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Faculty Perspectives on Redesigning Classrooms with Active Learning Technology Tools

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Walden University
2018

Abstract

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MBA, Regis University, 2005

Doctoral Study Submitted in Partial Fulfillment

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Abstract

Effective integration of active learning technology tools in classrooms is a key component of 21st century higher education classrooms. Challenged with outdated technology access and traditional classrooms, a local university in North Carolina initiated a strategic plan to update classrooms and laboratories with the 21st century technology. The problem of the study was that limited information existed regarding faculty perceptions regarding benefits of and barriers to integrating active learning technology tools. The goal of this study was to uncover the faculty members' views and perceptions about redesigning classrooms with the active learning technology tools. The technology acceptance model (TAM) framework was used in this qualitative exploratory case study to explore perceptions of 8 faculty members through semistructured interviews. The research questions were focused on exploring faculty members' perceptions about the main benefits and barriers of upgrading the local university's classrooms with active learning technology tools. The interviews were recorded, transcribed, coded, and analyzed for recurring themes. Insights from this study revealed that it is a teaching technique and style of the faculty members in the use of the active learning technology tools that determined the nature of their perception of success, rather than the active learning tools themselves. The resulting project study is a position paper intended to deliver the results of the case study. The position paper includes recommendations to the senior leadership to increase an understanding from the faculty members' perspectives to better align the implementation of these tools. Positive social change may result from this study, improving 21st century higher education classrooms through more effective implementation of active learning technology tools.

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Dedication

First and foremost, my heartfelt gratitude goes to God, who has been in every part of my life, for his grace, and for the resilience to keep me moving forward. This doctoral study would not have been possible without the support and encouragement of my family. First and foremost, I would like to dedicate this study for my husband, Rick, for his salient support and uplifting encouragement for pushing me forward no matter what. He listened, cared, and inspired me to be persistent throughout my doctoral journey. His profound presence was the greatest support that I have ever received. I am blessed and I thank God for him in my life. Second, my deepest gratitude to my daughter Christina who recognized the amount of work this was and cheered me on. Their love, prayers, and expectations have supported me throughout my doctoral journey that I will treasure forever.

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I would like to thank my chair, Dr. Dan Cernusca, for his dedication to my success and for his guidance throughout my doctoral journey. This study would not have been possible without his endless support and ongoing guidance. I also want to thank my committee members, Dr. Lynne Orr and Dr. Charlotte Redden, who were also instrumental in helping me achieve my goals.

In addition, I would like to acknowledge my Walden University colleague and friend Claudia Morris for her undying encouragement and her gentle prodding as we spend countless days and nights talking on the phone, encouraging each other, and plowing it away while working on our studies together.

I want to thank all my participants because without you, this study would not have even come to existence. Special thanks to Professor Kielb for his feedback, encouragements, and information that kept this project moving. Thank you for your time and support throughout the project. Finally, to my friends, family, and colleagues, thank you for your positive words and affirmations.

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Section 1: The Problem

Introduction to the Study

A large research university in North Carolina, called from now on the "local university," was challenged with outdated technology access and antiquated learning spaces (Local University, 2017b). With increased use of technology across all professions, and in people's personal lives, the availability of educational technology in the classrooms is expected by faculty, students, administrators, and policy makers (Meehan & Salmun, 2016). Despite increased technology access both in and outside of the classroom, technology is often not being used to support student learning in a meaningful manner (Li, Worch, Zhou, & Aguiton, 2015; McKnight et al., 2016; Mundy and Kupczynski, 2013). For example, classrooms at the local university were equipped with a traditional blackboard and chalk; the university administration has become acutely aware of being stuck in traditional methods of course delivery (Local University, 2006). In contrast, other major universities are increasingly implementing instructional technology as a main component of courses, such as through blended learning, which involves delivering asynchronous information through online resources as a supplement to face-to-face learning (Garrison & Kanuka, 2004). Implementing instructional technology in classrooms has become increasingly popular as it sparked motivation of the faculty members to actively use different teaching strategies (Siegel & Claydon, 2016; Finkel, 2012; Onder & Aydin, 2016).

According to the local university's strategic plan for 2017–2027, classrooms should offer flexible, technology-driven teaching and learning to facilitate learning

activities not only across the physical campus, but also to enhance digital and global efforts and enable the production of knowledge. As a result, the local university has increased efforts to implement technology in laboratories and classrooms (Local University, 2017b), specifically by transitioning to classrooms enabled with active learning technology tools such as smart whiteboards designed by Microsoft and Cisco companies known as The Cisco Spark and the Microsoft Surface Hub and classroom response systems known as "clickers." However, the strategic plan did not include information about the faculty members' role, support, and involvement as stakeholders in the change process. In order to understand the complexities of updating classrooms with various active learning technology tools, it was important to conduct a study to explore the faculty members' perspectives on updating classrooms with these tools.

In addition to 10 colleges on campus, the local university's infrastructure contains a health care system that includes clinical research and education at many different locations throughout the state. With a total number of nearly 15,000 students and with more than 8,500 faculty members, the local university offers 54 majors, 52 minors, and 21 certificates. Moreover, the university's facilities include 29 residence halls, 77 academic and research buildings, and 114 athletic, medical, and central campus facilities (Local University, 2017a).

Due to the size of the institution, I focused only on the engineering college at the local university in order to gain insight into broader issues with active learning technology implementation. As shown in Figure 1, at the time of the study, the engineering college had 1,234 undergraduate students, 976 graduate students, and 130

faculty members. The student to faculty ratio was 8:1 (“Engineering at a Glance,” 2018).

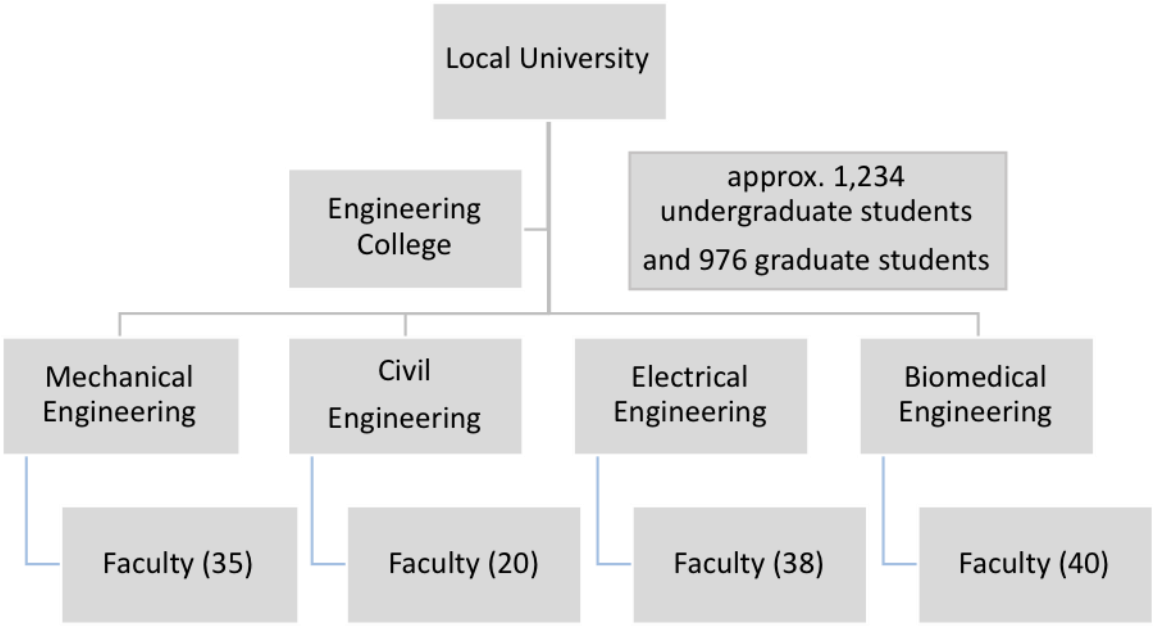

Figure 1. The organizational structure of the engineering college.

There was a common belief at the local university that the increasing speed of technology development was spreading to all areas of the university, changing and influencing how students, faculty, and staff interact with the university, information, and each other (Local University, 2017). Quick access to information along with students’ ease of use with technology was putting pressure on the local university’s senior leadership and faculty to redesign the traditional learning spaces. As a result, in the strategic plan for 2017–2027, the local university noted: “We cannot conduct and deliver world-class, 21st century science in outmoded laboratories and classrooms equipped with obsolescent instrumentation and 20th century computational capacity” (Local University, 2017, p. 15). The local university’s senior administrators and the president have started a

strategic planning initiative of updating classrooms and laboratories with the 21st century technology (Local University, 2017). Two major active technology tools were being targeted by the university administrators to update the classrooms. First, there was a plan to formally support a transition to classrooms equipped with active learning technology tools such as the Cisco Spark and the Microsoft Surface Hub smart whiteboards, for their ability to function as writing tool, where users could connect to the board wirelessly as well as join collaboration hubs within groups. Second, the plan included the use of clickers such as iClicker Reef for their ability to getting students actively engage with course material during class and to provide instant feedback by using existing devices such as a smart phone, tablet, computer, or laptop through an app or web browser. According to the associate dean, there have been many conversations with informational technology (IT) teams and senior leadership on what technology tool would work best in the classrooms. Despite these conversations, integration and design of the active learning technology tools in classrooms would have changed the nature of the instructional process including the faculty members' teaching methods. These changes would have had significant ramifications because of potential resistance from the faculty members if their input was not considered in this technology design and integration in the classrooms. That is why the local university needed to increase an understanding of the faculty members' perspectives about the use of the active learning technology tools and their role in creating an active learning environment for their students. My goal for this study was to address this gap by exploring faculty members' perceptions about implementing active learning technology tools in classrooms.

The Local Problem

In the local university, the lack of technological capacity in the classroom was identified as a need in the strategic plans for both 2006–2016 and 2017–2027 (Local University, 2006, 2017b). The local university's president indicated,

> We are living in a digital revolution. It has changed all aspects of our lives, and those changes are just now approaching us in higher education. I think the opportunity for us is to seize these new technologies, redefine the way we teach, and redefine our classrooms (Local University, 2016).

Several factors were contributing to the need for technology implementation in the classroom. Among these factors were the *digital native* students, the major influences, who in large part were accustomed to visual input (Prensky, 2001). According to Prensky (2001), who came up with the term digital natives, daily use of technologies resulted in enhanced thinking skills in several different areas that resulted in different learning styles and modalities. Gikas and Grant (2013) and Venkatesh, Croteau, and Rabah (2014) further determined that integrating instructional technology increased learners' perceptions of a course's effectiveness. To meet student expectations and increase their perceptions of the effectiveness of courses, administrators determined that it was important to implement instructional technology, including active learning technology tools, within classrooms.

Administrators also determined that instructional technology was important to continue the scientific contributions of the local university. The engineering faculty at the local university is known to work collaboratively with students to find solutions to the

world's scientific challenges. As mentioned, the engineering college enrolls over 1,200 undergraduate students every year. Nearly 60% of engineering undergraduate students were involved in faculty-mentored basic and applied research in discovering new engineering materials or systems (About, n.d.). As the dean of the engineering college stated, "we [the faculty] are committed to leading boldly to shape this technological era by creating an environment that enables our community to achieve great things" (Local University, 2018). According to the local university's strategic plan (2017), this collaboration and addition to scientific disciplines cannot continue without implementing appropriate technological changes in the classroom.

As indicated by citing the need for addressing the lack of technological capacity in classrooms in the local university's plan for 2006–2016 and 2017–2027, there were barriers to making changes regarding instructional technology implementation. Despite identifying the changing student population in 2006, the classrooms remained unchanged with respect to technology use. In the 2017–2027 strategic plan, the administration issued a more strongly worded plan of action, referencing the inability to teach students science effectively without implementation of technological course components (Local University, 2017). The lack of action may stem from the fact that implementing active learning technology tools in classrooms incurs significant cost, for which administrators will expect significant implementation and positive outcomes (Reid, 2014; Williams, 2016). Researchers have noted that without the meaningful engagement of faculty members, the strategic plan may not get carried out (Sanaghan & Hinton, 2013). Once the institution dedicates resources to implementing classroom technology, a key barrier to

technology adoption in classrooms is negative faculty perceptions of that technology (Fathema, Shannon, & Ross, 2015; Reid, 2014). When the local university invested in active learning technology tools, it became the faculty's role to then use these tools to support learning; therefore, understanding faculty's perceptions was essential to ensure the most effective implementation of active learning technology tools in the classroom.

