyzed. The research question addressed was research question 1:

Research Question 1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitude toward technology between NAS and NES teachers at a secondary school in Abu Dhabi?

The NAS teachers ($N = 42$) had mean scores of 4.52 ($SD = .52$) for perceived usefulness, 4.40 ($SD = .55$) for perceived ease of use, and 4.55 ($SD = .71$) for perceived attitude toward technology adoption. Conversely, NES ($N = 11$) registered numerically smaller mean scores for perceived usefulness ($M = 4.14$, $SD = .42$), perceived ease of use ($M = 4.15$, $SD = .42$), and perceived attitude toward technology adoption ($M = 4.30$, $SD = .59$).

To test the hypothesis that there were no statistically significant differences between NAS and NES teachers in their perceptions of technology usefulness, an independent samples *t*-test was performed. The independent samples *t*-test showed a statistical difference for perceived usefulness, $t(51) = 2.26$, $p = .028$, indicating that NAS teachers showed a more positive perception of technology usefulness than the NES teachers (see Table 8).

Table 8

t-test Results Comparing NAS and NES Teachers on Perceived Usefulness

Language	N	Mean	SD	t-value	Df	P	Decision
NAS	42	4.52	0.52	2.26	51	0.028	Reject
NES	11	4.14	0.42				

To test the hypothesis that there were no statistically significant differences between NAS and NES teachers in their perceptions of the ease of use of technology, an independent samples t-test was performed. The independent samples t-test showed a no statistical difference for perceived ease of use, t (51) = 1.38, p = .174, indicating that NAS teachers and NES teachers had about the same perceptions of the ease of use of technology. This is shown in Table 9.

Table 9

t-test Results Comparing NAS and NES Teachers on Perceived Ease of Use

Language	N	Mean	SD	t-value	Df	P	Decision
NAS	42	4.55	0.71	1.38	51	0.174	Retain
NES	11	4.15	0.42				

To test the hypothesis that there were no statistically significant differences between NAS and NES teachers in their intention to adopt and use technology, an independent samples t-test was performed. The independent samples t-test showed no statistical difference in terms of intention to adopt and use technology, t (51) = 1.08, p = .287, indicating that NAS teachers and NES teachers had about the same intentions to use technology. This is shown in Table 10.

Table 10

t-test Results Comparing NAS and NES Teachers on Intent to Use Technology

Language	N	Mean	SD	t-value	Df	P	Decision
NAS	42	4.55	0.71	1.08	51	0.287	Retain
NES	11	4.15	0.42				

In terms of answering Research Question 1, the data indicate no statistically significant differences between NAS and NES teachers in terms of their perceptions about the ease of use of technology or in their intent to adopt and use technology. However, there was a statistically significant difference between them in terms of their perceptions about the usefulness of technology in teaching. NAS teachers believed technology to be more useful than NES teachers.

Phase 2 Results

Phase 2 results are presented next. First the results from the classroom observations to answer Research Question 2 will be presented. Second the results from the interviews used to answer Research Question 3 will be presented.

Research Question 2: Observation results. Research Question 2 was "How do NAS and NES teachers in a secondary school who exhibit differing levels of technology acceptance use technology in their classrooms?" This research question was answered through the observation data for the four teachers. The data answered the questions what technology is being used, how are they using it, for what purposes are they using it, and what is the role of the teacher. Twelve observations yielded information about how teachers used technology in their classrooms. At least four uses were identified from the observations of each participant. Some of the uses were identified with all the participants

or a combination of participants. First, the overall findings comparing how the technology was used among the different teachers will be presented. Following this overview, thick, rich examples from the classroom observations will be presented for each teacher. This will enable to reader to more fully understand how the technologies were used in these four classrooms.

Comparison of observed classroom technology use. To answer Research Question 2 Table 11 was developed to show the various uses derived from the observations of each of the four teachers. Following the table is a discussion of the similarities and differences in how these teachers used technology in the classroom, first looking at similarities and differences among low and high scorers on the TAM, and then looking at similarities and differences between NAS and NES teachers.

Both low and high scorers on the TAM used technology to encourage and support research activities in the classroom and searching for information online. Use of technology to engage students was another use evident in both low and high TAM scorers as was using technology to assess and monitor student performance.

Low TAM scorers used technology in ways to encourage collaboration among students and to address different learning preferences. Low scorers also used technology to support teacher needs for multitasking and adapting their own pedagogy. These uses seemed less focused on meeting individual student needs and promoting specific leaning goals than what was observed in the high TAM scorers' classrooms.

Table 11

Comparison of Observed Technology Uses

Participant 1: NAS low TAM	Participant 3: NES low TAM
Use 1: Encourage collaboration	Use 1: Address multiple intelligences
Use 2: Research and information access	Use 2: Support low achieving students
Use 3: Assess and monitor student progress	Use 3: Multitasking
Use 4: Engage students	Use 4: Adapting pedagogy
	Use 5: Encourage collaboration
Participant 2: NAS high TAM	**Participant 4: NES high TAM**
Use 1: Engage students	Use 1: Develop critical thinking skills
Use 2: Differentiate instruction	Use 2: Time management
Use 3: Build linguistic skills	Use 3: Research and information access
Use 4: Research and information access	Use 4: Classroom management
Use 5: Assist low achieving students	Use 5: Engage students
Use 6: Assess and monitor student progress	

The two teachers who scored high on the TAM used technology to differentiate instruction for different learners, to assist low-performing students and to build individual linguistic skills, all strategies focused on individual student needs. These uses were not evident in the low TAM scorers' classrooms. In addition, the high TAM scorers used technology as a tool for building critical thinking skills and allowing students to manage their own time and as a classroom management tool. It seemed the high TAM scorers used technology in more ways overall and focused more on using technology to address individual student needs.

Both NAS and NES teachers used technology to support student research and help them access information, which seemed a common use across all teachers observed. Both NAS and NES teachers used technology to engage students in learning. And both groups used technology to support collaboration.

The NES teachers used technology to support multiple learning preferences and to address critical thinking, both directed at the whole class. NAS teachers used the technology to differentiate instruction, to support low-achieving learners, and to assess and monitor individual student progress; all strategies focused more on the individual student. In addition, there was a focus on building linguistic skills, particularly in English. These uses were not evident in the observations of the NES teachers.

Finally, there were uses identified in NES teacher classrooms that were about using technology to meet teacher needs, such as multi-tasking, time and classroom management, and adapting pedagogy. These uses were not observed in the NAS classrooms.

Participant 1 observation. Participant 1 was an NAS teacher with low technology acceptance. Participant 1 scored in the lowest quartile in terms of technology acceptance on the TAM. From the three classroom observations, four uses emerged in terms of how he used technology in his classroom: (a) to encourage collaboration, (b) for research and accessing information, (c) for assessment and monitoring progress, and (d) to engage students in learning.

Collaboration. Collaboration was one use evident from observing the NAS teacher who scored in the lower quartile of the TAM survey. This teacher used technology in his classroom to facilitate collaboration between teacher and students. There were many attempts at collaboration between teacher and students evident in the observations. It was also clear that Participant 1 favored collaboration among the students and he guided them in many activities that required them to work together to solve

problems as well as share information. Participant 1 constantly moved to each group lending his support to the students as they collaborated in lessons. Observation of one of Participant 1's classes showed him using technology to encourage his students to collaborate in the lesson. Participant 1 was teaching a topic on energy conservation and formed the students into groups of five, each assigned a specific topic. Students were asked to use their mobile phones to find the information and share their findings with other groups using their WhatsApp group. WhatsApp is a messaging application used on mobile devices and computers. Once all the information had been shared the group leader emailed the completed assignment to Participant 1 who was to correct them and suggest edits to the documents.

One action that Participant 1 repeated constantly in the classroom was giving students activities to complete online, then refocusing their attention to offline activities such as reporting findings, sharing solutions and perspectives, gleaned from the online activities. Students worked actively and collaboratively using technology and the teacher acted as a facilitator.

Accessing information. Using technology to support research and access information was a second use I observed in Participant 1's classroom. Participant 1, the NAS with low technology acceptance, was observed in teaching the students the rudiments of proper research. This recurring use was important as it represented a major component of the curriculum to be taught and practiced repeatedly throughout the school term. Students were guided into the proper handling of information sources from technological sources with integrity. Students used their mobile phones to access research

materials as Participant 1 modeled and demonstrated the correct procedures and likely outcomes of these procedures.

The students were guided into conducting research about green energy in the UAE, the Masdar City in particular. Despite students being Emirati citizens, not many of them knew the details about the Masdar City project. Participant 1 projected four facts about Masdar City that depicted green energy and each group chose one topic to research. Participant 1 then instructed the students in their groups to take out their mobile phones and access search engines of their choice to find the information they chose from the list. Participant 1 gathered the four students with limited English skills around the only personal computer (PC) in the room to give them individual guidance. After the time given, the students summarized the information they extracted from the Internet. They then shared the points with the other groups and the teacher wrote them on the whiteboard. All information gathered by the different groups was shared via social media to be collated for a later lesson. Participant 1 then demonstrated to the students how to record the sources of their information after the assignment.

Assess and monitor student progress. A third technology use that I observed in Participant 1's classroom was using technology to assess and monitor student progress. Participant 1 used the electronic Student Information System (eSIS) to record students' information such as report cards. Using the eSIS system allowed Participant 1 to input grades from all his assessments into the software and display the grades to the students and they saw how they performed on particular tests. When Participant 1 showed their assessment tracking, students knew the areas where they needed to work harder and

Participant 1 knew areas that he needed to focus on to improve students' progress. He also used eSIS to record attendance and I saw him easily check on the attendance pattern for his current class as well as for his other classes. Within the same software, Participant 1 entered the students' marks for their latest examination, with a focus on the skills tested. Participant 1 was able to save a lot of time and effort and plan lessons based on the data gathered from the tracking of grades in eSIS. Participant 1's class grouping was also based on the data available in the eSIS tracking and attendance. He examined the grades and placed students in groups according to the records in the eSIS.

Engage students. Use four was using technology to engage students. Teacher Participant 1 incorporated electronic games into lessons to arouse his students' interest in the lesson content. Traditional board games like bingo were used electronically by the teacher to generate and maintain interest throughout his lessons. Topics like vocabulary development, comprehension skills, and reading appeared challenging to many of the students in Participant 1's classroom. Introduction of electronic games proved successful in arousing and maintaining interest in these topics. Electronic games aroused the students' interest and they competed among themselves to solve problems and resolve issues. Even in mixed ability groups the lower achieving students got involved in trying to win in the different games. Games helped to arouse and maintain students' interest for long periods during lessons. In the bingo game, students worked in pairs with each pair of students having a bingo card to work together to interpret the clues. Participant 1 then projected clues on the interactive whiteboard (IWB) one after the other as each pair of students competed to be the first to unravel each clue to win the game. Participant 1

provided clues taken from the theme of the term so that students' knowledge base increased.