Faculty can be either the engine for change if they accepted the benefits of instructional technology on student learning, or the barrier to change if they experienced barriers in implementing classroom technology in the learning process (Fathema et al., 2015; Reid, 2014). Therefore, I chose to investigate the engineering faculty for this study. Information about faculty's perceptions may assist the administration in executing, implementing, and engaging key stakeholders from the academic side to increase the use of active learning technology tools. Because faculty members are key stakeholders from the academic side, it was important to assess their perceptions regarding how to effectively transition to technology-enhanced classrooms.

Kezar (2011) presented a few examples of different ways of bringing new initiatives to an institution. One example was that the administration acknowledges that faculty engagement is a central component in completing successful initiative programs (Kezar, 2011). However, the higher education academic governing system experiences friction with the university administration. Historically, these two sides, academic and administration, have "episodic, complicated, and often controversial connections" around issues such as financial, physical, or tangible resources (Morris, 2013). If the present study can bridge the gap between academic and administrative leadership, faculty

members' perspectives can help the administration to understand how to best implement instructional technology into the classrooms. It may also include what support was required for instructors, what barriers needed to be addressed, and what perceived benefits might come from adopting active learning technology tools. This partnership may create a more meaningful adoption of active learning technology tools. An in-depth understanding of faculty members' perceptions regarding benefits of and barriers to implementing instructional technology provided invaluable knowledge to inform the administration's decision-making process, and served as a transformational and strategic move to support the local administration.

The problem of the project study was that use of active learning technology tools is a key element of 21st century learning that has stagnated at the local university (Local University, 2006, 2017). To ensure effective implementation and appropriate allocation of resources in changing the classrooms to an active learning approach, it was essential that the administration understood and considered the perspectives of those who implemented the changes, namely, the faculty (Fathema et al., 2015; Reid, 2014). What was not clearly understood from the strategic plan was how the local university's senior administration would apply and carry out the goal in order to accomplish a successful transition to technology-enhanced active learning environments. Current practice of top-down administrative decisions may result in a barrier to effective implementation because of a lack of faculty buy-in (Reid, 2014). I designed the present study to gain information regarding faculty's perceptions of benefits of and barriers to implementing active learning technology tools in the classrooms. This information will help administrators to

better support faculty in the change through professional development and design a change process that emphasized benefits and mollify faculty apprehension toward change**.**

The issue at the local university was also a problem more widely in the education field. Higher education institutions in general have been challenged regarding how to successfully integrate the latest technologies to improve student learning (Li et al., 2015; McKnight et al., 2016; Siegel & Claydon, 2016; Vance, 2016), improve the use of classroom technology (Black & Lassman, 2016; Kriek & Coetzee, 2016), and enhance digital and global outreach (Ifenthaler & Schweinbenz, 2016; Mikalef, Pappas, & Giannakos, 2016; Yuan, 2017). Other studies have shown that, when used appropriately, active learning technology tools in classrooms increased students' learning achievements and improved an engagement of students (Chan, Borja, Welch, & Batiuk, 2016; Daniel & Tivener, 2016; Freeman et al., 2014; Li et al., 2015; Park, 2014). Thus, understanding the process of technology integration in classrooms becomes important for senior administration (Hilton, 2016; Lu & Overbaugh, 2009; Vann, Sanchez, & Santiago, 2015; Webster, 2017; Williams, Warner, Flower, & Croom, 2014; Weaver, Walker, & Marx, 2012). As the result, I clarified the perceptions of faculty regarding change in this study that increased faculty buy in and resulted in more fruitful administrative procedures in meeting strategic goals. A visual diagram of the main elements of the research gap of the project study is illustrated in the chart below.

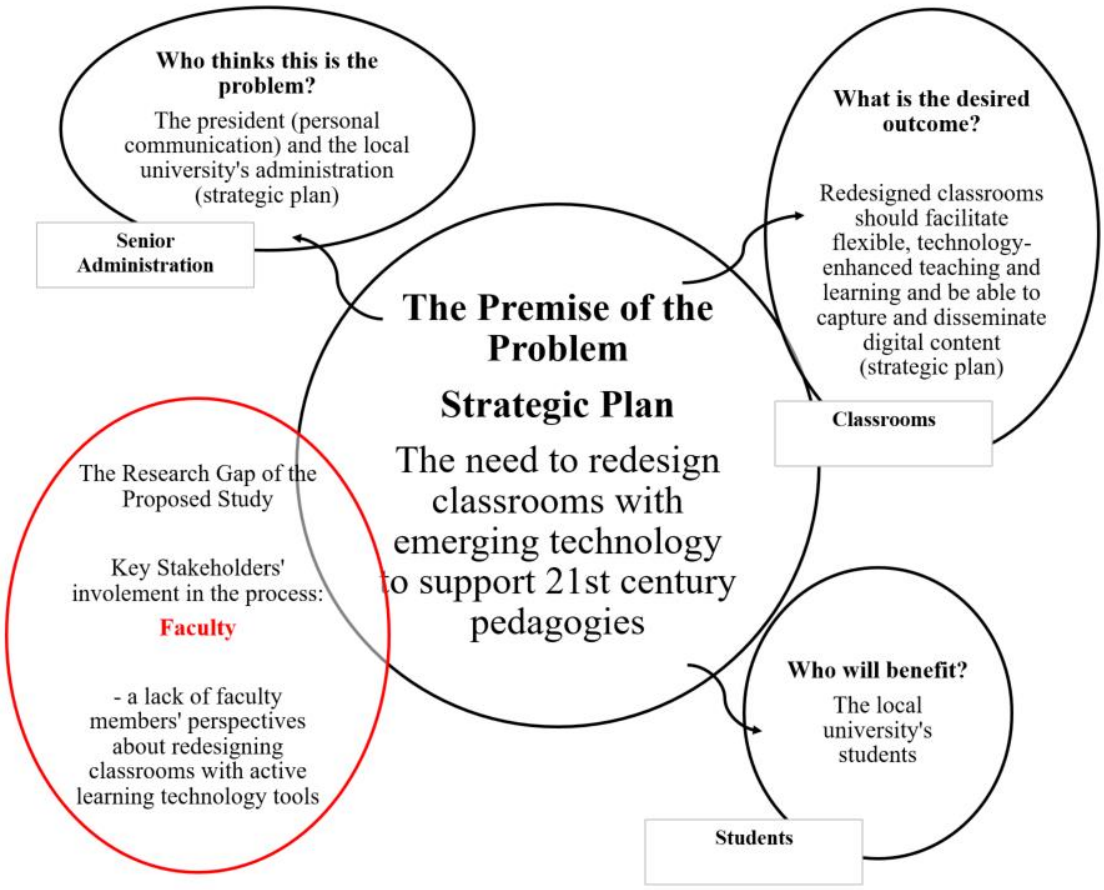

Figure 2. The visual diagram of the research gap of the project study.

Rationale

Evidence of the Problem at the Local Level

The university's primary goal is educating students. However, to accomplish that goal, faculty members need to understand the needs of learners. Kriek and Coetzee (2016) stated that faculty members are often focused on the content and less on the methods of teaching. Faculty might be reluctant to think about the methods of teaching by utilizing technology in the classroom (Kriek & Coetzee, 2016; Saine, 2012). In

addition, students like to multitask and quickly access information on their laptops or simply start researching the topic out of curiosity (Saine, 2012). The local university's leadership stated that the outdated classrooms without technological capabilities were already having a negative impact on "savvy and visually-oriented students, conversant with technology, who expect to interact with peers and professors 24 hours a day, 7 days a week and to have immediate access to digital resources, instructional technology, and interactive learning" (Local University, 2006, para. 3). According to the local university's (2017) strategic plan, the emphasis on the traditional classroom without technology was disabling 21st century learning for students, particularly in the sciences.

The local university was the first higher education institution in the United States to launch an iPod program to its first-year students in 2004 (Ryu & Parsons, 2009). The iPods were distributed to 1,600 undergraduate engineering students during the first year of their studies and 150 iPods were given to engineering faculty members (Belanger, 2005). While the initiative created a significant "cultural phenomenon," the results of the program evaluation study revealed several problems encountered during the iPod initiative (Belanger, 2005). One of the challenges was integrating multiple systems for sharing, accessing, and distributing learning materials to students. Integrating iPods with the university's existing technology infrastructure was difficult and expensive (Hokyoung & Parsons, 2009). Other limitations came from a lack of training resources available to faculty as well as a lack of awareness about this program within the university. While there were associated benefits such as increased collaboration and communication between technology teams across the university, the mere fact of keeping up with the

technology infrastructure due to the rapidly changing technology was daunting and time-consuming. The associated costs of nearly $500,000 needed to continue the program did not seem to substantiate the cost effectiveness of the program either. Thus, the program was canceled two years after its launch. Belanger (2005) also stated that not very many people participated in the survey; only 28% of the first-year students and 13% of faculty participated in the program evaluation study, which could also have been an indication of the limited knowledge in providing feedback in expanding and improving this program even further.

In reviewing the institutional impact of the iPod project, the use of iPods sparked many conversations among faculty about the best role of technology in teaching (Belanger, 2005). Some faculty members, who did not even think of using technology in their classrooms before this program, after implementation of this initiative, had an interest in improving course design and enhancing the delivery of the content by using technology. The gathered feedback indicated that because of iPod project the university was perceived as an innovator with technology. By identifying how to more effectively implement the next wave of technological innovation through faculty perceptions of active learning technology adoption, this study generated findings that may help revive or strengthen the innovativeness at the university, as indicated in the local university's strategic plan.

Evidence of the Problem from the Professional Literature

The purpose of this study was to explore faculty's perspectives on implementing active learning technology tools in the classrooms. The literature review was centered on

understanding technology integration and acceptance while also exploring active learning technology tools. The type of technology does not determine its successful integration in the classrooms, but how the technology is used can influence teaching and learning (Li et al., 2015; McKnight, et al., 2016). Thus, integration of active technology tools such as through smart whiteboards and clickers can contribute to an increased student engagement and better learning outcomes (Chan, Borja, Welch, & Batiuk, 2016; Daniel & Tivener, 2016; Freeman et al., 2014; Li et al., 2015; Park, 2014).

Students learn differently; some are visual and can understand the material by the show-and-tell while others prefer reading first and then illustrating (Truong, 2016). To gain insights into different learning styles, Truong reviewed 51 research studies and concluded that by using technology institutions could take advantage of these different learning styles and help students to optimize their learning experiences. Anderson and Horn (2012) found that 4-year university students showed a direct correlation between using technology and their self-reported educational gains. Researchers supported the claim that there was a need for a connection between instruction and technology. The use of digital instructional technologies was aimed to enhance and transform student learning. After interviewing and observing classrooms in seven schools across the United States, McKnight et al. (2016) reported a learner-centered approach that influenced the adoption of technology to support student learning process. In this multisite case study, the researchers stated that influencing aspects such as leadership, technology use, and instructional systems were necessary to the adoption of instructional technology. By making the integration of technology a part of pedagogy, as in blended learning (Garrison

& Kanuka, 2004), the faculty at the local university therefore supported student learning through active learning technology adoption, but only if adoption was systemic and if faculty bought in to the process.

The concept of integrating technology to support classrooms in higher education system is a difficult topic. As the world of the rapidly changing technology, the newer applications and programs are evolving every day for other needs than the educational purposes to meet the growing demands of student learning. There are different ways of learning and teaching with technology (Dolenc & Abersek, 2015). The findings of the quantitative study that was conducted by Dolenc and Abersek (2015) revealed that without "modern, innovative teaching and learning methods" a desired and improved outcome should not be expected (p. 356). This study highlighted once again that in order to fulfill the educational goals of the students, it is important to continuously update and evaluate the educational technology (Dolenc & Abersek, 2015).