Participant 1 was teaching his Grade 12 about different types of pollution. As he entered the classroom, he projected the instructions on the IWB while taking the roll on eSIS. Students were instructed to access a website and enter usernames and passwords for the crossword game that Participant 1 appeared to have organized previous to the lesson. As soon as the students found the website, Participant 1 reminded the students of the rules of the game then told them to get ready. He advised them that points would be allocated for the team and that a total of 20 points were available for each team. The team that scored the most out of the 20 points was the winner of the game.

The students acted as if they were familiar with the game as they followed the instructions without much trouble and collaborated in finding solutions to the clues that Participant 1 projected on to the IWB. The activities were timed, and the teacher encouraged the students to work as quickly as possible to complete the exercises in the twenty-minute allocation. Students appeared deeply engaged in searching for answers and discussed the best possible responses to the clues that Participant 1 had on the IWB. Students competed to be the first to complete all the answers correctly. At the end of the 20 minutes, not all groups were finished; they were all at different stages of completion, although there was a clear winner. Participant 1 then revised the questions with the class and discussed the correct answers. These activities succeeded in keeping students active and interested in what would normally be a boring lesson.

Participant 1 also fostered student involvement in the lessons using technology. The times when he was observed to use technology in his lessons, he ensured that students were aware of the purposes for using the technology. Participant 1 demonstrated keen interest in how the students were learning by asking them pertinent questions, planning, and proceeding based on the responses received. Students were encouraged to approach technology use in a variety of ways such as using mobile technology or the IWB for the research, as a dictionary, or as a translation tool. Participant 1 used technology to encourage involvement in the lesson and using technology as a catalyst. In one lesson Participant 1 was teaching students about water conservation. He instructed students to first find unfamiliar vocabulary using their mobile phones to get both English and Arabic meaning of the words so that they got a clearer understanding of the content. The mobile phone was used as a translation tool as well as a dictionary. Students transferred the information to their notebooks for later referral and revision.

Classroom observations for Participant 2. Participant 2 was an NAS teacher with high technology acceptance. Participant 2 was an NAS teacher who scored in the top quartile on the TAM survey, indicating high acceptance of technology use. From the three classroom observations done, six uses emerged in terms of his technology use: (a) to engage students, (b) to differentiate instructions, (c) to build linguistic skills, (d) to support research and information access, (e) to assist low achieving pupils, and (f) to assess and monitor student progress.

Engage students. Using technology to engage students was one recurring use in the observed lessons of Participant 2. Participant 2 used technology on different

occasions to engage students. Students displayed considerable interest in different types and different aspects of technology. Participant 2 used this interest in his lessons by planning lessons around technology use and providing activities that required student interaction with technology. Additionally, video clips piqued students' interest as they provided a change from the usual reading and writing exercises which can prove tiresome and monotonous, especially for teenagers. As they worked with the technologies, students' interest rose, and they relaxed as they completed their exercises. There was one lesson where Participant 2 was teaching about protected species in the UAE. He presented PowerPoint slides embedded with video showing the habitat of protected species in the wetlands for students to watch then discuss questions about the information in the video. There was an interview embedded in the PowerPoint slides and students watched it and summarized what they learned from the interview about protected species in the UAE wetlands. The variety of approaches engaged the students.

Using technology, I observed Participant 2 teaching about entrepreneurship. This was another lesson that demonstrated student engagement. It was evident in the initial stages of the lesson that the students were generally lackluster. However, after talking to the class for about five minutes, Participant 2 told the students to listen carefully as he was going to play an interview between a young Emirati entrepreneur and a reporter. The students were then advised to read through the five questions that were displayed on the IWB and listen to the recording and recognize any information that would help them to answer the questions on the board. After playing the audio recording three times, students were given time to address the answers to the questions followed by a discussion of the

audio recording. Participant 2 then played a 5-minute video clip explaining some ways of being successful entrepreneurs hosted by seasoned Emirati entrepreneurs. Following the video presentation, Participant 2 guided the students into planning a small business using the information gleaned from the two media shared with them and notes from a previous lesson. Students used their mobile phones to search Google and Bing for additional information to help them in the assignment. Because of the variety of technology media used, the students were kept engaged and less distracted.

Differentiate instruction. Differentiating instructions was a second use. Another observed way in which Participant 2 uses technology in his teaching was as a differentiation tool. He used the technology to foster whole class involvement in the lessons. He gave students projects which provided opportunities for differentiation of the various topics in the theme of the term. Participant 2 also introduced the students to learning games so that he could concentrate on the needs of the different groups as the needs arose. Additionally, the teacher gave students opportunities to use PowerPoint presentations to explain their understanding and perspectives on a variety of topics, which allowed students to learn at their own pace and explain their interests. Differentiation is a teaching strategy that allows the teacher to focus on individual students within a group so that each student benefits from the instruction. Differentiation is different from engagement which was previously discussed. Engagement is mainly focused on how students react to instruction rather than the approaches of the teacher.

In one lesson that I observed for Participant 2, he focused on using differentiation to get his mixed ability group to grasp the concepts being taught about a business

concept. Differentiation can take many forms including by content, process, adaptable groupings, among other strategies. Participant 2 chose to approach differentiated instruction from both a process and grouping perspective. He first directed students' attention to the instructions on the IWB while explaining the objectives of the lesson and the requirements of the project.

Participant 2 divided the information into small chunks in a PowerPoint presentation so that students opted for the sections that they could manage. Additionally, he froze each PowerPoint slide on the board so he could use the one PC in the room to facilitate one-to-one instruction and the assignment instructions were available to students for the duration of the lesson. He then adapted the groups in the room according to the interests and choices of the students so that those students could share ideas. Participant 2 then instructed the respective groups to use their mobile phones to retrieve the information that they needed and organize the information to plan their projects for subsequent presentation, while Participant 2 worked with the lower achieving groups, allowing them access to the PC. The different tasks were timed, so that students could complete and save each portion in the common area for assignments, so in subsequent lessons, they could access and continue their projects.

Build linguistic skill. Use three had to do with building linguistic skills. Participant 2 was observed using technology to boost students' linguistic skills. The teacher built on the technology skills that the students possessed and used mainly to access social media communication. As a result of this situation the primary task of Participant 2 was to guide students into linguistic learning. Rather than concentrating on

the different aspects of linguistics, he incorporated aspects of language learning into the teaching and learning situation using available technologies such as mobile phones, which served many purposes. Students had to complete project work and apply different levels of language to the different aspects of the project. As they progressed through the various stages of the project, the teacher increased the level of language required for the end product. Participant 2 was teaching comprehension and he asked students to listen to a pre-recorded reading of the comprehension passage while tracing the words on the hand-out. After the reading, Teacher Participant 2 instructed the students to find the unfamiliar words using their mobile phones and to find the Arabic meaning as well. They then shared their words and the teacher typed them and projected them on the IWB. Following that, he had the students taking turns to read the challenging words from the board, helping each other to sound out the words.

In another example, teacher Participant 2 started the lesson by projecting four scenarios on the IWB and asked students to choose one and send a text message giving advice in the situation chosen. To avoid confusion, Participant 2 paired the students who were to send text messages to each other. After the messages were sent, Participant 2 asked different students to share the message that they received, and he wrote them on the left side of the board. The messages on the board were then read and the text languages discussed. Participant 2 then wrote the words of the text messages shared on the board and highlighted them. He then provided the proper English word for each of the abbreviated and text message words and explained them to the class. After that he explained the words and demonstrated their use, he asked the students to re send the

messages revised and without the use of text language. Some students were successful in using less text language, while some still struggled to get it correct.

Access information. A fourth use was using technology to access information and for research. Another way in which Participant 2 used technology in his teaching was as an information retrieval and sharing tool. He allowed students to use their mobile phones to easily access and share the information they gathered from designated websites. Students shared the information they gathered among their study groups in an online forum. The success of their information gathering and sharing indicated how effectively they used technology to increase their knowledge. At the same time, Participant 2 made the students aware that technology use was not confined to social media; neither was text language the only effective way to communicate with technology. This information retrieval approach is similar to the exercises that Participant 1 used in his lesson where he guided his students into using their mobile phones to access websites, retrieve information and ultimately to share the information retrieved.

Enhancing the skills of low achieving students was use five. Participant 2 used technology in his classroom to target low achieving pupils (LAPS). Using the students' general interest in technology and their ability to manipulate programs and software, teacher Participant 2 presented specially planned lessons to target LAPs. The teacher incorporated specific strategies aimed at raising the standards of students. The low achieving pupils in the mixed ability group were targeted using technologies such as PowerPoint presentations projected on the IWB screen, as well as their mobile phones when needed. The low achieving students were adept at technology manipulation

therefore they were able to access the content easily and quickly, which enhanced their learning of the content. When students did not understand words and phrases they did not quickly researched in Google or other search engines and translated into Arabic for better understanding. In one lesson Participant 2 targeted the low achieving pupils using technology to arouse and maintain their interest. The focus was on students practicing their reading and making connections to self and country. Participant 2 handed out the reading scripts while projecting them on the whiteboard so that all students were seeing the information while he explained. Students read through their scripts after which, Participant 2 advised them to underline all the words that were either difficult or unfamiliar to them. The students then used their mobile phones to find the Arabic and English meanings of the unfamiliar and difficult words in in the Merriam-Webster dictionary. Participant 2 asked the students to look at the pronunciation of the words in the dictionary and practice saying them to each other until they were comfortable. Following pronunciation practice the students read the text again with the newly learned words in the text.

Assess and monitor student progress. Use six was using technology for assessment and to monitor student progress. It was evident that from observations that the teacher used technology to monitor and support student progress. Participant 2 used technology to assess his students' work and subsequent progress with minimum effort. He built assessments into his lessons and used technology to support the progress of the lessons. The assessments progressed seamlessly as Participant 2 infused technology into the lessons in different ways. This provided him with an opportunity to give each student

personalized instruction, guiding the less able, while monitoring the more able students to keep them on track. Additionally, students and teacher could do more with the time saved. Monitoring student progress is about assessing or measuring how the student is performing compared to past performances. It is then imperative that plans are put in place to move the student forward. Differentiation means that teachers adapt their instruction to suit the needs of each student in the class.

I observed Participant 2 using the eSIS system to monitor the academic progress of his students. In one lesson he projected the gradebook onto the whiteboard and pulled an electronic shutter over the data, revealing one row at a time and asking students to give their opinions about the progress revealed in each row. Students' names and eSIS numbers were not shown, so no one apart from the teacher knew whose grades were being discussed at any given time. Participant 2 explained to them that he wanted all of them to be aware of the general progress of the class before meeting individual students and planning interventions suitable for each student. Following the blind analysis of the grades, students logged into their eSIS accounts on their mobile phones and accessed an end of unit assessment. After they completed the assessment, they immediately submitted it to the teachers' gradebook area for grading. As soon as the assessments were submitted the teacher accessed a clean copy and projected it on the board and guided the students through the solution for each test item. Participant 2 explained concepts that students found difficult during the test and offered explanations of challenging concepts.

Classroom observations for Participant 3. Participant 3 was an NES teacher with low technology acceptance. Participant 3 demonstrated several ways in which he used

technology in his classroom. The uses derived from observations of his classroom included: (a) to address multiple intelligences, (b) for supporting low achieving students (c) multitasking, (d) adapting pedagogy, and (e) to support collaboration and teacher and student interaction.

Multiple intelligences. The first use from Participant 3 was use of technology to cater to the students' multiple intelligences. This multiple intelligence is different from differentiated instruction in that differentiated instruction is primarily concerned with using numerous strategies, techniques, and resources to guide students with a range of abilities to experience success in their learning. Multiple intelligences on the other hand, is more about capabilities and learning preferences which emanate from student experiences, cultural awareness, and whatever motivated them to act. Participant 3 planned and executed lessons based on the various needs of the students and their various learning styles. Lessons were created using various technology tools that would cater to individual students' intelligences. Some lessons were created videos to cater to the visual and audio learners in the class. There were lessons with text being the dominant strategy, while others had mainly still images. PowerPoint presentations were used extensively in the observed lessons, and videos, audios, and texts were embedded into PowerPoint presentations in strategic slides or used in a variety of combinations. Participant 3 was observed conducting a writing to inform lesson where he also concentrated on vocabulary development, a use similar to the language development observed in Participant 2's (high TAM scorer) lesson. Participant 3 started the class by introducing the topic on the whiteboard and explaining the objectives of the lesson after which he put on a 5-minute

video of the trailer of the film *Hunger Games* which was embedded in a PowerPoint presentation. After the students watched the trailer twice, Participant 3 displayed a billboard advertising the film and asked students to list as many facts as they could from the billboard. Following viewing of the film, Participant 3 explained what it meant to write to inform. He then explained the rudiments of an information text. To make it easier for students to understand, Participant 3 projected the acronym GAPS on the board to represent genre, audience, purpose, and style. He explained each concept in turn, showing examples of how they fit into a finished product. After that he gave students an exercise to review the film using the acronym as a guide as they wrote. He gave each student a sheet with a rubric for them to use as a guide to writing, an effective information text and to assess his partner's work.

Support low achieving students. Use two was using technology for supporting low achieving pupils. In any instances where students found concepts difficult to comprehend, Participant 3 was observed using illustrations to make the lessons clearer to struggling students. He projected images and illustrations on the IWB that would allow students to see graphics of concepts as they were explained. The illustrations and images were effective as the students matched information with illustrations and gained deeper understanding and clarity of the concepts. This approach is similar to the approach used by Participant 2 to target LAPs. However, despite the objectives being similar, the approaches and strategies used by each teacher were different.

Multitasking. A third use was multitasking. Another way in which Participant 3 used technology in his classroom was to multi-task during his lessons. By using

technology, he was able to perform more than one task within each lesson. Additionally, students were able to perform many of their assignments simultaneously using the technology available to them in the classroom. Students were seen interacting in their WhatsApp study group, typing information to share, while accessing research data from the Internet, as well as searching for unfamiliar vocabulary. Similarly, Participant 3 used technology to complete multiple tasks at the same time. He was guiding students to follow proper research procedures, while explaining lesson concepts on a PowerPoint slide and taking the roll. Participant 2 similarly used technology to guide students' research in some of his lessons. These activities would previously have been completed over numerous lessons, individually. These lessons were observed to progress with consummate ease as the number of activities within one lesson was not overwhelming to the teacher or to the students despite the volume of information and the number of tasks to master. Participant 3 entered the classroom and set students to copy the topic and objectives from the whiteboard. While that was happening, he was taking the roll on eSIS. Participant 3's lesson began with him taking the roll on the desktop computer as he projected a PowerPoint presentation on the board. He then explained the objectives of the lesson to the students and guided them about proper research protocols from the information on the PowerPoint presentation. While some students were typing the information on the board, others were sharing and communicating on WhatsApp regarding their findings on the research topic. Participant 3 was explaining and demonstrating proper research procedures for the students' projects.

Adapting pedagogy. Use four was about adapting pedagogy. Participant 3 made use of technology to enhance his pedagogical skills. It was evident from the observation that Participant 3 used technology as tools to improve his teaching applications in the classroom. This action was evident at different levels across the lessons that were observed as he coupled traditional teaching strategies technology resulting in more interactive approaches. The teacher made it easier for students to reflect and share their learning through technology by providing tasks and exercises that required reflection and sharing. Participant 3 showed that he was aware of the value that incorporating traditional teaching strategies with technology can be very effective. Participant 3 was teaching about renewable energy so he mounted pictures of different renewable sources and placed them at the five corners of the classroom representing the five groups, as he explained that each group was to imagine what they thought could be happening in the pictures and how it could impact their community. He instructed students to write their ideas in their notebooks and share them later with the rest of the class. As the students read their ideas Participant 3 wrote them on the IWB. He then played a short video where the manager of a renewable energy company was explaining about the types of renewable energies and their impact on the community and the environment. Students then aligned the information with their own ideas from the pictures of the respective groups.

Many students were already skillful at many aspects of technology use. Participant 3 planned his lessons around the knowledge that students were not novice technology users. He frequently encouraged them to complete tasks using the skills he knew they already possessed. He also guided students to transfer their technology skills

to current uses in the classroom. Students were set tasks and the teacher would guide their skills in such areas as social media skills, to share information, to access information, and to create objects relevant to the lesson, or series of lessons. This was a recurring use in Participant 3's lesson as he focused students' skills with current situation to enhance their learning and interaction in the lessons.

Collaboration. Use five was using technology to support collaboration and teacher and student interactions. Interaction involves communication and other activities that provide learners with opportunities to contribute to their learning by doing various activities such as reading or using a computer. Student teacher interaction is another important way in which Participant 3 used technology in his classroom. Many activities that would not allow for interaction without technology became more interactive with technology infusion. Simply projecting lessons from a PowerPoint presentation on the IWB was seen to assist greatly in adding interactivity in Participant 3's lessons. Everyone was positioned to see the information simultaneously and could interact with the teacher as the lesson progressed. With the technology affording everyone simultaneous access, interaction between the teacher and the students become easier and more successful. Participant 3 had the students in groups to make plans for a system to provide energy if the UAE should run out of oil. The teacher offered a choice of solar, wind, or water on the IWB for students to use in their projects to solve the perceived energy problem. Students were guided into completing an interactive display as they presented their solution of the contrived energy problem together in their respective groups. Participant 3

encouraged the students to share information with other groups using their WhatsApp group chat.

Classroom observations for Participant 4. Participant 4 was a NES teacher with high technology acceptance. Observing Participant 4's classroom over three lessons led to the identification of five uses: (a) develop students' critical thinking skills (b) for time management, (c) for research and information access, (d) for classroom management, and (e) to engage students in learning.

Critical thinking. Use number one was developing students' critical thinking skills. Participant 4 used technology to help to develop his students' critical thinking skills. He placed students in mixed ability groups then handed them copies of two articles he had written about innovations at the Dubai Expo 2020 and how the expo can contribute to renewable energy in the UAE. Participant 4 then asked students to refer to notes they had written in the previous lesson for 5 minutes. As a reminder, Participant 4 highlighted the main points of the previous lesson on the IWB. He the instructed students to read both articles and discuss the one that they thought was better reported, giving reasons for their conclusions. Next, Participant 4 asked students to decide within their groups whether there was any information that was not included in either article that could have made it complete. He then projected some phrases on the IWB as prompts. The difference with this activity is the focus. It was evident from Participant 4's learning objectives that the focus of his lesson was to develop critical thinking skills by practicing problem solving, recognizing strengths and weaknesses of presentations, summarizing research reports, and collaborating in analyzing information.

Time management. Use two was time management. Effective time management was another way in which Participant 4 used technology in his classroom. Since the textbooks for the course were available online, students were allowed to access lessons at any time, as a result, saving time in lessons for other activities. He encouraged students to complete or read tasks outside of the class so that when they arrived for the lesson the teacher would spend less time introducing the work to be done. Moreover, the teacher saved time by preparing one sample of most lesson activities and used technology to distribute it to all his students simultaneously. Another way in which technology helped save Participant 4 time was in handling student attendance. Instead of calling home when a student was absent, he would take the attendance and as soon as the student was marked absent on the computer, a text message would be sent to the registered phone of the student's father.

Participant 4 started a lesson by requesting the preparation work they were given at the end of the previous lesson. Each group was given 5 minutes to explain their findings from the work they did overnight. As Participant 4 did not have to explain in-depth concepts, students were prepared and needed only minimum prompting to begin their tasks. Participant 4 gave the students 5 minutes to quickly organize their presentations. These presentations would have normally lasted for almost all of the lesson with each group allocated 5 minutes to present. The remainder of the lesson was spent analyzing and discussing the presentations. This exercise would have normally taken two lessons, but the preparations prior to the lesson saved considerable amount of time.

Accessing information. Use three was for research and information access. Participant 4 used technology to help students to conduct proper research. Previously, when teachers wanted to guide students in research it would entail booking the library days, or weeks in advance. There would be competition for the few available computers. Participant 4 had his students conducting research on their mobile phones without getting out of their seats. Considering that research was such a vital component of the curriculum, this was an important use of technology in his class. The students had access to translation software to explain technical terms and unfamiliar vocabulary, so they could edit their research information while conducting the research. Using technology to teach research skills was effective because there were no reams of paper to peruse, the teacher gave individual attention to students as the need arose. As a result of the technology, students edited their research based on the feedback received from the teacher.

Classroom management. Classroom management was use four. Improving transition time between tasks was one way in which Participant 4 used technology in his classes. Transition time between tasks in a lesson usually involves books, papers, and other equipment. Using technology in Participant 4's classroom showed that transitioning occurred from different activities so that students did not have to stop what they were doing to pack away equipment and resources. One strategy that worked well for Participant 4's classes was displaying the timing on the IWB so that the entire class could see it and time their progress and a bell to signal the end of the activity. Students acted as if they were familiar with this use of technology in their classroom, because as soon as

they heard the bell, they switched activity. Participant 4 entered the classroom and reminded the students about the end of unit assessment they were to complete in that lesson. He advised them to get out their workbooks and turn the assessment page. While students were finding the assessment pages, the teacher was setting up the IWB timer system. He set the timer so that a bell would sound to signal end of that section of the assessment and for students to move onto the next task. Participant 4 then reminded the students to glance at the clock as they progressed through each segment of the assessment. As there was no break to change resources, movement in the lesson was limited and resulted in better classroom management.