Higher education institutions that want to integrate technology face numerous challenges, such as resistance to change (McKnight et al., 2016), low self-efficacy beliefs about technology integration (Li et al., 2015), and faculty buy-in (Skiba, 2016; Wood, Pasquale, & Cruikshank, 2012). In addition, to define the fast grown *digital native* phenomenon, a survey of 90 students and 10 teachers revealed the results that students do not use technology more than instructors do; students do, however, exhibit the typical *digital native* characteristics of early adopters (Gu et al., 2013). In a quantitative survey study, Gu et al. (2013) revealed an intertwined pattern of differences in technology usage among students and instructors (p. 399). These different patterns were explained by

different influence factors such as classroom setting and learning materials that were supported by technology. The grade level of the students also positively fluctuated based on the usage of technology. The Gu et al. (2013) study echoed what other studies reported as barriers to integrating technology: teachers typically had a strong desire to integrate technology into the classrooms, but not having adequate confidence and competence were significant barriers.

The need for the systemic change of educational technology has also been one of the barriers that delayed in upgrading existing technology systems. Technology trends affecting higher education were reported in the study conducted by Skiba (2016). This study measured short- and long-term impacts of redesigning learning spaces. The comparison of 2015 and 2016 yearly trends revealed a growing trend in addressing the basic requirements to make sure that students had the knowledge and skills to meet the requirements of the job market. The challenges both in 2015 and 2016 were consistent in showing that there was a need to improve digital literacy among students. Skiba (2016) described that these challenges were solvable if there was enough faculty support for the integration. Further, Gikas and Grant (2013) and Venkatesh et al. (2014) indicated that students in higher education had positive perceptions of increased learning when courses were augmented with technology. Skiba (2016), therefore, suggested that higher education institutions need to convey technology awareness in the classroom setting with faculty support.

In addition to the various factors influencing technology integration in the classrooms, Hur, Shannon, and Wolf (2016) examined a gap in the major factor that

related to perceived benefits, which clearly showed how teachers' technology use in classrooms as well as their perceived benefits in connection with their confidence in using technology (Hur et al., 2016). The findings of this study revealed that to use technology in the classrooms, higher education institutions should approach instructional technology in more organized and systematic ways. For example, at the local university, the transition to technology-enhanced classrooms must be supported at all levels; however, for appropriate adoption, it was important to understand how said faculty perceive adoption of active learning technology tools.

Rapidly advancing technology has proven the need to have training opportunities for instructors to use emerging educational tools in a variety of learning environments. Professional training workshops for those instructors who have not been up to date with technology have been offered in several states (National Association of State Board of Education, 2012). There were reportedly approximately eighty three training programs conducted in Illinois and Nebraska that also showed the need for instructor training in other states. While professional training is necessary, there is not consistency on how teacher candidates are prepared to teach with technology.

Technology in classrooms has many factors and challenges that influence the decision-making process. Higher education institutions in general have been challenged regarding how to successfully integrate classrooms with the latest technologies to improve student learning (Li et al., 2015; McKnight et al., 2016; Siegel & Claydon, 2016; Vance, 2016), improve the use of classroom technology (Black & Lassman, 2016; Kriek & Coetzee, 2016), and enhance digital and global outreach (Ifenthaler & Schweinbenz,

2016; Mikalef et al., 2016; Yuan, 2017). It is essential that faculty, who implement the technology and are key drivers of instructional technology adoption, provide insight into the barriers to and benefits of instructional technology, so administrators can provide more effective guidance to implementing technological changes in the classroom.

Definition of Terms

Active learning technology tools: various technology tools that include hardware and software to support face-to-face, hybrid, and online learning (Holmes, Tracy, Painter, Oestreich, & Park, 2015).

An innovative approach to classroom design: shifting from traditional content delivery and learning "regurgitation" to creating a teaching-learning environment that promotes and uses educational technology (Siegel & Claydon, 2016).

Blended learning: an approach to classroom design where traditional, face-to-face meetings are supplemented by online, text-based resources (Garrison & Kanaka, 2004).

Classroom response systems ("clickers"): a set of hardware and software that facilitates teaching activities in getting students actives engaged with course materials during class (Bruff, 2018)

Cisco Spark Board: all-in-one smart whiteboard that allows wirelessly connect for team collaboration to share video and audio input, all at touch of a finger (Cisco Spark Board, n.d.).

Digital natives: people who have grown up with any type of technologies and possess knowledge and understanding how to use them naturally (Dotterer, Hedges, & Parker, 2016).

Digital immigrants: people who are new to technology, possibly motivated and fascinated by the new technology, but should learn how to use them effectively (Dotterer et al., 2016).

Digital divide: it is a separation that exists between people who have and do not have access to technology (Cook, 2016).

iClicker Reef: a mobile and cloud-based classroom engagement system that allows the use of mobile devices, laptops, and iCliker remotes (iClicker, 2018).

mLearning: a type of learning that includes "the mobility of technology, mobility of learners, and mobility of learning" (El-Hussein & Cronje, 2010, p. 20).

Microsoft Surface Hub: a fully integrated smart whiteboard that is designed to connect individuals, regardless of their location, to collaborate, brainstorm, and share ideas and projects (Microsoft Surface Hub, 2018).

Technology integration: technology integration is a process of combining different pieces of technology to support student learning (Siegel & Claydon, 2016).

Significance of the Study

Just as technology is influencing the way people live, it has been reshaping the way institutions deliver courses in various classrooms (Black & Lassmann, 2016; Kriek & Coetzee, 2016), and it certainly has the potential to reshape the local university. Students perceive courses with instructional technology as more effective than traditional courses (Gikas & Grant, 2013; Venkatesh et al., 2014). The results of this study increased understanding of the faculty members' views and perceptions on redesigning the classrooms with active learning technology tools, specifically by implementing the *Cisco*

Spark and *Microsoft Surface Hub* smart whiteboards and clickers. This understanding also ensured that the administration's initiative to provide a classroom experience was consistent with 21st century skills for students and continued contribution to scientific knowledge. Insights from this study will support both the university leadership and faculty members to integrate faculty members as essential stakeholders in the process and facilitate effective integration of active learning technology tools in classrooms.

The project study was unique to the local university. The results of the study provided an original contribution because there was limited knowledge within the university regarding how faculty members viewed the use of active learning technology tools in the classroom setting. The success of using technology in classrooms involves more than providing laptops or computers (Allsopp, McHatton, & Cranston-Gingras, 2009). The study helped in seeking a deeper understanding of faculty's perceptions of barriers to and benefits of active learning technology tools. Listening to the opinions of faculty in the engineering college ensured that administrators must make appropriate decisions so that the transition to technologically equipped classrooms is effectively supported and that appropriate resources are provided to address perceived barriers to implementing these active learning technology tools.

Guiding/Research Questions

Guiding Question: What are the faculty members' perspectives regarding the implementation of the active learning technology tools such as the Cisco Spark and Microsoft Surface Hub smart whiteboards as well as clickers in their classrooms?

Research Questions:

RQ1. What are faculty members' views and perceptions about the importance of implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in the classrooms?

RQ2. How do faculty members describe the main benefits of enhancing the classroom experience with instructional technology by using these active learning technology tools in their classrooms?

RQ3. What are faculty members' perceptions about potential barriers to implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in the classrooms?

Review of the Literature

The review of the research literature varied greatly depending on the direction of technology integration and acceptance. I started the literature review by using Walden University library's databases, such as Academic Search Complete, ERIC, SAGE, and Education Research Complete, searching for peer-reviewed journal articles published in the last 5 years that focused on identifying the type of classroom technology that was available for integration. Keywords that I used for the search were: *classroom technology, active learning technology tools, higher education, active learning technology integration and acceptance, learning with technology, teaching and technology, higher education and technology, impact and educational technology, technology adoption, problems and technology integration, benefits,* and *active learning technology tools.*

My initial goal was to understand the role of classroom technology in general and its infrastructure. My second goal was to identify peer-reviewed articles that explored the reasons why it was important to implement technology as a supplement to classrooms by also looking for the research that studied the impact of technology on learning. In addition to searching by using keywords, I also used reference lists from related dissertations and articles. It led me to review and use online journals such as *Journal of Educational Technology, Journal of College Teaching and Learning,* and *Journal of Educational Technology* in finding other related scholarly articles. The review of the scholarly articles helped me identify evidence of the problem for this study. Many researchers often talked about barriers and challenges that surfaced during technology acceptance and integration studies. This led me to research for scholarly articles that described the challenges and barriers associated with successful technology integration and its acceptance. I concluded with a scholarly review of potential deficiencies in the research.

Theoretical Framework

Most technology is available to improve learning, but some technologies are neither consistently accepted nor used by the faculty (Day, Demiris, Oliver, Courtney, & Hensel, 2007; Perez, Popadiuk, & Cesar, 2017). I used Davis's (1989) technology acceptance model (TAM) as the framework to explore this study and analyzed the faculty members' perspectives towards implementing active learning technology tools such as the Cisco Spark, Microsoft Surface Hub smart whiteboards and clickers. Davis (1989) proposed that *perceived usefulness* (PU) and *perceived ease of use* (PEU) are the factors

that affect people's attitudes and behaviors toward technology. PU is defined as "the degree to which a person believed that using a particular system would enhance his or her job performance," and PEU involves "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989, p. 320).

Although the TAM has been widely used and known in technology acceptance research within a quantitative context, the framework has been increasingly used as the model for qualitative research in predicting user acceptance of emerging technology (Akgun, 2017; Cuhadar, 2014; Dube, 2017; Day et al., 2007; Hoppe, Steinhüser, & Vogelsang, 2013; Ifenthaler & Schweinbenz, 2016; Khalil, 2013; Karsh, Escoto, Beasley, & Holden, 2006; Middlemass, Vos, & Siriwardena, 2017; Salmona & Kaczynski, 2016).

Based on Sarker and Wells's (2013) exploratory research study, the researchers provided an integrative view of the TAM framework that related to the *assessment of experience* that determined technology *acceptance outcome*. The TAM also has been redefined in response to technology acceptance discussions where it was often referred to as limited in its ability of predicting acceptance behaviors (Salmona & Kaczynsko, 2016).

In this project study, new users are the faculty members of the local university, who will potentially use new technology tools, i.e. the active learning technology tools in their classrooms. I used the TAM to understand the faculty members' perspectives by suggesting that perceived usefulness and perceived ease of use were of key importance in technology acceptance behavior. When applied in quantitative research, the TAM is used to analyze statistical relationships between variables with various numerical method applications. In predicting adoption of technology, many researchers argued that it is also

important to explore backgrounds and the human interaction between an individual and technology (Hoppe et al., 2013; Kavanagh & Ashkanasy, 2006; Ouadahi, 2008; Salmona & Kaczynsky, 2016). Because quantitative studies used questionnaire-based surveys, the focus was on statistical findings, not the interaction between individuals and technology (Hoppe et al., 2013; Lee et al., 2003; Wu, 2012). Additionally, researchers often questioned the relevance of studies that relied on only quantitative data in the environment of relatively unexplored technology tools by suggesting that significant characteristics may easily be overlooked without taking qualitative data into account (Hoppe et al., 2013). However, these questions in quantitative studies are also viewed as strengths from a qualitative point of view (Hoppe et al., 2013; Salmona & Kaczynski, 2016). Hoppe et al. (2013) analyzed the technology acceptance factors in-depth by looking into interaction between the individuals and technology. The authors used the TAM as a model in their qualitative research study to provide with an evidence that the TAM was "underrepresented" in qualitative research (Hoppe et al., 2013). As Holden and Karsh (2010) noted that TAM in qualitative studies can be informative. Therefore, the TAM framework provided the means to explore the faculty members' perspectives to accept the active learning technology tools and to identify any associated and underlying factors.