Engaging students. Use five was to engage students in lessons. Technology was used in Participant 4's class to promote vicarious experiences via multimedia. In one lesson about Dubai's Expo 2020 and the various innovations that will be on show there, students were introduced to ways that water and solar power will be used at the expo. They watched videos that explained how these innovations were used in life situations. From seeing the innovations in that format, students lived in the moment through videos. Technology was used in Participant 4's classroom to pique students' interest where the teacher was observed using cartoon videos and generated students' interest in the lessons to be presented. The videos were effective as they were projected so that it was visible to the whole class and they responded to the videos simultaneously. Participant 4 was observed using technology when he played a short video to get students familiar with the Abu Dhabi mangroves as part of their conservation term project. During the video, students showed keen interest in the information that was in the video. After the video it

was easier to teach the topic to the students who were already familiar with it in graphic format and their interest was already aroused in the topic. To further consolidate the information and maintain interest, the teacher introduced electronic games such as bingo and vocabulary dominoes.

After the observations were completed, participants were interviewed. Each interview was conducted at a time and place convenient for the teacher. The third research question was addressed using the interview data. Findings from the interviews are discussed next.

Research Question 3: Interview results. The third research question addressed how NAS and NES teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about the adoption and use of technology in their classrooms. The results of the qualitative interviews of this explanatory sequential mixed-methods study were aligned to Research Question 3. Analyzing the interview phase of this study was characterized by a search for concepts identified in trying to ascertain how teachers with differing levels of technology acceptance make decisions about technology adoption and use in their classrooms. Additionally, in the interviews I asked the teachers to explain their strategies in making decisions about adopting and using technology in their classrooms. Several key ideas emerged from the interview with each participant. Participants shared details about their decisions to adopt and use technology in their teaching. Teachers revealed various perspectives regarding their decisions to adopt and use technology in their teaching. All four interviewees explained that they saw the role for technology in the classroom to be important. The interview phase of the study was

conducted to get the views of teachers from four representative groups: the low NAS, high NAS, low NES, and the high NES.

First, I will present an overall summary of the findings comparing the teachers. Then thick, rich descriptions of what the interviewees said will be presented to allow the reader to "hear" their voices and they describe their choices to use technology in the classroom.

Comparison of interview findings. Following analysis of the interview data Table 12 was constructed to be able to compare the results from the four interviews. I looked at comparing high and low TAM scorers and NAS and NES teacher respondents.

The factors of access to technology, technology to support learning, and ease of use of technology were evident in both the low and high TAM scorers' interviews as reasons they would decide to adopt and use technology in their classrooms. From the low TAM scorer's interviews in deciding whether to adopt technology in their classrooms the factors of technical support, versatility of the technology, expectations in the 21st century, and more teaching strategies were evident. These are factors that did not come out of high TAM scorer's interviews. The high TAM scorers expressed that if technology improved teaching, was easy to use, and was culturally aligned to the content of the lesson, it was likely to assist in deciding to adopt and use technology in their classrooms. These are factors that were not highlighted in the interviews of the low TAM scorers.

Table 12

Comparison of Interview Findings

Participant 1: NAS low TAM	Participant 3: NES low TAM
Factor 1: Access to technology	Factor 1: Expectation in 21st Century
Factor 2: Technical support	Factor 2: Ease of use of technology
Factor 3: Technology to support learning	Factor 3: More teaching strategies
Factor 4: Versatility of technology	
Participant 2: NAS high TAM	**Participant 4: NES high TAM**
Factor 1: Access to technology	Factor 1: Ease of use of technology
Factor 2: Technology to improve teaching	Factor 2: Familiarity with technology
Factor 3: Ease of use of technology	Factor 3: Technology to support learning
Factor 4: Cultural alignment	

Technology to support learning and ease of use of technology were common factors between both groups. The factors that came out of the NES interviews to show ways in which they decide to use technology in their classrooms include expectations of technology in the 21st century, technology providing more teaching strategies, and familiarity with technology.

NAS teachers unearthed access to technology and access to technical support as factors that guided them into whether to choose technology as part of their teaching toolkit in their classrooms. Versatility of technology and improving teaching performance were also included in the factors derived from the interviews. Cultural alignment with technology on teaching and learning was also derived from the NAS interviews. Cultural alignment is about the consistency of practices or policies with cultural norms. These factors were not evident in the NES interviews.

Factors from Participant 1's interview. Participant 1 was an NAS teacher with low technology acceptance. Analysis of the interview with Participant 1 revealed four factors

related to his deciding to use technology in the classroom. These were: (a) access to technology, (b) access to technical support, (c) technology to support learning, and (d) versatility of technology to enhance the learning environment.

Access to technology. The first factor that was derived from the interview with Participant 1 was Access to technology, which suggests that access to technology is the first step in a teacher deciding to use it. Participant 1 stated that, "Decision-makers should think about the great positive impact that technology can have on classroom activities and make technologies accessible to the teachers and students." To further support this idea, Participant 1 argued that access to technology would, "Ensure that teachers choose technology as they would see that it can make their lessons much better as students would show interest as they are already familiar with using technology in other areas of their lives." Participant 1 also shared that access to technology is important as, "It gives students the impetus to be independent learners and changes the role of the teacher to facilitator who guides students into solving problems and finding their own information and analyzing it." Participant 1 stressed that when students and teachers have access to technology, "There is less dependence on books and papers which indefinitely impacts the environment and can eventually cost less." So, access to technology was important in deciding to use it in instruction.

Technological support. The second factor unearthed from Participant 1's interview was access to technical support. When teachers are given access to technology in their classrooms, it is important that they receive technical support. Sometimes they

have problems with operating the technology and need support, or sometimes the support comes in the form of training and demonstrations. According to Participant 1,

> Many times, there are small problems and teachers with the technology, but because we are not trained in using the technology, we do not know that the problem can be easily solved. If we had the training, we could deal with the problem and continue with our lessons instead of wasting precious time. A colleague, even, could spend a few minutes to give a presentation to help out.

Technical support can come from a technical support team, or it can be from a colleague who understands the technology. Participant 1 argued that, "Technology is a good tool to have in the classroom, but they do break down and if they break, teachers need to have reliable access to technical support." Teachers will be inhibited about deciding to adopt and use technology in their teaching if they are not assured of getting technical support. He stated that, "If technologies stop working and there is no technical support, teachers will be at a disadvantage and not inclined to decide to adopt technology in their classrooms." Participant 1 reported, "Sometimes the internet goes, or there is a piece of equipment that I don't understand. Those are the times when I need technical support urgently so that my lesson is not disrupted." Teachers perceived a need for technical support to use technology in the classroom.

Technology to support learning. The third factor arising from Participant 1's interview was his belief that technology can support learning. This factor seems to indicate that if technology is to be effective in the classroom, it has to be the type of technology that enhances learning. The technology needs to be the type that will be

suitable in different learning situations. Participant 1 supported the fact that if technology is to support learning it needs to be interactive. He shared that, “Sometimes the lesson is very difficult, and it needs some aids that might help the students to understand it.” When technology is effective in supporting learning, it is likely to increase the chances of Participant 1 adopting and using technology in his classroom. He said, “It is very important for me to assist my students throughout the lesson especially when they find abstract materials difficult to understand. Adopting technology could be useful in helping to clarify some of these abstract issues.”

Technology is also effective in supporting learning when the teacher can give students immediate feedback to the students. Participant 1 said, “Technology is important to me when I can use it to present problems to students and they use the technology to solve the problems. Then I will be happy to use technology in my classroom.” Participant 1 reported, “It is very important for me as a teacher to decide if I am going to use technology or not. If the nature of the lesson is very difficult to be introduced, technology is going to make it easier, not only for me as the teacher, but also to my students.” Participant 1 in explaining how technology can influence learning said, “First, I check whether students are going to use it or not and get the benefit at the same time. Sometimes technology wastes students’ time, so it’s very important that before introducing it, I myself should make sure that the students use them in a correct and appropriate way.” Participant 1 further explained that, “If you have a lesson at period nine which is the last period of the day when students are tired, you can use the technology to maintain their interest. In this way the technology will impact their learning

by keeping them interested and interacting with me and the other students." Believing that technology could be used to support learning was a key factor in adoption.

Versatility of technology. Versatility of the technology to augment his teaching and learning environment was the fourth factor arising out of Participant 1's interview. Before technologies can be adopted and used by teachers, they must know that they can facilitate the myriad activities that are carried out in lessons. Because teaching is a dynamic endeavor, teaching tools are better when they are can assist in numerous undertakings in the classroom. Participant 1 explained, "You know, sometimes there is no internet connection. Sometimes the students do not accept the material that you are going to introduce." From this explanation, it is evident that Participant 1 desires technology that can be used with or without technology. Additionally, he seemed to favor technologies that he can switch if one approach is not producing the desired effects. He added that, "Also, the number of students in the class could be considered as a factor that the wrong technology could impact in the classroom." Versatile technology means that it can be adjusted for use in large or small classes. Participant 1 said, "Sometimes you do not know how to get the students interested, so you rely on technology, so technology must have many functions."

Factors from Participant 2's interview. Participant 2 was an NAS teacher with high technology acceptance. Four factors emerged from Participant 2's interview in terms of his considerations in choosing to use technology: (a) access to technology, (b) technology improves teaching, (c) ease of use, and (d) cultural alignment.

Access to technology. Availability of technology was the first factor from Participant 2 the NAS teacher with high TAM acceptance. It is important for technology to be available to teachers if they are going to decide to incorporate it into their classrooms. According to Participant 2, "Before planning my lesson, I must check to see what technologies are available in school and if they are in good working condition." Teachers will need to have the technologies continuously available to them if they are going to successfully carry out the mandate of guiding students into technology preparedness. Participant 2 shared, "A number of factors are instrumental in helping me decide whether or not to adopt and use technology and one of them is availability of suitable technology." Teachers will decide to adopt and use technology if they know the right technologies will be made available to them. Participant 2 stressed that, "It is also very important to know what technologies are made available so I can decide which ones will go best with my lesson, or which ones will help me get the most out of my students." Access to the technology was also important for this teacher.

Technology to improve teaching. The second factor that arose from the Participant 2 interview was using technology to improve his teaching performance. For teachers to decide to adopt and use technology in their classrooms, they have to ascertain that it can be used to help them perform their jobs better. Participant 2 said, "I perceive my role in technology adoption and use in my teaching to be pivotal because technology is out there to make my teaching better and to make my students achieve better results." Participant 2 explained, "I perceive my role in technology adoption to be to use technology to help improve the ethos of the classroom. It is also my role to get teachers

and students to interact to improve communication in the classroom and so improve the teaching and learning in the classroom." Participant 2 also stated that, "Technology is important to me as it helps to marry old teaching methods with the new ones to improve job performance in the classroom." This participant believed technology could help improve teaching performance.

Ease of use. Ease of use of the technology was the third factor. Teachers will be more confident in adopting and using technology in their classroom if they can use the technology with ease and comfort. Not being able to use technology with relative ease can form a barrier to any decision to adopt and use technology in the classroom. Participant 2 reported, "I have to consider the factor whether it is easy to learn and use this technology in a short or long term." In explaining about his perception of the ease of use of technology, Participant 2 said, "Generally, I find technology easy to use, so I don't have problems using technology in my teaching." He added, "I find that when I teach some technology skills to some teachers, or even if they [are] not teachers, it comes to me easily." Ease of use definitely influenced decisions to use technology in the classroom.

Cultural alignment. The fourth factor that was extracted from Participant 2's interview was a need for cultural alignment. Technology is very invasive, so sometimes it will affect different cultures in different ways. Often it is necessary to follow cultural rules and policies before deciding to adopt technology in the classrooms. Teachers should be mindful that cultures do not deal with issues in the same way. Participant 2 explained that, "Our culture is tied to our religion; therefore, everything I do, including teaching, must satisfy cultural expectations." Any teacher who teaches in a cultural context must

consider specific rules of that culture as they incorporate technology in their classrooms. Participant 2 reported that, "When I plan my lessons with technology, I have to first complete my research and ensure that all images, words, and symbols are in keeping with cultural expectations." He added that, "As you know, in our culture, men are only allowed to teach boys, therefore whatever technological resources I have to block aspects of Western cultural images that are embedded in the technology resources and software." Cultural aspects had an influence on how Participant 2 used technology in the classroom.

Factors from Participant 3's interview. Participant 3 was an NES teacher with low technology acceptance. Three factors emerged from the analysis of the interview data from Participant 3. These were: (a) technology use as an expectation in the 21st century, (b) ease of use, and (c) technology provides more teaching options.

Expectation in 21st century. The first factor evident in Participant 3's interview was his personal belief that technology is compatible with 21st century teaching and that students expect it. Teacher beliefs can be influenced by the curriculum and how they perceive technology in relation to their pedagogical duties in addition to the place of students in the teaching and learning environment. Participant 3 stated, "My belief is that when you see the importance of technology in the classroom, it will guide you into deciding if it's something you want to take on in your own classroom." I interpret Participant 3's belief about technology to be centered around the idea of technology as relevant for 21st century teaching and his belief that teachers would find teaching tedious and untenable for 21st century students who use technology as part of their daily lives. He said, "Even if the school cannot afford all the expensive and current technologies,

there are usually older versions that are still useful and can be used in the classroom to great effect." Participant 3's personal belief also extended to making choices in technology adoption and use in his classroom. He explained that, "I would rather have an older version of a technology to use in my classroom than not to have any at all. Many older versions are still in excellent working condition and can help the teacher to facilitate the technological needs of his students." Participant 3 stated, "It's a must that students definitely benefit from technology adoption in the classroom. It is the 21st century and 21st century society and jobs demand that students benefit from technology integration in their classrooms." Interaction with their peers and with their teachers is one way that students can benefit from technology in the classroom. Participant 3 said, "Students must be up to date with the technology around them as they learn from their teachers and each other. Technology is here to stay a long time, so students have to benefit from its inclusion in the classroom." These responses indicate a belief that technology integration is expected for teaching.

This expectation for teachers to use technology in the classroom reflects the need for students to be prepared for life after school in a society inundated with technology. If technologies are to be incorporated into classrooms, they must be ones that align with what students will encounter in society after leaving school. Participant 3 said, "You have to do it and go along because the world is changing fast. We must get the students to prepare for this society where everything they do will require some technology skills." Participant 3 reported, "It is our job as teachers to ensure that we do the right thing with the technology and our students to give the right technology skills, so they do not enter

society as misfits." As much as possible, teachers should provide students with relevant and up to date experiences in using technology that will bode well for them as they begin life outside of school. Participant 3 said, "Well, we have to be up to date and, you know, follow up on recent trends. And make sure that we use real-life technology in our classrooms, like iPads, because students are using them every day, so we have to be up to date and use the technology in the classroom." Clearly this teacher believed engaging with technology was important for students' futures.

Ease of use. Ease of use of technology was the second factor I derived from Participant 3's interview. The idea was not only to make technology available to teachers, but it was also important to provide technologies that were easy to use by the teacher. Ease of use of technology is the extent to which the teacher finds the technology easy to use without incurring any length of training. Participant 3 stressed, "If I should decide to adopt and use technology in my classroom, I would have to first find it easy to use and there is no need for attending long difficult courses." In many instances, when new technology is introduced into schools the teacher must take time out of class schedule to attend courses to learn the technology. Participant 3 explained, "I am aware that technology is not always installed with everything ready for immediate use, so if teacher finds it easy to learn the technology it would be an incentive for him to adopt it into his classroom." Ease of use was important in decisions about what technologies to use.

More teaching strategies. Seeing technology as providing more options for teaching strategies was the third factor emerging from Participant 3's interview. The learning needs of students require a plethora of strategies to be used in the classroom for

optimum effect. With teachers having to be aware of 21st century needs of students, versatile technology use is important to help in meeting so many student and teacher needs, while preparing students to be 21st century citizens. As Participant 3 stated, "Well, in English you can always use technology for many things. You can show a video so they can see and hear someone talking in English, or a part of a movie, so it's definitely easily applied in the classroom." Participant 3 reported, "It can be used to design suitable lessons, incorporate a video, PowerPoint; it can be beautiful for English as a subject." In a situation where students' first language is not English, it is important that the technology gives them sufficient confidence to explore the language enough to delve deeper into mastering it. Participant 3 shared, "Well, we had a listening test where we used computer to play the listening test. We had lessons where they saw videos, and then they would write comments or essays about what they saw in the videos. That was successful. We would watch different movies that we would talk about later, so that was successful." Technology was perceived as a way to expand teaching options.

Factors from Participant 4's interview. Participant 4 was an NES teacher with high technology acceptance. Participant 4's interview analysis resulted in three factors. These were (a) ease of use of technology, (b) familiarity with technology, and (c) a belief that technology supported learning.

Ease of use. The first factor uncovered in Participant 4's interview was ease of use of technology. This factor indicates the desire for teachers to be comfortable using any technology available to them in their classrooms. Teachers expect that technologies in their classrooms should not pose any difficulties for them to use, so they do not have to

expend great effort to use the technology. When teachers are comfortable using the technologies, they will be encouraged to adopt and use technology in their classrooms. Participant 4 stated, "I consider the ease of the actual lesson and think if technology can make this be delivered easily, or will it create a stifle on the lesson." Participant 4 explained that, "If you are familiar with the actual hard or software of the technology that you are using, it becomes pretty easy." Sometimes the technology has to be set up for the lesson and then broken down after the lesson. This can be quite frustrating for the teacher. Participant 4 said, "So, pretty much, the fact is, looking at the set up and break down time, how easy or harsh it would be if I use or not use technology." Again, ease of use was seen as a critical factor in using technology for instruction.

Familiarity with technology. The second factor that surfaced from Participant 4's interview was familiarity with technology. To be effective practitioners, teachers need to be familiar with a range of technologies that will assist them to complete the array of tasks that teachers are responsible for throughout a workday. Participant 4 stated, "I mean, teachers have to get to know technologies well enough so that they can decide on the most suitable materials for student engagement and progress." When teachers get more familiar with technology, it can improve their behavior and attitude toward technology adoption and use in their classrooms. Participant 4 reported, "As teachers get more familiar with technology their behavior and attitude could change to reflect their growing familiarity with technology and could help to decide if technology will help their teaching in any way." Participant 4 believed teachers had to be familiar with the technology. Participant 4 commented that, "Most students come to class already familiar

with technology, so it is important that teachers develop familiarity with technologies to meet the needs of their students. “To make good instructional decisions, it was important for teachers to understand how the technology could be best used.

Technology to support learning. Factor three in Participant 4’s interview was using technology to support learning. Participant 4 shared, “If you use technology to drive your instruction, what ends up happening is that you go through your lesson and there is an opportunity to break down your lesson plans and show particular standards, particular activities based on your lesson planning.” Before embarking on technology use in the classroom, it is important that teachers decide how they will use the technology to aid understanding of the main learning points in the lesson. Participant 4 said, “You should use the technology whether it be the smart board, whether it be a computer, it might be a laptop, and you can use your smartphone in the classroom if it is allowed.” Participant 4 saw technology as increasing the ways he could meet learner needs, saying, “As a high school teacher I use the smart board and what ends up happening is that you incorporate movement with using the smart board.” He also explained, “As I’m doing presentations around maybe using PowerPoint, or using Prezi [presentation software], and I grab students’ attention and then I have students come up and show me things on the board, or answer questions on the board.” Before making the decision to adopt and use technology in their teaching, teachers must be clear that the technology will be beneficial to their students. Participant 4 pointed out, “I look at the spacing in the classroom; you know, I look at how the students are going to be seated, observe the actual lesson, then consider whether I am going to use the data show. And then I look at

the attention span. I try to consider the activeness of the students in choosing the right technology for the classroom, so if they are a bit more active, the sitting through a presentation wouldn't be the best technology piece." One role of technology in the classroom is to ensure that the student is learning from the introduction and use of technology in the lesson. Participant 4 stated that, "We take the opportunity to use technology so we can add to all other learning styles in the classroom whether the student is a visual learner, is a auditory learner, or, you know, he is a hands on, so you kind of adapt your lesson plan to that and the technology gives the visual piece." Using technology can be seen as a way to help meet student needs.

Evidence of Trustworthiness

Several strategies were used in this study to enhance the rigor and trustworthiness of the findings. These strategies were described in Chapter 3, including references for them. How I used these strategies in my study are described in this section.

Credibility

Several strategies were used to enhance the credibility of the study. Each participant was given the transcripts of the interviews to read and to make any corrections I might have misunderstood. Participants were told that they could take more time to review the data in case they remembered something to add or needed me to delete any part of the data. Triangulation of data from collection of multiple types of data (survey, observation, and interviews) and from different participants added to the credibility of findings as did the use of quotes that provide low inference descriptions of participant thoughts. I was also open about my role in the school.

Transferability

Transferability is the extent to which results of a study remain applicable in other situations to prove external validity (Lincoln & Guba, 1985). This is a situation that allows an audience to detect the transferability of the study. From the detailed presentation of this study, readers can identify how the findings of the study are transferable. Also, I clearly described limitations and the methods used in the study to enhance transferability.