Synthesis of the Literature Review

Several researchers studied university professors about their perspectives on teaching and learning with technology and they highlighted two common topics: the flexible design of space with appropriate technology and adequate professional training

(Goral, 2013; Li et al., 2015; Murphy, 2016; Murthy, Iyer, & Warriem, 2015; Siegel & Claydon, 2016). Some researchers examined how faculty perceived technology integration (Englund, Olofsson, & Price, 2017; Garner & Bonds-Raacke, 2013; Hodges & Prater, 2014), which was helpful in expanding the discussion of the role of technology in the classrooms. Other researchers explored the associated trends and barriers with technology integration (Hoffman, 2013; Gu, Zhu, & Guo, 2013; Morris, 2013; Tierney, 2014; Webster, 2017; William, 2016).

In examining the complexity of how larger higher education institutions adopt technology, Singh and Hardaker (2014) revealed the ability to manage the adoption of technology is a complete and engaging process. The university leaders need to be involved in strategic development to be able to attract and engage key stakeholders from academic side to make sure there is ownership by the faculy members. There needs to be a clear vision communicated to academic faculty and departments who are reluctant to engage in these innovative initiatives. Singh and Hardaker (2016) suggested considering "psychological and pragmatic motivations" of the adopters (p.116). Without the management support and commitment, the adoption of technology is useless (Singh & Hardaker, 2014).

Role of Classroom Technology

Many forms of technology are available and used throughout higher education institutions of learning (Black & Lassman, 2016). Generally, classroom technology may consist of one of the following: computers, laptops, projectors, cell phones, social media and networks, software applications, and the Internet (Anderson & Horn, 2012; Black &

Lassman, 2016; Davison & Lazaros, 2015; Mueller et al., 2012; Shao & Seif, 2014). In addition to these widely known technology tools, active learning technology tools such as smart whiteboards and the audience response system tools such as clickers (Chan et al., 2016; Daniel & Tivener, 2016; Eichler & Peeples, 2016; Freeman et al., 2014; Park, 2014) are being introduced as instructional strategy to improve instruction (Finkel, 2012; Onder & Aydin, 2016; Siegel & Claydon, 2016). Moreover, video-based learning (VBL) multimedia instructional tools (Ifenthaler & Schweinbenz, 2016; Mikalef et al., 2016; Yuan, 2017) and social media tools for student learning (Nykvist & Lee, 2013; Romero, 2015) are also being utilized as effective tools to increase student engagement in classrooms.

Active learning technology tool integration is a process of combining different pieces of technology to support student-learning environment (Chan et al., 2016; Daniel & Tivener, 2016; Eichler & Peeples, 2016; Freeman et al., 2014). Knowing what type of technology is available for classroom integration is helpful; however, when it comes to active learning technology integration development, such as smart whiteboards (Park, 2014) and clickers (Chan et al., 2017; Daniel & Tivener, 2016; Olson & Winger, 2013), operations are carried out in a variety of electronic formats that allow and facilitate students' interaction with a professor in real time. According to Chan et al. (2017), an intermediate level of the computer skills is enough to know how active learning technology tools can assist instructors in teaching. Understanding how to use the smart whiteboards requires appropriate training materials and support (Park, 2014). The local university administration will need to understand what tools are required and invest

appropriate resources to introduce the faculty to key features and capabilities of these active learning technology tools.

Uses of Active Learning Technology in the Classroom

Technology has become an important part of learning (Siegel & Claydon, 2016). In exploring the faculty members' perspectives on using the active learning technology tools, Siegel and Claydon (2016) reported that nine out of 30 professors used various technologies to redesign class materials to utilize the innovative technology. In their qualitative case study, Siegel and Claydon (2016) suggested that the uses of technology are not solely for instruction, but they contribute to teaching and learning dynamics in which students are becoming actively engaged.

Black and Lassman (2016) offered evidence of various forms of technology used in English classes. Rather than focusing on why administration or academic leaders thought technology was necessary for learning their study was a literature review focused on analyzing students' perceptions of using the technology. While there was the convincing literature in Black and Lassman's (2016) study regarding the success of technology use in English classes, the ease of access to information, and students' abilities to multitask, the authors indicated that these factors added pressures on faculty to change approaches to teaching.

Kriek and Coetzee (2016) investigated, in their exploratory, descriptive, and explanatory case study, how faculty members needed to align their teaching methods with students that have learning difficulties by using a relevant technology. The participants of the study were lecturers and students. The research revealed how to use

relevant technology to address those special learning needs of the students and ultimately improve their learning. However, the important part of Kriek and Coetzee's study was to develop productive and efficient work processes in learning with technology for the students as well as to design and create a knowledge base for teachers to teach with technology.

The advancement of active learning technology tools has started shaping all aspects of teaching in the classrooms. For example, clickers have drastically improved the quality of the class discussions (Chan et al., 2016). A quantitative study at one southeastern university conducted by Chan et al. (2016) revealed that one of the main factors that influenced the acceptance of the clickers in the classrooms was that the faculty needed to be given an opportunity to try the clickers prior to implementation. Allowing faculty members to try before implementation required substantial amount of time and financial resources before they could experience the benefits of the clickers (Chan et al., 2016). A quantitative study conducted by Daniel and Tivener (2016) compared the use of clickers based on individual use versus a small group that shared one single clicker. The results of the study indicated that clickers can be an effective active learning tool to use in small groups and achieve positive outcomes associated with active learning (Danieal & Tivener, 2016).

Active learning technology tools increased students' performances in science, engineering, and mathematics (Freeman et al., 2014). Freeman et al. (2014) analyzed 15 studies reported that average examination scores increased by 6% in active learning classroom environment as well as students in traditional classes were 1.5 times more

likely to fail exams than the students in active learning classrooms (Freeman et al., 2014). These findings from the above study helped me to understand faculty members' motivations who might be reluctant to use innovative tools in classrooms.

Several researchers studied unique technological novelties such as iPad tablets, multimedia teaching sources, and VBLs to coordinate students' learning environments (Ifenthaler & Schweinbenz, 2016; Mikalef et al., 2016; Yuan, 2017). The researchers suggested that students, who used iPads on a daily basis, were keen on continuing on using the tablets in the classrooms. In addition, students anticipated that the iPads would help them with learning, which has resulted in an overall positive behavior towards using the iPads in the classrooms (Ifenthaler & Schweinbenz, 2016). At the same time, multimedia teaching is an easy and creative way for instructors to use digital media in order to improve the quality of teaching (Yuan, 2017). The role of multimedia was primarily to help faculty with creative and personalized multimedia teaching courses. In Yuan's report, multimedia materials included text, sound, video, chart data, and various animations. This particular study suggested that offering effective application of teaching resources improved education and teaching environment (Yuan, 2017).

In addition to multimedia materials, VBL is emerging as an educational tool in flipped classrooms and online learning (Mikalef et al., 2016). A questionnaire administered to approximately 1,500 individuals from various universities revealed that the role of VBL is to optimize and extend education with the intent of removing geographical limitations. The added benefit of VBL has been contributed to the growing trend and demand to accommodate education with "lifelong" and "on-demand"

necessities (Mikalef et al., 2016, p. 10). If for example, an institution wanted to enhance education, skills, and knowledge of students, VBL technology could have been introduced, which could also potentially lead to the adoption of the tool.

Social media has been trending with a growing interest in several research studies. Social media can be a part of the learning process in higher education. Romero (2015) analyzed the use of social media tools by students between two countries, Mexico and South Korea. Mexico was one of the countries that had about 46% of the Internet users and South Korea was the leading country in the social media use, reportedly reaching 81.6% of the population that used social media (Romero, 2015). The comparative analysis of social media in classroom setting revealed a "participatory culture" that promoted the social belonging and public awareness (Romero, 2015). For example, social media technologies served as a platform to engage students in collaborative learning. Technology integration created socio-emotional benefits to students and gave them space to collaborate and exchange concepts by using a computer as a mediator. The results of the Romero's study revealed several social media tools that could be useful in the classroom learning environment. As an example, South Korean universities used participation, openness, conversation, community, and connectedness in implementing concepts and new ways to teach with technological tools. The study also provided several examples of social media tools such as Wiki, Blog, YouTube, Facebook, Twitter, Cloud computing used as learning tools that could potentially be useful in identifying solutions to the local problem.

As Dotterer et al. (2016) described, an overwhelming number of teachers and parents voiced that educational system should integrate technology in teaching by "giving young people the tools" (p. 59). However, the authors stressed that successful integration of technology in the classroom required more than just providing students with access or computers. Therefore, the researchers urged the higher education community to engage students in critical thinking activities in the classroom setting if they wanted to integrate appropriate technology effectively. Evolving from the use of laptops and computers, the personal technology such as smartphones simplified student learning by allowing immediate access to information. Mueller et al. (2012) argued that mobile technology in higher education can be used as a portable handheld device for immediate access to information. A feedback from a total of 108 graduate student participants revealed that the mobile technology tool was "most useful" as a "learning tool" (Mueller et al., 20120, p. 49). Moreover, several other studies described teachers' beliefs about technology integration by revealing that mobile devices were one of the most preferred technologies that teachers would have liked to see in classrooms (Mueller et al., 2012; Woodcock, Middleton, & Northcliffe, 2012). In unfolding the reasons of why mobile devices were the most desired technology revealed that these devices were engaging and interactive (Hodges & Prater, 2014) and it gave students a sense of belonging (Nykvist & Lee, 2013) while having immediate access to information (Shao & Seif, 2014). The "future of ever-evolving hardware" enabled students to have access to information at their fingertips by taking "education" anywhere (Hodges & Prater, 2014, p. 5).

It is also widely known these smartphones come equipped with social media applications. Utilization and impact of mobile devices by the first-year students were analyzed in a mixed methods study conducted by Nykvist and Lee (2013). The study revealed that 51.8% of the students felt a sense of belonging while using social media technologies and "kept them up to date" with other students (Nykvist & Lee, 2013, p. 3). Nykvist and Lee's study brought up the importance of using mobile devices in the classrooms because these technologies were a part of students' everyday lives and had changed the way they communicated and interacted with each other. In addition, Nykvist and Less cautioned that some students felt lost if they could not use their cell phone in the classrooms. For the social media to work, therefore, mobile devices will need to be used by students.

In a cross-sectional quantitative study, the use of mobile smartphones with the utilization of mobile learning (mLearning) technology has shown a growing trend in a higher education field (Barreto, 2013; Davison & Lazaros, 2015). mLearning is defined as a learning process that "takes account of the mobility of technology, mobility of learners and mobility of learning" (El-Hussein & Cronje, 2010, p. 20). After surveying over twenty thousand graduate and undergraduate students, the results of Davison and Lazaros's (2015) study revealed that almost 60% of students used smartphones and 45% used tablets as the primary mLearning technology. These researchers found that students utilized smartphones for their courses. Indeed, learning when using mobile devices is a latest innovation for teaching and learning at a global scale. (Shao & Seif, 2014). Shao and Seif reported that about 42% of students used mobile devices for searching articles

and references. It is implied that mobile devices could become one of the preferred choices for innovative methods of teaching and learning (Shao & Seif, 2014, p. 3). Therefore, the immediate access to information is going undoubtedly push the use of mobile technology in classrooms.

Student Perceptions of Active Learning Technology

Student perceptions seemed to correlate with some underlying factors of accepting technology in classrooms. Han and Han (2014) revealed that not all students are ready to use new technologies. No matter how different or newer technologies were, in their study they found that students had various approaches about using new technology (Han & Han, 2014). On the contrary, Dornisch (2013) showed that there was a digital divide of the comfortableness of using classroom technology between students and the faculty members. In this quantitative study that primarily examined student perceptions, the high school students that participated in this study reported innate desire to use technology in classrooms by also asking for more technology (Dornisch, 2013). The digital gap, however, that was highlighted by Dornisch's study identified that today's students known as the "digital natives" and today's faculty are referred to as the "digital immigrants" (p. 14). Digital natives are born in the technological era, and digital immigrants, on the other hand, struggle with emerging technologies daily. While digital natives could learn new technology quickly, it took time for the digital immigrants to learn and adapt to new technology.

The use of active learning technology tools at one university in North Dakota revealed that students preferred that faculty members were more focused on using active

learning technology tools such as interactive videos and less on lecture materials (Olson & Winger, 2013). Students indicated that faculty members need to be role models when it came to using technology tools in classrooms. The results of this study also led to the conclusion that without an adequate administrative support, neither faculty nor students would succeed in using and implementing active learning technology tools in classrooms (Olson & Winger, 2013).

When students were asked how they perceived the use of new technologies, in this case, e-learning tools, students stated that e-learning environment enhanced their deep learning and understanding of the course because it gave them time to work on their answers, discussions, and reflections (Ishtaiwa & Abuilbdeh, 2012). While this qualitative study was geared toward an online classroom environment, it highlighted an importance of the fact that faculty should be encouraged and motivated by new technology and use available e-learning tools as part of their teaching methods in traditional classroom setting. Moreover, in their observation of 12 classrooms, Min and Siegel (2011) revealed that the 67% of students had fun and 83% learned more during SMARTboard lessons. The results of the quantitative study showed that students paid more attention, participated and learned more, and assignments were done on time.

Vance (2016), on the other hand, described how technology impacted knowledge construction. Specifically, he explored the use of interactive programs and applications that allowed students to personalize their Internet experiences. The use of personal blogs versus classroom blogs was found helpful in improving pieces of writing by inspiring students to interact with each other in a meaningful way. Also, to understand the

knowledge construction among students, Vance (2016) examined the written blogs and concluded that the environment also helped students build strong collaborative skills. As a result, the article provided information on how technology was impacting education in many ways; however, it did not ignore the fact there was the need for the skilled and knowledgeable faculty to support this process.

Faculty Perceptions of Active Learning Technology Tools

Introducing active learning technology tools to faculty might require them to acquire new skills and attend professional training. The faculty perception of using technology in classrooms was revealed by Weaver, Walker, and Marx (2012) who found that students "were ready to attack technology" without any formal training. Faculty, on the other hand, had the difficulty of maintaining proper training in basic software applications, had limited financial support to try and integrate technology in the classrooms as well as had constant challenges in identifying proper teaching methods that fit a lesson. A mixed study about faculty perceptions of using smart whiteboards that was conducted by Park (2014) revealed that implementation of smart whiteboards facilitated interaction between teachers and students and promoted student learning environment. However, some of the already mentioned concerns such as training and sufficient technical support will still be required to effectively utilize new technology tools. Furthermore, in discussing some of the implications concerning the use of smart boards, Al-Qirim (2016) reported that integration of these smartboards in classrooms should be in "a peace-meal fashion" (p.1909) in a form of supplementing existing parts of teaching approaches and strategies, in which, the adoption and usage of the smart whiteboards are

eased by the faculty members. However, the adoption and the implementation of these types of learning tools such as the smart whiteboards in the classrooms required top administrations support (Tosuntas, Karadag, & Orhan, 2015).

In gathering feedback from faculty members, students, and administrators, DiVall et al. (2013) stated that 64% of faculty members of one college used various available classroom technology while claiming that using classroom technology enhanced teaching practices. In this study, faculty members reported changing their teaching practices to accommodate various technology to meet the students' needs; and students, on the other hand, reported overall satisfaction and positive feedback about the appropriateness of technology that was used throughout the classes. For example, active learning technology tools such as clickers were used to enhance teaching practices as well as to foster student engagement (Chan et al., 2016; Daniel & Tivener, 2016). In Chan et al. (2016) quantitative study that surveyed approximately 600 full and part-time faculty members, the results revealed that faculty members should try and test the technology before its adoption. In an effort to determine factors that influenced faculty members to use classroom technology, Garner and Bonds–Raccke (2013) stated that four factors such as time, attitude, belief, and comfort level were present in studying faculty members' usage of technology. The results of the study indicated that those faculty members who received a formal training at the university level had higher levels of using classroom technology. While the study provided practical implications of faculty members' time, attitude, belief, and comfort levels, there was an indication that there is still more research to be done in finding out how to best influence teachers to integrate active learning technology tools.

Barriers and Challenges of Technology Integration

Technology integration is increasingly happening in classrooms (Hilton, 2016). Hilton (2016) followed a year-long integration of iPad by conducting a qualitative case study in the hopes of gaining insights of successful technology integration in social studies classrooms. The study's results showed that teachers should approach new technology integration as a systematic and reflective way. In viewing as a systemic and reflective way, Lu and Overbaugh (2009) stated there were barriers to successful technology integration. The tangible common barrier that was identified was the access to resources when technology got outdated or sometimes was limited (Vann et al., 2015; Williams et al., 2014). The most frequently mentioned barrier was inadequate professional training (Araujo & Luiz, 2015; Bleakley & Mangin, 2013; Liu, 2013; Merc, 2015; Petersen, Finnegan, & Spenser, 2015; Singh & Hardaker, 2014).

There have been transformational changes in four key areas in higher education - systems, privatization, academic work, and technology (Tierney, 2014). As Tierney indicated that when it comes to technology, higher education will continue transforming how faculty will do their work in the future. Tierney (2014) argued that although most traditional universities were challenged by the inability to change, some universities tried to adapt to the rapid technological changes to meet the demands of the students by adopting a 'sustainable' technology. The sustainable technology was supposed to replace and improve the current technology (Tierney, 2014). The simplest example of the sustainable technology is when "typewriter companies moved from manual to electric" (Tierney, 2014, p. 1423). However, not all technological improvements were successful

as there were challenges that cost time, money, and focus (Tierney, 2014). The study, therefore, provides information about shifts that are likely to occur in higher education that might not only impact administrative and overhead costs but also might influence the technology integration process part of the local problem.

A detailed look at environmental pressures that higher education institutions face today was closely connected to the local problem emerged from Hoffman's (2013) policy report. In order to provide quality, efficiency, and value to the educational process, universities were being pushed to meet global requirements for their students' preparation. The results of Hoffman's (2013) report revealed the importance of updating the classrooms by providing technology access to the students mainly because of the "upsurge of social changes" (p. 49). Higher education institutions were caught between the requirements of the accreditation while also needing to rapidly innovate to meet the demands of new emerging technologies for learning. Therefore, examining the current change environment of higher education is the one step that institutions could do by looking at the design of active and engaging learning environments, which ultimately could help build and extend knowledge of technology integration in the classrooms in the local setting.

Similar to environmental pressures, it is important to be aware of the philosophy of technology assumptions. In a qualitative study, Webster (2017) examined the philosophical assumptions of educational technologies in leadership and how these assumptions might influence technology decision making. In his critique of the claim of the digital natives, Webster (2017) defined a theme titled "technological determinism" (p.

26) to examine influences of assumptions on how technology served as a dominant force for social change. With over 20 participants that held leadership positions in the educational technology, the study provided convincing findings to support that technology be a critical component to achieving educational goals.

In reviewing the results of a case study, MacKinnon and MacKinnon (2013) identified a "digital divide" between developed and less developed countries such as in one Jamaican university (p. 50). The digital divide, as explained by the researchers, is "the haves and have-nots" of computer ownership and it only is a beginning of the digital divide. Beyond computer ownership, the universities experience a digital divide caused by other factors such as connectivity, skills, freedom of access, or technical support (Hawkins & Oblinger, 2006). The study helped in understanding different perspectives on the digital divide among faculty members from different countries. The study illustrated that regardless of the level of faculty struggles with the integration of technology in classrooms, it is more significant when this type of struggle occurs in a well-developed environment such as in the United States. The digital divide across developed and underdeveloped countries is similar to the divide at the local level. For example, Cook (2016) also argued the digital divide happens when it comes to students who have access to the latest technology and those who do not. Furthermore, Cook stressed that there was a growing gap between savvy students and their schools. Linking technology use in academic programs should not only be the issues that schools need to deal with but also it could have a positive impact on learning (Cook, 2016).

When it comes to the concept of innovation in higher education, Williams's (2016) article revealed that those universities that attempted an innovative process of technology integration had to take a step back because of the costs. Furthermore, Williams described the feeling of "24/7" in which technological devices consumed our lives; the American universities went through "a chain of perceptive shocks" causing "a continuous disequilibrium" and anxiety (p. 114). To add to these side effects, the researcher emphasized a fundamental flaw that the structure of higher education should not solely depend on students' needs and desires but should instead focus on what the society collectively already knows and what was essential to innovative technology integration. By revealing the side effects of the technology integration and costs associated with the innovative process, Williams's (2016) article might help in supporting some of the unspoken issues in addressing the local problem.

Identified Gap in the Research

From the review of the recent scholarly publications, it can be concluded that there is not one simple model when it comes to augmenting classrooms with appropriate technology, as is necessary in the transition to active learning technology classrooms. Technology integration and its use require hands-on experience, and a gap exists between administrators at the local university who see instructional technology as a solution to problems and the faculty who have been slow to take up the project, as indicated by the continuing needs identified in the local university's strategic plans. Moreover, technology is emerging at a faster speed than people can adapt to them (Ahalt & Fecho, 2015). Some emerging technologies in instructional strategies that had been reported by Ahalt and

Fecho (2015) included tools such as electronic grading, textbooks, flipped classrooms, and learning management systems. As newer technology becomes available, there will always be new and modified ways of learning and teaching on a continuous basis. This in itself creates a new kind of digital gap in the educational system because of the complexity of staying up-to-date on a rolling basis. As Merc (2015) stated, for an improvement in technology in education, faculty needs to be aligned with modern developments and stay up-to-date as new technologies emerge. This observation holds for the adoption of active learning technology tools at the local university.

Implications

The study's findings may bring a positive social change, as this study also provides recommendations for successful integration of active learning technology tools in classrooms is a key component of 21st century higher education classrooms. The context of the study brings a significant awareness in senior administration and in faculty members at the local university. The recommendations from this study is presented in a form of a position paper.

Technology, in general, has served society as "information highway" as well as has made important contributions in the classrooms (Riley, Kunin, Smith, & Roberts, 2016, p. 212). Information and technology literacy have become essential to navigating in society just as reading and writing. However, when technology is not integrated into higher education, students do not develop information literacy or effective use of technology for learning (Riley et al., 2016). In addition, computers, laptops, iPads, smartphones, tablets, digital telephone lines, and whiteboards have been around most

professionals' desks of faculty and staff offices, yet technologies are almost non-existent in the local university's classrooms. Therefore, this study's impact could facilitate a form of social change in the higher education system as well as in society by exposing students to active learning technological tools in the classrooms.

Summary

The conceptual framework for this study was based on Davis's (1989) theory of the technology acceptance model. Davis emphasized that it helps to explain the attitudes and behaviors of accepting these innovations based on people's perceptions. Uncertainty, or a limited knowledge and information such as the case in this local study, was the greatest obstacle to the acceptance of innovations.

Within the higher educational context, technology can be viewed as a means of removing barriers for faculty and students. First, technology can expand geographical boundaries (Mikalef et al., 2016) and remove financial barriers (Weaver, Walker, & Marx, 2012) to further student learning experiences. This will allow faculty and students to experience learning opportunities that otherwise would not have been possible. Second, technology can impact student learning by focusing on problem-solving skills and creative thinking (Saine, 2012). In addition, multimedia and other instructional tools can be used to assist faculty in acquiring new skills and knowledge to support teaching methods.

Furthermore, emerging technology has shown transformational foundations within the educational context. Integration of smart whiteboards and clickers can significanly improve student engagement in the classrooms (Chan et al., 2016; Daniel &

Tivener, 2016; Freeman et al., 2014; Li et al., 2015; Park, 2014); social media and smartphone technology attributes to social engagement and simulation of learning (Mueller et al., 2012; Woodcock et al., 2012) as well as to the immediate access to information (Shao & Seif, 2014), that creates a sense of belonging (Nykvist & Lee, 2013). Continued use of latest technology can advance the effectiveness and efficiency of student learning experiences (Vance, 2016). Therefore, this study provided with an in-depth understanding of the perceptions of faculty regarding implementing active learning technology tools in the classrooms. Consequently, Section 2 will give an overview of how the research was conducted. Specifically, this section includes a description of the research methodology, data collection methods, and the analysis strategies. Section 3 describes the project's findings that emerged from the research. Finally, in Section 4, I reflected on my personal experience, reflections, and conclusions as a scholar, a practitioner, or a project developer by also providing any possible implications for future research.