Dependability

To enhance dependability, and to ensure qualitative rigor in my study, I asked a researcher from Khalifa University in Abu Dhabi to peruse the research process to ascertain that the research findings align with the data collected. I have also been careful to give details of every step in the research process so that if another researcher wishes to reproduce the study, the process can be replicated. Additionally, details of the fieldwork conducted can be accessed in the interview and observation protocols.

Confirmability

The audit trail also assisted in enhancing confirmability as did the triangulation of data. This audit trail can be made available to other researchers. In addition, I kept a reflexive journal to not only keep details of actions taken, but also to document thoughts along the way and to track any potential for bias to address those issues.

Summary

The purpose of this sequential mixed-methods study was to gain a clearer understanding of how teachers in a secondary school adopt and use technology in their

classrooms. Within this chapter, I discussed the demographics of the participants and how this might affect the results of the study. I included the data analysis process and the uses and decision-making factors derived from the surveys, observation, and interview data I collected from the participants. Findings were aligned with research questions specific to the survey, observations, and interviews.

The first research question asked whether there were statistically significant differences in how two culturally different groups of teachers perceive technology usefulness, ease of use, and attitude toward technology adoption. Research question 2 showed how two culturally different groups of teachers use technology in their classrooms, while the third question explained how these two groups decide to adopt and use technology in their classrooms. Also included in Chapter 4 is the evidence of trustworthiness and detailed presentation of the study results. Chapter 5 includes the interpretation of the findings, limitations of the study, recommendations for further research, and implications for positive social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this explanatory sequential mixed-methods study was to gain understanding of how teachers in a secondary school from Western and Arab cultures adopt and use technology in their teaching. This chapter comprises key findings aligned with literature about the degree of technology adoption and use among teachers from different cultures and perceived similarities and differences in how they adopt and use technology in their teaching. The discussion also includes the relationship of the key findings with the TAM theory. Within the chapter, there are exploration and research recommendations for future research. Finally, the chapter ends with a discourse about the limitations of the study, interpretations of the findings, recommendations, and implications.

This study focused on the following research questions:

RQ1: Are there statistically significant differences in perceptions of technology usefulness, ease of use, and attitude toward technology adoption between NAS and NES teachers?

RQ2: How do NAS and NES teachers in a secondary school who exhibit differing levels of technology acceptance use technology in their classrooms?

RQ3: How do NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about adoption and use of technology in their classrooms?

The research questions presented opportunities to explore in-depth perspectives of technology acceptance, decisions to adopt technology, and whether there are cultural

differences in how teachers use technology in their classrooms. Statistical tests were conducted to assess the results of the survey data and to compare how teachers from two different cultures adopt and use technology in their teaching.

Phase 1, the quantitative portion of the study, indicated that there were no statistical differences in the perceptions of NAS and NES teachers in terms of ease of use and attitude toward technology adoption and use. There were statistical differences between NAS and NES teachers in their perceived usefulness of technology in their classrooms. Whereas over 90% of NAS teachers agreed or strongly agreed regarding the usefulness of technology in their teaching, just over 80% of NES teachers agreed or strongly agreed to this question. The interview and observation portions of the study (Phase 2) were conducted to determine whether there were any different patterns in the qualitative data from what was unearthed in the quantitative data. Qualitative data were analyzed to identify how technology acceptance is likely to influence technology decision making in the classroom and how teachers use technology. The findings of the qualitative observation portion of the study indicated that low TAM scorers used technology in different ways than high TAM scorers did. Low TAM scorers focused more on how technology could enhance their pedagogical needs, whereas high TAM scorers were keen on using technology to aid in improving teaching strategies to promote specific learning goals of their students. Furthermore, high TAM scorers used technology for classroom management and aiding in enhancing critical thinking skills. Similarly, it was found that NAS teachers used technology in different ways than NES teachers. NES teachers were more likely to use technology to support whole class activities and for teacher needs,

while NAS teachers used technology for individual student needs, such as differentiating instruction and monitoring individual student progress.

Interviews indicated that NES teachers adopted technology because they believed in its importance in developing 21st-century skills and that technology could provide them access to more teaching strategies. NAS teachers discussed access and technology support as barriers to adoption, and one NAS teacher discussed the importance of cultural alignment as a factor in adopting technology.

Interpretation of Findings

The various perspectives that emerged from the literature review in Chapter 2 were identified as suitable for interpreting findings in this chapter. Davis (1989) introduced three constructs that were pivotal in determining user acceptance of a technology system. The primary premise is that perceived ease of use, perceived usefulness, and attitude toward technology adoption and use would determine user acceptance of a technology. The objective of this study, therefore, was to gain the perceptions of teachers from two different cultures regarding technology adoption and use and whether there were any differences in their approaches to technology adoption. In the next sections, I interpret the findings in relation to the research questions, prior research, and the conceptual framework.

Research Question 1

The first research question addressed differences in perceptions of technology usefulness, ease of use, and attitude toward technology adoption between NAS and NES teachers using survey data. The null hypothesis was that there are no statistically

significant differences between NES and NAS teachers (IV) in their perceptions of technology usefulness (DV_1), ease of use (DV_2) and attitudes toward technology adoption (DV_3). The null hypothesis was partially rejected as there was no statistical difference between groups for ease of use (DV_2) or attitudes toward technology adoption (DV_3), but there was a statistical difference for perceptions of technology usefulness (DV_1). So, for the *t*-test related to DV_1, the null hypothesis was rejected.

Both NAS and NES teachers had positive attitudes toward technology adoption and believed technology was both easy to use and useful. Analysis of data to answer the first research question found that NAS teachers had higher means on perceived usefulness, perceived ease of use, and attitude toward technology use, but those means were statistically different only for perceived usefulness, indicating NAS teachers more strongly believed in the usefulness of technology in the classroom. Scherer et al. (2019) argued that the TAM remains an effective tool for understanding teacher adoption and use of technology in teaching. This finding indicates NAS teachers may believe more strongly that technology will enhance job performance as it aligns with the idea of performance expectancy, which was advocated by Teo et al. (2012). Performance expectancy signals how much the user is convinced the technology will improve their job performance. Lopez-Perez et al. (2019) concurred that performance expectancy is an important factor in teacher acceptance and use of technology. Venkatesh et al. (2003) was a proponent of this idea and suggested that performance expectancy in education would bolster activities and approaches within the classroom by expediting technology

adoption. Taherdoost (2018) reiterated the importance of teacher beliefs in affecting attitudes and behaviors toward technology adoption and use.

The interview findings could point to the cultural differences espoused by LeGros and Faez (2012) that effective teaching is sometimes guided by the culture of the teaching environment. This cultural difference aligns with the perspective of Prowse and Goddard (2010), who noted that it is important for teachers to use their students' cultural backgrounds to plan for students of different cultures. Prowse and Goddard further stated that effective teaching is guided by the culture of the teacher or cultural diversity of the classroom or institution. In addition, Alanezi (2017) found Saudi Arabian teachers were not well trained to adopt and use technology, which may be a result of culture. NES teachers might not be aware of cultural nuances within the Arab culture that would aid in their decisions to adopt and use technology in their teaching. One NAS teacher clearly felt culture was an important consideration in deciding to use technology. However, other researchers have argued that culture draws on the wider community of the school and the environment (Liddicoat et al., 2018) rather than individual cultural differences. The possibility of cultural differences and cultural influences found in this study could lead to consideration of perhaps introducing this concept in the TAM model.

Research Question 2

RQ2 asked how NAS and NES teachers in a secondary school with differing levels of technology acceptance use technology in their classrooms. I conducted observations to address the second research question. Regardless of whether they were NAS or NES teachers, those scoring low on the TAM tended to use technology less

focused on meeting individual student needs and promoting specific leaning goals than what was observed in the high TAM scorers' classrooms. High TAM scorers used technology in more ways overall and focused more on using technology to address individual student needs.

The literature supports the incidence of teachers from different cultural backgrounds employing common approaches to technology use in their classrooms. Kervin et al. (2013) argued that educators and teachers have been given the mandate to ensure that technology provision in the classroom is in keeping with the situation in the business industry. The authors stated that the onus is on educators to teach students the skills necessary and technological expertise to fit into a technologically demanding society and the workforce. But I found in my study there were differences, both in terms of using technology for individualized versus whole class instruction and in the use of technology to meet teacher needs.

The differences between NAS and NES teacher use of technology could be due to what Moursand and Bielefeldt (1999) claimed in their seminal work; that the major reason for teachers to struggle in their adoption and use of technology is that they have narrow grasps of how to effectively use technology in their teaching. It is possible that NES teachers coming from cultures where technology is readily available, were more adept at using it in a general sense and for increasing their own efficiency. Moursand and Bielefeldt suggested that teachers need to be taught how to use technology in teaching. Gray et al. (2010) argued that many teachers are still unsure of how to use technology as a teaching tool. Ertmer (1999) suggested that in-service training and curriculum guidance

are needed if teachers are to become adept at successfully using technology as a teaching tool. Khlaif (2018) noted the importance of other factors that contribute to teacher adoption and use of technology, including technical support and training. This need for training and support in how to incorporate technology is echoed in more recent literature as well (Bindu, 2017; Durodolu, 2016). There is limited literature on cultural influences on technology use and the findings of this study seem to suggest there may be differences in use between cultural groups. This is an area that may need more research.

Research Question 3

RQ 3 asked how NES and NAS teachers in a secondary school who exhibit differing levels of technology acceptance make decisions about adoption and use of technology in their classrooms. I used interview data to address this research question. All teachers indicated access to technology and ease of use influenced their decisions to use technology. But again, there were differences between the groups. NES teachers indicated factors important in deciding to use technology in their classrooms included expectations of 21st century skills, technology providing more teaching strategies, and feeling familiar with technology. NAS teachers were more focused on aspects such as technical support, versatility of technology and improving teaching performance, as well as cultural alignment. These findings are consistent with the finding from Research Question 1 that NAS teachers believed more strongly that technology would improve job performance, hence its usefulness.

The literature highlights intrinsic barriers to technology adoption as aligning with teachers' perspectives on their role in student-teacher interactions and the strategies to be

employed using technology. Intrinsic barriers align with the perceptions of NES teachers. Burden and Hopkins (2016) suggested intrinsic barriers such as attitude and self-efficacy are important factors in teacher adoption and use of technology, a finding similar to Atkin et al. (2017). Additionally, in keeping with NES teachers' perceptions, Sadeghi et al. (2014) noted that for educators to prepare students for a 21st century society, there have to be changes that will drive the effort of 21st century technology adoption. Sung and Liu (2016) noted the challenges educational administrators face in developing rich technological learning environments appropriate to today's technological realities, while Alanezi (2017) discussed the rapidly changing technologies available for teaching and learning.