Section 2: The Methodology

Introduction

I chose a qualitative exploratory case study to explore the local problem of stagnation in technology innovation in classrooms at the selected university by uncovering the views and perceptions of the faculty members about redesigning classrooms with the active learning technology tools. In this section, I discuss the rationale for the chosen research design and how it logically derived from the local problem and the research questions. This section also includes information regarding the participants, criteria for selecting and gaining access to the participants for this study, and the protection of their rights and ethical implications. Finally, I describe the data collection and analysis and the study results.

Research Design and Approach

I conducted the qualitative exploratory case study to explore the views and perceptions of the faculty members in the engineering college at the local university regarding redesigning classrooms with active learning technology tools. Stake (1995) stated that an exploratory case study should be used if a researcher has no clear set of outcomes. For this study I used an exploratory research design to explore and acquire new insights from the faculty members. Case studies can be conducted about programs to make necessary decisions (Stake, 1995; Yin, 2003). Thus, the exploratory case study method was essential in order to explore faculty members' views and perceptions in order to address the limited information surrounding the local strategic initiative.

Yin (2003) categorized case studies as explanatory, exploratory, descriptive, multiple-case, instrumental, collective, and intrinsic. In choosing an appropriate type of the case study, I reviewed and considered other types of case studies that might have been effective for this study. Specifically, I compared explanatory, exploratory, and intrinsic case study categories. I considered using the explanatory case study but according to Yin (2003), it was mainly applicable to seeking information regarding cause and effects circumstances that were too intricate for the survey or experimental analysis. I examined the intrinsic case study as it was designed by Creswell (2007) to understand a program or an organization. While it could have been applicable to the project study, I then excluded it because this study did not have a clear set of outcomes as its purpose was to explore the active learning technology tools before they were going to be implemented at the university level.

I deemed the exploratory case study method appropriate for this study for several reasons. First, exploratory case study was beneficial in exploring the local study. As Yin (2003) described that the exploratory case study was mainly applicable if there was "an intervention that is being evaluated with no clear or single set of outcomes" (p. 548). Moreover, according to Yin (2003), this type of case study was not designed to develop a theory. I was not planning to develop a theory because it was not within the scope of this study. The exploratory case study was the most suitable for this study because it not only allowed me to explore the views and perceptions of the faculty members in the engineering college but also led me to a better understanding of the limited information

surrounding the strategic initiative with its focus on providing findings that could justify additional research.

I chose the qualitative tradition over quantitative and mixed methodologies because Stake (2010) stated that qualitative research aims to understand one particular topic in more depth. In addition to reviewing different types of case studies, I also considered a sequential mixed-method research design embedded in a case study. The sequential mixed methodology offered a two-stage process where the quantitative data were collected first, followed by a qualitative data collection in the second stage. The significance of this method would have been on the qualitative analysis in gathering feedback and information from faculty; however, after careful consideration, I determined that this method was not practical and not necessary for answering the research questions. The exploratory case study methodology was sufficient and practical to obtain and provide a meaningful information to conduct the proposed study.

Participants and Their Selection Process

I conducted the research in the engineering college at the local university. The engineering college has four academic departments and employed approximately 130 full-time faculty members at the time of the study, typically teaching at least 1–2 classes per semester. Within the engineering college the 130 faculty members teach within four departments, three departments were made up of approximately 35–40 faculty members and one department had 20 faculty members (see Figure 1).

I used a purposeful stratified sampling strategy for selecting participants from this group. Purposeful sampling, as defined by Patton (1990), is a powerful sampling method

for those case studies that have complex description and information, and it was sufficient for this study because it allowed selection of individuals with direct experiences related to the purpose of my study, which ultimately provided answers in support of the research questions. Specifically, the participants for this study were the key informants (Lodico, Spaulding, & Voegtle, 2010, p. 34), who shared their experiences about the unique needs of students in the engineering college and about the status of technology use within the engineering college. They spoke from their experiences regarding what needed to be done in terms of improvements or in terms of barriers. Their desire to be involved in the study and the availability to share experiences and opinions was part of the consideration to achieve the desired results (Bernard, 2002; Spradley, 1979).

I implemented the sampling process in two steps that Merriam and Tisdell (2016) described. First, as it was mentioned in the strategic plan for 2017–2027 that "…outmoded laboratories and classrooms equipped with obsolescent instrumentation and 20th century computational capacity" (p.15), I selected the faculty members from the engineering college as they have first-hand knowledge of the scientific, computational, and laboratory technology requirements of the engineering students. In the next step, I used a stratified strategy to ensure a proportional representation of faculty members from each department in the engineering college. I used two main criteria for selecting the participants for this study: (a) faculty members actively teaching at least 1–2 classes per semester and (b) several participants from each of the four departments of the engineering college proportional to the size of the department. By using Patton's (2002)

purposeful stratified sampling strategy, I ensured that each department within the engineering college received proper representation within the sample.

I recruited eight participants that matched the sampling criteria proposed for this study. The sampling within the four departments was as follows:

Table 1

Sampling Representation from four departments

	Mechanical Engineering (35)	Civil Engineering (20)	Electrical Engineering (38)	Biomedical Engineering (40)
Number of Participants (8)	3	2	1	2

Although different factors can determine the sample size, in qualitative research, there are no set minimum sample sizes (Lodico et al., 2010). I reached saturation because the sample size of eight was sufficient. As O'Reilly and Parker (2012) stated, the quantity of the sample size is not as a major factor because the goal of the research is not to count the thoughts of the participants, but to obtain a variety of opinions and perspectives. Therefore, a sample of eight participants was sufficient as their experiences gave a unique perspective and insights regarding using classrooms with active learning technology tools.

Researcher-Participant Working Relationship

I had a good understanding of the culture in the engineering college and maintained positive relationships with all departments inside the college. At the time of this study, I was working as associate director of global education at the local university.

In this role, I did not supervise any of the faculty members in the engineering college. Similarly, I did not personally know all 130 faculty members working in the engineering college. Therefore, the potential for unethical coercion and personal bias was minimal.

According to Lodico et al. (2010), the evidence of credibility can take many different forms. To establish credibility with my participants, I maintained meaningful and positive interactions with them. I also strived to build rapport and trust so that participants were at ease to speak to me during the interviews. For the conversations to be natural I was flexible and open to small talk before engaging them in the interview questions and I gave the participants an opportunity to gain comfort with me prior to beginning the interview. I also encouraged the participants to ask questions and make comments during our conversations. I ensured the participants that confidentiality would be maintained and respect for their privacy.

Access to the Participants, Protection, and Ethical Considerations

Access to the participants required multiple levels of approvals. The local university has an Institutional Review Board (IRB) department. Prior to submitting the proposal, I needed to obtain the local university's IRB approval in addition to Walden University's IRB approval for the project study. Consequently, to comply with the local university's IRB procedures, I met with the local university's IRB department to learn about its approval process. After our discussions about the proposed study, the local university's IRB approval was not necessary to conduct the study in the engineering college. Walden University's IRB approval was sufficient for this study. The local university's IRB department only asked to submit the Walden University's IRB approval

number for their records after it was approved. After I received Walden University's IRB approval (approval number #03-16-18-0589774), I submitted the requested information to the local university's IRB office.

To further gain access to the participants, I also spoke with two associate deans and three departmental chairs in the engineering college. The purpose of these discussions was to make them aware of the proposed study and to obtain their approval to access the site and the participants. I received their verbal approval to proceed with the study after I received Walden University's IRB approval.

The participants' rights and their voluntary participation in this study were communicated to them from the beginning of the interview. The participants' names and other identifiable characteristics were concealed from anyone who was not directly associated with the study. During the data collection process, the participants were assigned a numeric code, 1 through 8, to protect the identity of these individuals. The notes and the documents containing the actual names with the corresponding numeric codes are stored on my personal password protected laptop. I maintained sole access to my personal laptop. I also stored the data, notes, and document linking pseudonyms and names on an encrypted backup USB drive that was password protected to allow me to access data in case something happens to my personal laptop.

Protection from any physical harm and any ethical implications on the rights of the participants were my priority. I made the participants aware that any disclosed sensitive or confidential information would remain confidential. Administering data

collection involved being aware of many ethical implications and my personal bias. Every participant was, therefore, treated equally and with respect.

Data Collection

The data for this study were collected with in-person and telephone interviews that took place after receiving Walden University's IRB approval to proceed with the project study. I recruited the participants via an email invitation (see Appendix C). I used a purposeful stratified sampling strategy and the participants were selected with the following steps. First, I created a list of all faculty members in the engineering college who taught a normal load of 1–2 classes per semester. Second, I grouped the faculty members by departments and then randomly selected the planned number of participants from each department. Third, I sent the selected participants the email inviting them to participate in the study. If I did not recruit the desired number of participants willing to be engaged in this study using the invitation emails, I continued this process by selecting others from each department until I reached the targeted sample size as summarized in Table 1.

Due to time and location constraints, five interviews were conducted via face-to-face sessions and three were telephone interview sessions to accommodate the participants' preferences. The interviews' duration ranged from 20–40 minutes. My goal of the research interview was to engage faculty members in a conversation guided by the interview protocol developed by me for this study (see Appendix B). The interview protocol served as a script to ensure that I did not forget key research questions throughout the interview sessions. The interview protocol included the interview

questions that were developed in conjunction with the case study's research questions. The open-ended interview questions were developed to capture the views and perceptions of the faculty members regarding redesigning the classrooms with active learning technology tools. Following Patton's (2015) six types of interview questions, when asking participants' beliefs or opinions, I started my questions with, "What's your opinion about…?" To ask questions about someone's feeling, I asked questions that started with, "How do you feel about…?" When asking participants questions about opinions, feelings or thoughts, I was looking for a response with adjectives such as confident, frustrated, happy, unsure, and so on. I refrained from asking "why" questions, because according to Merriam & Tisdell (2016) and Patton (2015) they might lead to justifying answers that could also potentially lead to dead-end answers.

In constructing the study's interview questions, I also reviewed whether the questions were aligned with the theoretical framework for this study. Davis's (1989) TAM framework, as presented in Section 1, described PU and PEU as two major factors affecting how users come to accept and use technology. The interview questions were also aligned with these two TAM factors as shown in Appendix B. For example, the interview questions that I asked regarding the benefits of implementing the active learning technology tools in classrooms addressed usefulness and the perceived benefits of using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers. Likewise, the interview questions about barriers and obstacles of using active learning technology tools in classrooms addressed the ease of use factors.

For each interview session, I also used the probing questions throughout the interview. Probing questions were helpful in furthering the discussion or following up on participants' responses. Probing questions were used, as needed, to elicit more information or clarification during interviews (Glesne & Peshkin, 1992; Merriam & Tisdell, 2016). For example, some generic probing questions I asked, "Could you please elaborate on…?" or "Can you provide an example of…?" I stayed vigilant in asking probing questions when appropriate.

Furthermore, I wrote the dates of the interview and any reflecting thoughts immediately after each the interview session. As the researcher, my goal was to be open and flexible in engaging in conversations with the participants. I started the interviews with a small talk for a few minutes and the remaining time was used to engage in both open-ended and, when appropriate, some probing questions to ask participants for more information on what they have already answered. The entire interview process took about two months to complete.

Finally, I used a smartphone voice recorder, which is a built-in app that comes with the device, to record the interview sessions. I had my personal laptop as a backup should I incurred technical difficulties with my smartphone. My laptop was also equipped with the audio recording program called "Sound Recorder" which is an audio recording program built into the Microsoft Windows operating system. After each interview, I saved a copy of the audio file on my computer with a backup copy also saved on USB drive. I typed my reflective notes after each interview. All collected data was stored on

my personal laptop, which is also a password-protected device. I will keep collected data for five years (IRB Application, 2015).

Role of the Researcher

I am currently employed as an associate director of global education office at the local university. As the associate director, I manage and provide administrative oversight for all undergraduate study abroad exchange programs with foreign universities. As a former administrative staff member of the engineering college, I did not personally know all 130 faculty members working in the engineering college; I ensured that my personal bias did not hinder the project study.

Currently, the engineering college is in three different adjacent buildings. My private office was in close proximity to these buildings. The participants requested to conduct the interview in a coffee shop as a neutral space, which was desired by most of my participants. Although quick access to the participants and to the local setting of the project study added great value to the study, it was important that the data collection process was not influenced by my personal perceptions.

Data Analysis

Data analysis is the process of analyzing and interpreting the collected data. Merriam and Tisdell (2016) described data analysis as the process of making sense of the data. I used the process described by Bogdan and Biklen (2007) as a basis to guide me through the data analysis. First, I transcribed verbatim the audio recorded interviews by typing the conversations into a Word document. I transcribed the recorded interviews, and made some preliminary notes about words and phrases that stood out repeteadly

throughout the conversations. In an attempt to learn the basics of coding, I then printed one shorter version of the interview transcription for manual coding as my first try. As I began searching and manually analyzing words and short phrases by vigorously circling, highlighting, bolding, and underlying words I quickly realized that this was not the most efficient way of coding. Forthwith, I turned my attention in finding software that would help me to automate the manual process by also efficiently store, organize, and manage the data. I utilized NVivo software to code the rest of the interview transcripts. One of the best features of the NVivo program was in its ability to display codes for a quick glance and visual organization.

Coding and re-coding took time as I went back and forth until the codes were clearly organized and became more refined. The main challenge in this process was to consolidate, reduce, and interpret what the participants conveyed during the interviews. The data analysis was a multi-cycle process. As I completed the second cycle of coding, the data contained a cluster of codes that needed further fine-tuning. The bigger challenge was to bring the coding all together in a meaningful way. As coding continued, some of the codes from the second and subsequent cycles were re-coded, re-defined, or sometimes eliminated altogether. Overall, I went through six cycles of coding. Although the data analysis for the case study also involved an analytical approach, the identified categories and themes originated in an inductive approach. The inductive approach, as explained by Gabriel (2013), is the process when a researcher moves the specific data to generalization by using "bottom-up" approach. In an inductive process, the collected data is synthesized for any patterns and then a researcher steps back and takes "a bird's eye view of the data"

(Pedraza, 2017). In applying the inductive process during the data analysis, I started with the participants' individual responses and then moved from these experiences and observations to a broader set of themes and categories. The inductive approach helped analyzing the qualitative data in a systematic way where the analysis was guided by specific research questions (Thomas, 2003).

In addition to the coding process, I also reviewed my handwritten notes from the interviews and from the classroom observations. I used the classroom observation documents to note the classroom setup which included the location of the physical objects such as the blackboard, projector, classroom furniture, and the overall technological objects. These documents provided with additional pertinent information that supported the study's results. I organized all collected data in a way to make a connection with the guiding research questions and with the participants' answers to the interview questions.

Trustworthiness Strategies

Trustworthiness strategies ensured the quality of this qualitative research study. Credibility and dependability were considered to ensure that the research study met the quality standards for a doctoral-level qualitative research as well as it was conducted an ethical manner.

Credibility strategies. Credibility in this study was implemented through triangulation, member checking, and peer review strategies (Creswell, 2007). The triangulation process was used as a check on trustworthiness by comparing different information sources that focused on the same topic (Creswell, 2012; Denzin, 1984; Stake,

1995). Creswell (2007) described the triangulation as a method of collecting data from different people. Stake (1995) stated that data could be triangulated by using interview protocols to ensure accurate and consistent process. And, finally, Denzel (1984) explained that triangulation would occur from gathering data from various sources, not only from people.

For this study, I triangulated the interview findings with observations of the classroom technology provided additional information in the instructional context that were helpful in corroborating specific points resulting from the interviews. I observed technology use in the classrooms auditing different courses at different times to observe what type of technology was used and how it was used throughout the lectures. I used these observational data to understand the context of the physical environment by describing existing classroom space including various objects, resources, and existing technologies that were already in place in the engineering college classrooms I observed.

I also used my notes from the interviews. Within the notes, I documented the pattern of the interactions between myself and the participants, and the direction of our conversations throughout the in-person interviews. While I could not observe subtle factors such as nonverbal behavior and visual cues during the telephone interviews, I noted how it allowed the participants to feel more relaxed and how they were willing to talk freely as they were able to disclose more information than in face-to-face interviews.

Furthermore, member checking, the second credibility strategy used in this study, is known as a method of checking for credibility and accuracy of the results (Merriam & Tisdell, 2016). For member checking, the verbatim transcriptions from audio-recorded

interviews were returned to the participants in a Word document via email to check for accuracy with what they intended to say. I asked each participant to check if the transcript was complete, fair, and accurately projected what they intended to say. A few of the participants returned the transcripts with tracked grammatical changes, but there were no substantial changes to the content.

Finally**,** to further establish the credibility of the findings, I asked a colleague with a Ph.D. in Engineering to assist with reviewing the data collected throughout my study. The peer reviewer examined my transcripts and findings (Given, 2008). In this process, I ensured that the information provided did not contain the participants' names or any other identifiers. As required by Walden University's IRB, I also asked the peer reviewer to sign a confidentiality agreement to ensure the information was protected.

The peer reviewer was a senior researcher working in one of the centers in the engineering college. The peer reviewer, thus, was not a faculty member, and, therefore, was not a part of the selected target population. Since this colleague was familiar with various research practices, he provided support, questioned my assumptions and results, and assisted in improving the study overall. The peer reviewing process consisted of one in-person meeting, where I provided him with a general overview explaining the case study by outlining the research questions, the chosen methodology and the framework, and by also describing him the data collection methods. The subsequent three telephone meetings consisted of the discussion of data analysis, codes, themes, and their respective similarities and differences.

Dependability strategies. Dependability in qualitative research establishes trustworthiness in research by proving consistent methods for collecting data (Lodico et al., 2010). For this study, I had my field notes, my reflective notes after each interview, and the audio recording sessions throughout the interviews (Merriam & Tisdell, 2016). The use of a digital audio recording device during the interviews supported dependability of data collected. In addition, my reflective notes helped to provide an additional source of data to triangulate the findings of the study, and to note any modifications to the data collection process (i.e., changes in location of interview, etc.). One of the examples of my reflective notes is attached in Appendix D.

In conclusion, by implementing these above-mentioned trustworthiness strategies, the credibility and dependability of the findings were established. Triangulation, member checking, peer review, and notes strengthened the results of the study and reduced the researcher's bias.

Research Findings

The study focused on exploring the faculty members' perspectives about implementing active learning technology tools in the classrooms. As part of the data analysis, I synthesized the findings to establish connections between the research questions and the raw data, i.e. the participants' answers. During the process, I also reviewed and utilized my field notes and classroom observation notes as part of the data analysis process.

I used the inductive approach for the data analysis. I read the transcripts several times to go over the identified codes in order to reveal the themes and subthemes. I

summarized the codes in a way that it framed each theme. I then re-read the transcripts according to the new theme. This process helped me in conceptualizing these themes from the raw data. The inductive data analysis approach helped with the development of themes and subthemes from the raw data (Thomas, 2003). Within each of these themes, I searched for sub-themes and their supporting factors, while also paying attention to any opposing views and perceptions of the participants. As the result, themes emerged that explained how the participants viewed and perceived the implementation of the active learning technology tools in the classrooms.

To support the findings from the inductive analysis, I selected the participants' direct quotes that carried the main theme or the elements of each subtheme. I assigned a numeric code to each participant and referred to them as "P1, P2, P3…" and so on to directly quote each participant to support the findings. The inductive process helped to make broader generalizations from specific interview questions, which resulted in identifying three major themes: 1) choosing a fit technology; 2) perceived benefits; and 3) perceived barriers. The identified themes were directly associated with the guiding research questions as they were the basis for the data analysis process. I summarized the themes and the corresponding subthemes in Figure 3 below.

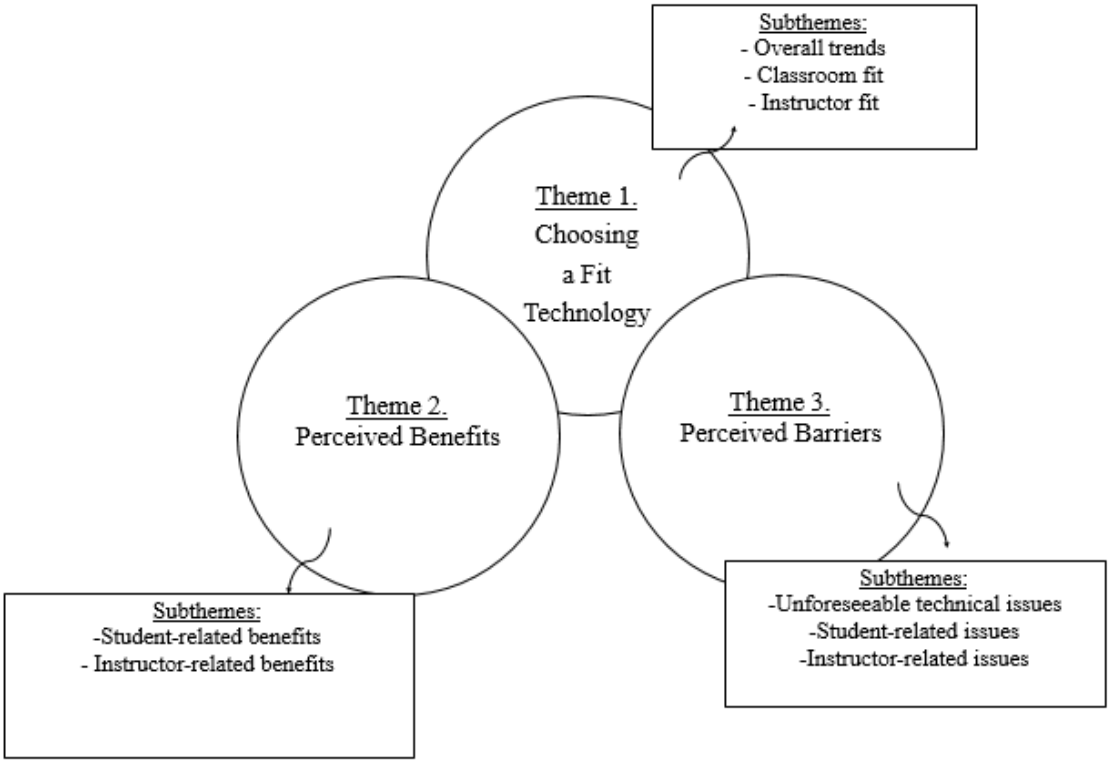

Figure 3. Graphic illustration of the themes in the study

Furthermore, I have identified the relationship between the emerged themes and subthemes to the research questions in Table 2 below.

Table 2

Relationship of Themes and Subthemes to Research Questions

Theme/Subtheme	RQ1	RQ2	RQ3
1. Choosing a Fit Technology			
Overall Trend 1.1	X		
Classroom Fit 1.2	X		
Instructor Fit 1.3	X		
2. Perceived Benefits			
Student-related Benefits 2.1		X	
Instructor-related Benefits 2.2		X	
3. Perceived Barriers			
Unforeseeable Technical Issues 3.1			X
Student-related issues 3.2			X
Instructor-related Issues 3.3			X

Theme Description and Supporting Factors

Theme 1. Choosing a Fit Technology

Theme 1 addressed the following research question: "What are the faculty members' views and perceptions about implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers?" To answer the first research question, the theme revealed a general trend of overall views and perceptions of faculty members about the importance of implementing the smart whiteboards and clickers in the classrooms (subtheme 1.1). The analysis of the interview data that suggested that the participants felt comfortable using technology; however, the use of these tools was associated with the fact that: a) these active technology tools should not be uniformly imposed across diverse classrooms (subtheme 1.2) and b) faculty members' teaching

practices often influenced decisions in using the active learning technology tools (subtheme 1.3).