NAS teachers favored technology that would assist in improving student learning. Teo and Noyes (2011) argued that in education performance expectancy usually leads to greater efficiency with technology within the teaching and learning environment. This could explain the NAS teachers' perceptions. Versatility of the technology is also in line with findings in literature. Khechine et al. (2014) noted that as users get more comfortable using technology, they become more versatile and eventually decide to accept and use the technology as a teaching tool. Facilitating conditions or technical support is important in deciding a user's decision to adopt and use technology and will be measured by the level and consistency of support made available, as noted by other authors (Alanezi, 2017)

Cultural differences in how teachers decide to adopt and use technology in their teaching could be attributed to what Zenkov et al. (2014) described as some teachers

getting fully prepared to take up cultural teaching assignments, while others are not as well prepared. Oskineegish (2015) argued that some of the difficulties among non-native teachers are that some of them are not adequately prepared about suitable cultural practices that would guide their progress and success within these schools.

Conceptual Framework Connections

The TAM was the theory underlying the framework for this study. It indicates that importance of perceived usefulness and ease of use are important factors in determining the user acceptance of technology (Teo, 2011; Wong et al., 2012). The conceptual framework posited that culture would influence teacher perceptions about technology ease of use, usefulness, and technology adoption and that those differences would in turn influence classroom practices and that perhaps different factors would influence their decisions to use technology in the classroom (see Figure 2 in Chapter 1). The findings from the survey data indicate that both groups had positive perceptions of ease of use, technology adoption and usefulness, but that for NAS teachers the factor of technology usefulness was significantly higher. Perception of usefulness or ability to improve performance was a more important factor. And while there were differences in both teaching practices observed during the observations and in factors identified by the teachers as influencing their choice to use a technology from the interviews, there were also similarities. Thus, it appears culture may influence perceptions of technology usefulness and teacher decisions to use technology and their actual use.

The fundamentals of the TAM are couched in the literature that aligns with factors from the interviews about decisions to adopt and use technology in teaching. The

participants noted that teachers need to have access to technology which aligns with ease of use in TAM. Ngafeeson and Sun (2015) argued for access to technology as an important determinant in deciding to accept or reject technology in the classroom. Grant et al. (2015) argued that as teachers attempt to adopt technology into their teaching, they will face external barriers such as lack of training and support and lack of equipment, meaning that teachers do not get access to the technologies.

Participants, and particularly NAS teachers, indicated that perceptions that technology supports learning are important in decisions to adopt and use it in their teaching. This finding aligns with the perceived usefulness described in the TAM. Perceived usefulness is the extent to which the individual believes that the technology will be useful in enhancing job performance and the job of a teacher is to support learning.

Limitations of the Study

The size of the population was considered a potential limitation for the study. Fifty-two of the 75 teachers contacted completed the survey. This smaller representation of respondents limited the number of responses that were available for testing. An additional limitation was the qualitative data collection. Purposive sampling was applied to a chosen population of teachers who used technology in their teaching. Thus, findings may not be representative. In addition, the two groups (NAS and NES) were no equal, with only 11 NES teachers responding to the survey. The small number of respondents could have limited the power of the statistical tests.

Another limitation was that all participants were male. Female teachers were exempt based on UAE law which bans male and female interaction. As I was not permitted to visit a girls' school, and a female teacher was not allowed to visit a boys' school, female teachers had to be exempt from the study. Males and females may respond differently to similar situations and concepts (Evans & Waring, 2011), and findings may not reflect perceptions of female teachers.

As a member of staff at the study school, personal bias could have been unconsciously included into the process, thus changing and invalidating the results of the study. Therefore, to minimize personal bias, respondents from the interviews were given their personal transcripts to review for accuracy and I used several strategies to enhance the rigor of the study. This study only looked at possible cultural differences between NAS and NES teachers and findings may not reflect potential differences and similarities between other cultural groups. Findings may not generalize to other cultural groups.

Recommendations

In this section I provide recommendations for further research. A study consisting of a larger population expanding to include the northern emirates of the UAE that are located in rural settings is recommended. The study could focus on comparing perceptions of adoption and use of technology between NAS and NES teachers in rural area schools and include female teachers. A new or extended study could still apply the mixed-methods approach. From the interview transcripts, it was evident that teachers would be more inclined to adopt and use technology if school management or technology leaders provide training and technology support. A qualitative study could be conducted

to better understand the types of training and technical support that would be most useful to teachers.

The focus of this study was on teachers' perceptions, ease of use, usefulness and attitude toward the adoption of general technology tools in their teaching and learning. Another study could be conducted to focus on technologies that are specific to education. Such focus could eventually make it easier for teachers to decide on the best technologies to adopt for their classrooms and teaching and learning situations and needs. Guiding teachers into using specific technologies could ultimately become an effective form of technology support. A research project could be a source of invaluable information to technology providers about supporting teachers in their classrooms.

The cultural backgrounds and practices of NAS and NES teachers warrant provision of different infrastructure for each group, thereby enabling them to be comfortable in deciding to adopt and use technology without deviating from their respective cultural comfort zones. Additionally, if both groups are involved in decision-making about training and technology provisions, the opinions and views of both groups can be considered and ultimately combined to create a more culture-friendly support system.

A study with the focus on extending to other cultural contexts would be useful in getting the perspectives of more than two cultural groups. This study would reveal whether the findings from this study would be similar in other cultural environments. These results would provide different perspectives from which to view the issue of culture and technology adoption. Results could also be used to make more

comprehensive and relevant plans for catering to the needs of teachers who adopt and use technology in their teaching as well as bridge any cultural gaps in planning and supporting teachers from various cultures simultaneously

Implications

In this section, I discuss implications derived from the findings of this study. There are both implications for practice as well as implications for social change that are important to consider. The implications section is followed by conclusions.

Implications for Practice

The teachers noted that ease of use of the technology is an important factor in deciding to use technology as was perceived usefulness, particularly important for the NAS teachers. This finding leads to a recommendation to provide more training to ensure teachers feel comfortable using technology. In addition, more could be done to help teachers see the usefulness of the technology during training. Consequently, school senior management or technology leaders could design comprehensive technology courses so that teachers can acquire relevant technology skills to help them decide whether they will use technology in their classrooms and gain more information on specific ways to use technology in the classroom to support both whole class and individual student needs. Additionally, if teachers are introduced to multiple technologies, they could have a range of choices and therefore build their confidence as they make decisions regarding adoption and use of technology in their teaching and learning environment.

Along with providing training in using technology and introducing teachers to a wide choice in technologies, teachers should be taught pedagogical strategies to use with

the technology. It is not enough that teachers become skillful at manipulating technology, but they must also know how to apply the technology skills to enhance the teaching and learning environment, especially their teaching strategies. Such training could also help teachers better see the link between the technology and their performance in their teaching role. The training should focus on aspects such as how the technology can help students gain appropriate 21st century skills, how technology can help differentiate instruction based on learning needs, and how technology can support teacher tasks. Another factor that needs to be addressed to enhance technology practice would be to provide adequate technical support to the teachers

Another recommendation is that both teachers and administrators should be aware of the need for technology to be culturally aligned. This cultural alignment was particularly important for the NAS teachers. This may also be an issue for developers who create tools to serve individuals across the globe. Developers of technology should focus on making technologies that are intuitively easy to use and culturally appropriate. More user studies might help with that development.

Implications for Social Change

The issue of effective technology adoption and use is a contemporary social problem in schools. This study highlights some of these problems and how they affect social change. Based on this study's findings about technology adoption and use among a group of teachers from different cultures I concluded that there are social gaps to be bridged. As a result, the onus now falls on school administrators and technology leaders to implement plans to develop professional development plans to help teachers gain

technological knowledge and skills so that they can decide to adopt and use technology effectively in their classrooms and thus better support student learning.

Per Walden University, social change should foster human experiences. Based on the results of this study, the impact on social change includes better understanding of how teachers from culturally different backgrounds make decisions to use technology and how they use it in the classroom. If technology developers and trainers can better understand those cultural aspects, it has implications for how they design training and how they design tools for teacher use. In an increasingly diverse world, understanding culture is important. Perhaps providing opportunities for different cultural groups to share their perceptions of and uses of technology can lead to better understanding and to more culturally sensitive practices in the classroom.

The beliefs and attitudes of teachers from both cultural groups could be studied to ascertain whether any of their respective practices can be melded to improve their perspective and consequently their approach to technology adoption and use in their classrooms. This melding of ideas would be one way to affect broad based change within each group which could trickle down to the individuals, affecting wide and lasting changes in their approach to technology adoption and use in their classrooms

Another social implication based on the results of the study is for school administrators to get actively involved in teachers' adoption and use of technology by providing support for more technology aware teachers to assist in mentoring less experienced and less confident teachers who find it difficult to interact with technology. This could affect teacher confidence and improve their technology skills as well as

impact social change at both the individual and organizational level. Because school administrators would be involved, social change at a policy level may be influenced as well.

Conclusions

The proliferation of technology tools in society has placed the onus on educators, including teachers, to incorporate technology into every classroom to keep in line with developments and demands in society. This need for technology use is for both the job market and higher education institutions. Consequently, teachers need to become proficient in applying technology as an important learning tool in their teaching. It has become necessary for teachers to adopt and use technology in their classrooms. In Phase 1, I found that there were no statistical differences between NAS and NES teachers in their attitudes toward technology adoption and use or in their perception of ease of use of technology. However, in terms of the usefulness of technology, there were statistical differences, with NAS teachers indicating higher levels of usefulness. Findings in the qualitative portion of the study (Phase 2) signaled differences in technology use between Low TAM scorers and High TAM scorers in how they used technology in their teaching. I also found that NAS and NES teachers used technology in their classroom in different ways and that they had different considerations in deciding to use technology, with NAS teachers including consideration of cultural alignment. These differences may become an important factor to consider as technology is adopted across a range of cultures.

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Appendix A: Technology Acceptance Model Survey

Technology Acceptance Model Survey

Part 1- Instructions

Please enter and/or circle the most appropriate information for your situation

Top of Form

* 1. What was your age on your last birthday?

- 18-20
- 21-34
- 35-64
- 64 Plus

* 2. What is your gender?

- Male
- Female

* 3. What is your education level of your degree program?

- Bachelors
- Master
- Doctorate

* 4. What is your Content Concentration Area within Secondary Education?

- Science /Introductory to Technology Course (ITC)
- Mathematics
- Social studies
- Languages Arts
- Other(s)

Other (please specify)

* 5. How many years of Experience do you have using Web2.0 tools (e.g. blogs, Google Drive, avatars, wikis, iPads, podcasts, or other online interactive tools that support student collaboration, sharing of student-generated content, and social networking)

_____yrs.

Next

4FoTYerhlqpl9PS false

Bottom of Form

Powered by

Technology Acceptance Model Survey

Please circle the number that most accurately captures your reaction to the following statements.

1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree

Top of Form

* 6. I find technology tools easy to use

- 1
- 2
- 3
- 4
- 5

* 7. I find technology tools useful in my course work.

- 1
- 2
- 3
- 4
- 5

* 8. I find technology tools to be flexible to interact with

- 1
- 2
- 3
- 4
- 5

* 9. I would find it easy to get technology tools to do what I want them to do

- 1
- 2
- 3
- 4
- 5

* 10. Using technology tools in my teaching would enable me to accomplish task more quickly

- 1
- 2
- 3
- 4
- 5

* 11. It would be easy for me to become skillful at using technology tools

- 1
- 2
- 3
- 4
- 5

* 12. Using technology tools would make it easier to complete my teaching

- 1
- 2
- 3
- 4
- 5

* 13. Learning to use technology tools would be easy for me

- 1
- 2
- 3
- 4
- 5

* 14. Using technology enhance my effectiveness for instructional activities

- 1
- 2
- 3
- 4
- 5

* 15. My interaction with technology tools would be clear and understandable.

- 1

- 2
- 3
- 4
- 5

* 16. Using technology tools would improve my instructional performance for my classes

- 1
- 2
- 3
- 4
- 5

* 17. Using technology tools would make it easier to do my instructional work

- 1
- 2
- 3
- 4
- 5

* 18. I plan to use technology tools in the future

- 1
- 2
- 3
- 4
- 5

* 19. I intend to continue using technology tools in the future

- 1
- 2
- 3
- 4
- 5

* 20. I expect my use of technology tools to continue in the future

- 1
- 2

- 3
- 4
- 5

* 21. Additional Comments Regarding technology tools:

Prev Done

4FoTYerhlqpl9PS	false

Bottom of Form

Appendix B: Observation Protocol

Observation Schedule (Protocol)

Date_____

Time Observation Begun_____ Time Observation Ended _____

Participant being Observed _____

Type of Class

Describe Classroom Context

Observation notes in 5 minute increments

	Observation notes (what technology is being used, who is using it, how are they using it, for what purpose are they using it, what is the teacher's role, etc.)	Inference/reflections (what do I think is happening, why do I think this is happening, how do I think students are reacting, how do I interpret the teacher's actions)
0 - 5 minutes		
6-10 minutes		
11-15 minutes		
16-20 minutes		

21-25 minutes		
26-30 minutes		
31-35 minutes		
36-40 minutes		
41-45 minutes		

Post Observation Reflections

Overall interpretation of uses of technology and interactions with technology taking place during the observation.

Key examples of uses of and interactions with technology

Appendix C: Interview Protocol

Time of interview:

Date:

Method: In person

Interviewer: Stanford Clarke, doctoral candidate at Walden University.

Interviewee:

Position of Interviewer: Teacher

Location:

Interview length:

• Thank you for coming today

• Introduction of facilitator (myself)

My name is Stanford Clarke

I am a student at Walden University

Currently a candidate for a Doctorate degree in Philosophy of Education, specializing in Educational Technology

In case of problems or concerns you may contact a Walden University representative at the information provided on your consent form.

• Purpose of the discussion:

The purpose of this study is to understand your perception, attitudes and behavior toward technology adoption and use in your teaching. It is hoped that this project will help education managers and planners better support technological experiences for teachers so that they can enhance their pedagogical offerings to students.

• Informed consent

You have agreed to participate in an interview that is expected to last an hour. Some time after the interview, you will be asked to review the transcript of the interview to ensure its accuracy and the accuracy of my interpretation. This is called member checking and

should take about 30 minutes. With your permission, the audio portion of the interview will be recoded; no video will be recorded. No personally identifiable information will be shared on audio recordings or notes from the interview. I will not report any information that could potentially make you identifiable, like your name or personal characteristics. The data I collect will remain confidential. You have the right to review the interview transcript, the material that is collected, notes collected as part of observations I will conduct in your classroom, and any data that has been gathered as the result of this interview session. You have the right to withdraw from the study at any time without prejudice. You can choose to leave or not answer any questions asked should you feel uncomfortable at any time during our discussion of your experiences.

• Check for understanding and obtain consent:

Are there any questions about the informed consent information?

Do I have your consent to proceed with this interview?

• Confirm permission to record the session

To help me in my analysis I would like to record our session.

I am the only person who will access audio-recordings. Transcripts, that do not contain names, will only be available to members involved directly with the research. Instead of names I will use pseudonyms in the transcripts. As I reflect, summarize, and report on what we have discussed, I will never share information that would allow you to be identified.

• Check for Understanding and obtain consent:

Are there any questions about the intent to record our session?

Do I have your consent to record our session?

• Ground rules:

There are no right or wrong answers—I am interested in your perceptions and experiences. Please let me know if you wish to stop or take a break at any time

• Check for Understanding:

Are there any questions regarding the ground rules that were just shared?

Interview questions

1. What role do you see for technology in the classroom?
2. How do you perceive your role in technology adoption and use in your teaching?
3. What are the advantages and disadvantages you perceive in adopting and using technology in your teaching?
4. What is your perception of the ease of use of technology in your teaching?
5. What things do you consider when deciding whether or not to use technology in the classroom?
6. What factors help you to make decisions regarding adopting and using technology in your teaching?
7. When designing your classroom activities, how do you decide which technologies are most suitable to attain your objectives?
8. In what ways, do you believe your culture influences your decisions to use technology in your teaching?
9. Can you give me examples of when you felt technology was successfully used in your classroom?
10. Can you give me examples of when technology was used unsuccessfully in your classroom?
11. What factors do you think influence the success or lack of success in integrating technology in the classroom?
12. Are there any other thoughts you would like to share about integrating technology in the classroom?

Appendix D: Letter to ADEC for permission and Permission Approval

The Director

School Operations

Abu Dhabi Education Council

December 14, 2016

Dear Mr. XXXXXXXXXXXXXX,

I am a teacher at the XXXXXXXXX School. I am pursuing a PhD in Education at Walden University in the United States, specializing in Educational Technology and would like to conduct my data collection exercise at the school. The data collection will consist of a standard survey to all teaching staff and follow up interviews and observations with four teachers chosen based on their responses to the survey.

The title of the research is, A Mixed Methods Study of **Teachers in the United Arab Emirates and their adoption and use of technology in the classroom**

Any assistance offered to me in this important matter will be greatly appreciated.

Kind regards,

Stanford A. Clarke (EMT)

مجلس أبوظبي للتعليم
Abu Dhabi Education Council
Education First التعليم أولاً

Date: 2nd February 2017		التاريخ: 2 فبراير 2017
Ref:		الرقم:
To: Public Schools Principals,		السادة/ مديري المدارس الحكومية
Subject: Letter of Permission		الموضوع: تسهيل مهمة باحثين
Dear Principals,		تحية طيبة وبعد،،،
The Abu Dhabi Education Council would like to express its gratitude for your generous efforts & sincere cooperation in serving our dear students.		يطيبُ لمجلس أبوظبي للتعليم أن يتوجه لكم بخالص الشكر والتقدير لجهودكم الكريمة والتعاون الصادق لخدمة أبنائنا الطلبة.
You are kindly requested to allow the researcher/ Stanford Adolphus Clarke , to complete his research on: **Teacher in the United Arab Emirates and their adoption and use of technology: A case study in Abu Dhabi**		ونود إعلامكم بموافقة مجلس أبو ظبي للتعليم على موضوع الدراسة التي سيجريها الباحث/**استانفورد أدولفس كلارك**، بعنوان: **Teacher in the United Arab Emirates and their adoption and use of technology: A case study in Abu Dhabi**
Please indicate your approval of this permission by facilitating his meetings with the sample groups at your respected schools.		لذا، يرجى التكرم بتسهيل مهمة الباحث ومساعدته على إجراء الدراسة المشار إليها.
For further information: please contact Mr Helmy Seada on 02/6150140		للاستفسار: يرجى الاتصال بالسيد/ **حلمي سعدة** على الهاتف 02/6150140
Thank you for your cooperation.		شاكرين لكم حسن تعاونكم
Sincerely yours,		وتفضلوا بقبول فائق الاحترام والتقدير،،،

محمد سالم محمد الظاهري
المدير التنفيذي لقطاع العمليات المدرسية

مجلس أبوظبي للتعليم
Abu Dhabi Education Council
School Operations Sector

ص.ب: ٣٦٠٠٥، أبوظبي – إ.ع.م. هاتف: ٠٠٠٠ ٦١٥ ٢ ٩٧١+، فاكس: ٠٦٠٢ ٦١٥ ٢ ٩٧١+، البريد الإلكتروني: info@adec.ac.ae
P.O.Box. 36005, Abu Dhabi - U.A.E., Tel: +971 2 615 0000, Fax: +971 2 615 0602, Email: info@adec.ac.ae

Appendix E: Email to inform teachers

Dear Potential Participant:

I am inviting you to take part in a research project in Educational Technology by Stanford A. Clarke, a student at Walden University, which will ask you to share your experiences, attitudes, and perspectives about using technology in your teaching by completing a short survey. The reason for your selection as a potential participant in this study is because you teach at a school managed by ADEC and you are believed to have experiences that could add to this study.

If you would like to participate, you may click the link below which will take you to the consent form that describes the study in more detail and provides access to the online survey, which should take 10 minutes to complete. A small number of participants who complete the survey may be asked to participate in an interview and observation to gain further insights in technology use in instruction.

(Link to consent form and survey)

Thanks for deciding to help!

Stanford A. Clarke

Walden University PhD Student

Appendix F - Confidentiality Agreement

Confidentiality Agreement

Signer's name:

_____

While I carry out the activity of transcribing data for the research, *Teachers in the United Arab Emirates (UAE) and their Adoption of Technology: A case study Abu Dhabi, I* will have direct access to confidential information which should not be disclosed. I acknowledge that the information must remain confidential, and that any form of disclosure can be injurious to the participants.

I sign this Confidentiality Agreement to signal my agreement and that I will not:

Disclose or discuss any confidential information with anyone else, including friends and family.

In any way destroy, copy, sell, release, divulge, loan, any confidential information except where I have received proper authorization.

Discuss confidential information so that others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is omitted.

Make any unauthorized transmissions, inquiries, modifications, or purging of confidential information.

Forget that my obligations under the agreement after completion of the job that I will perform.

Forget that violation of this agreement carries legal consequences.

Use any systems or devices that I am not officially authorized to access, and I will not demonstrate operation or function of systems or devices to unauthorized individuals.

By signing this document, I acknowledge that I have read the agreement and I agree to abide by all the terms and conditions stated above.

Signature: _____ Date: _____