Subtheme 1.1. Overall trends. The participants not only commented on using their technical skills effectively but they also seemed to value use of any type of technology tools in the classrooms. The participants generally expressed a positive attitude toward the active learning technology tools such as the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers. For instance, five out of eight participants had a positive attitude toward these tools, an attitude that was summarized well by P8, who felt that the overall process is "definitely going to the positive direction. The update of the classroom technology is going to the right direction and definitely a trend."

To learn about the importance of the active learning technology tools, P4 noted that these tools often provide more opportunities to improve student learning by having additional resources and information available to students. The readily information was helpful "during a class so they can make a use of the lecture" (Participant 4). Others, for example, P1, P2, P3, and P8 added that active learning technology tools make teaching better and efficient. If these tools were available, the participants said that they would effectively use them as much as needed. For example, P1 indicated that it would definitely help to "mix things up" during a class. Although, P1 stated that the new technology implementation process was not always smooth, and "I would prefer technology, but technology is not always available. So, it is okay for me."

Subtheme 1.2. Classroom fit. This subtheme emerged from various views and opinions that were shared among the participants that using and implementing active learning technology tools should not be developed and implemented as one unique strategy. Instead, it should be tailored to demands of different disciplines, class sizes, and students. For example, P1 stated that, while using the smart whiteboards, "if I were given the chance but not for every single class. When I need to explain some of the concepts visually and doing things together in groups." The active technology tools have a potential to change the teaching methods. It was evident that some faculty members had the ability to move from the traditional methods of delivering lecturers to encourage students in active classroom participation. P2 also carefully explained reasons behind choosing one tool over another:

> For my class A, I toyed with an idea of which program to use to create the PowerPoint slides, and especially if I wanted to write on them. So, I went with the One Note for one class and used a Surface notebook for another. The reason for that is I needed to customize my lecture to see which one was a better fit.

Explaining difficult learning materials and letting the students to work individually were one of the common teaching goals of the participants. P7 thought that new active learning technology tools might be appropriate for some disciplines more than for others:

> I'd highly recommend especially for science type classes. If it were a discussion-based class like history or social science, then I wouldn't recommend it. They wouldn't benefit from it. For science classes with a lot of formulas and math type

> classes, I'd highly recommend using some type of classroom technology to make it faster and easier.

Class size was another important factor that was frequently came up during the discussions. For example, P3 described that a class size will be one consideration when choosing the right technology:

> I teach three different classes. It depends, I have about 70 students in one of my classes and it would depend on what I use since I teach in a large auditorium. For the functionality, if it's something that I'd need to ask students to upload or something like that, then there are some other technology are available that the IT department can probably help me with that. If I need to put something to put on a screen, which is a lot larger, and it would need to project it. I also teach smaller classes with 48 students, still not too small, and another class with 6 or 7 students. So, smartboards could come in handy if I had smaller size classes, I think. I do things similar to what I know so far that the smartboard is capable of doing.

The instructional approaches must be flexible enough to adjust the course of the lecture in order to engage students' minds (Gilakjani, 2013). To that effect, P2 added:

> Of the two that I described, it would depend on the class. If I had a class where I had to use picture type content, graphics, were such that you needed to spend a lot of time to look at the dimensions and directions, in that case, I'd probably go with writing on the PowerPoint slides. You know, so it would depend on the type of the class. <…> I could have used a smart whiteboard, if that was an option, to do all these things in one place. If that's what it does.

Subtheme 1.3. Instructor fit. The relationship between faculty members' teaching approaches and the use of the active learning technology tools, such as Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers, is one of the factors that stood out from the interview analysis. Faculty members' teaching styles and their teaching practices often influenced decisions about using classroom technology tools (Gilakhani, 2013). For example, P3 explained the ways of choosing a classroom technology tool, if it were available, for each class:

> … first of all, I do a lot of research about my audience: what were the pre-requisites, what do they already know by walking to the door? What do I need to teach them to get to their end point? What have they seen before? Do they need more background? So, first and foremost, I need to understand my audience. And, what is the outcome at the end? What do I want them to do at the end? Once I decide that, I work backwards. Then, I'd think about how I'm going to do that, how I'm going to motivate them to learn and to be excited about it. And, so, a lot of thought process of coming up with ideas. Once I worked the material, then I think about the presentation. Will I be using power point slides, team activities, or experimental labs? What are the tools that I'm going to use to reach those outcomes? It varies from class to class; I do many different things to meet the students' learning expectations.

Participant 3 further elaborated on how one's teaching style may affect the classroom technology choice:

> Say, I can lecture for 75 minutes and students can sit and stare at me. There are not getting engaged about the material, about any of the lecture. To get two 75 minute classes in one week.
>
> …I have no problem of using it [active learning technology tool]. There are lot of people that will get hang up on redoing it over and over to make it perfect. They need to have everything perfect. Students aren't worried about those things. The goal should be to get it and have it out there. Not worrying about little details. It will be too much of a barrier if trying to make it perfect.

It was apparent from my conversations with the faculty members that the use of the active learning technology tools in the classrooms were associated to their teaching experiences. According to P8, who stated that younger professors already come more skilled and proficient in using computer technology tools than, for example, the "seasoned" professors. Participant 8 explained that the 'seasoned' professors are not focused on changing their pedagogical approaches for two reasons. The first reason is that choosing one tool over another was related to the comfort level and the one's experience:

> The smartboard was there for some time. Clicker is something that I first time heard about it. One thing about technology. Chalkboards were there forever, for centuries. The smartboards change every single year. It is actually stressful to keep pace with it. The kind of tablets I use, no one use it anymore. So, if I bring it to the classroom, there has to be significant changes. Some of my best teachers told me that the best way to teach a class is to use a blackboard.

The second reason was that it might be "natural" for younger faculty members to resolve the technical difficulties because they were more experienced and familiar with the computerized programs to find immediate solutions especially during lectures. For example, P5 explained:

> If something happened to one of the classroom technology tools, then the lecture time is lost. Technology takes preparation and takes time. I would love to try, but I would probably think twice before using. Just to make sure how to use it. For some people it is natural, some people are not natural in this.

On the contrary, P6 thought that a lot depends on the instructor's personality and not necessarily on one's teaching experience:

> I just think everybody should know what works best for them. I think that is a strong feeling I have in general that it depends on person's personality, I think some people could do a really good job with the clickers or some might feel it is a gimmick. <...> It depends on the instructor. You can really have a great class with a chalkboard and a horrible class with the smartboards; it all depends on the instructor or the content.

Theme 2. Perceived Benefits

Theme 2 addressed the following research question: "How do faculty members describe the main benefits of enhancing the classroom experience with instructional technology by using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in their classrooms? The second theme includes the perceived benefits of to what

extend using the smart whiteboards and clickers will help with the implementation of active learning technology tools in the classrooms.

Subtheme 2.1. Student-related benefits. This subtheme describes the participants' views on how the active learning technology tools could benefit the students in the classroom. For instance, anonymity was one of the factors that arose from the discussions on being able to submit responses anonymously helped some students to participate in the class discussions. Most participants believed that, in contrast to the traditional classroom discussions, an opportunity to submit answers to the questions without a risk to be embarrassed in front of their peers promoted students' engagement. In particular, P2 described the dynamics of teacher-student interaction:

> I used to display students work. Then I'd say, 'okay let's talk about this' – anonymously. Unless you know their handwriting, you'd not know who the student was. Let's talk about this. If you agree or don't agree, then we could talk about what they did wrong. Without embarrassing the students.

The use of clickers would have given the students to submit their responses anonymously, which ultimately would have helped some students to be involved in the discussions. For the classroom activities, the clickers would allow students to work independently and maybe even encourage students to participate in the discussions. Similarly, P6 shared that she would use the clickers to answer multiple-choice questions. She talked about how including multiple-choice questions in the presentation of the class material helped to get "students a little bit into it":

> I might do it by making multiple-choice questions along the way. And, have students to answer that way. […] You know once they know the right answer, they might get excited about it, suddenly it's like they're invested in this and put themselves out there in anonymous ways.

Asking students to raise their hands can diminish learning by limiting the time to which a student engages (Levy, Yardley, & Zeckhauser, 2017), particularly in larger size classes. Clickers can enable the faculty members to effectively manage, at the same time, assess the level of the students' understanding of the material. For instance, as P7 reflected, traditionally only a few selected students would participate in class discussions. Majority would adopt a "sit and listen" approach. An introduction of the clickers can completely change the traditional ways, since all students have an opportunity to quickly submit an answer to a question in an anonymous way. In addition, it would have helped the instructor to discuss in detail wrong answers and to correct misunderstandings. P7 described how he might have used them in a class:

> If I ask students to answer questions, if 10 students raise hands and I have 30 students in the class, I can't call every one of them to tell the answer. So, if I'm using the student response tool, every student answers the question. 10 seconds later, everyone answered. If 2 students got the answers wrong, then I'd say let's talk about those 2 wrong answers. Students do not need to know who got the wrong answers. Students would know who got them. They wouldn't have raised their hands to tell me. They don't have to feel their peers are looking at them.

Furthermore, a few participants felt that utilizing active learning technology tools effectively helps to motivate and engage students. For example, P1 recognized that the use of the active learning technology tools would have helped to engage the students:

> If I were to choose between what's available to me, it will be a smartboard. It is like a computer. With the clickers, it's more interactive for the questions to use who got the right. The smartboard, you can show things, it's visible and different. <...> With today's students, they will look at the smartboards. Interact with something before they will look at the handouts.

P8 felt that the smart whiteboards might work for some students better than for others: "I think it gives broader knowledge and helps the visual learners and auditory learners. I think it helps a lot of different learning styles, and interactive."

P2 also thought that a traditional way of teaching might be somewhat boring to students, because "that it's basically me speaking the entire time. And, you just have to passively listen and take notes." In contrast, using various active learning tools would have allowed the instruction to become more engaging, however, not all instructors would feel comfortable with it: "Not everyone [faculty members] might think or use it that way, even if it was set up that way, there are ways for others to turn it around and use it as an active class" (Participant 2). The main advantage of using smart whiteboards for P4 was "because it makes the material more interesting to pull everything together."

Some of the participants, who expressed a positive attitude and perception, also added it would be fun and engaging for students mainly because it is "the connectivity that you get. To get feedback. To click on something. To check in with them [students]

throughout the class. To keep them engaged" (Participant 4). For example, P6 also added, "Yes, I think, even if something is more complicated or with the multiple choice questions, it would help for keeping up. I feel it would be fun and engaging for students." Similarly, P3 also thought that "the primary benefit […] is that the students must be motivated to use the clickers," and that the main point "of the clicker is to motivate and engage them."

P7 commented on how these active learning technology tools might promote creativity among students and how these tools might help to hold their attention. The participants appreciated how active learning technology tools had interactive components to hold students' attention. Faculty members' views and perceptions on the benefits and usefulness of the smart whiteboards were significant, as P6 clearly stated the way he will use it: "I will use it as interactive; I used to go to different websites for ideas. For many types of learning activities or some creative ideas I would do that to do different activities on the smartboard." He thought that it would help "to keep the students involved and not get bored." He also contrasted the traditional way of teaching with the new technology-based one: "when I was younger, all we had was traditional blackboard. [Smartboards] just seem to have them [students] more interested, some of activities you put on the smartboard, they [students] immediately pay attention. They are more involved and more interested."

Subtheme 2.2. Instruction-related benefits. The participants' views on how the active learning technology tools would benefit them for instruction were also strong indicators of their planning, decisions, and classroom practices. One of the first important

elements of these indicators, P2, P6, and P7 talked about its potential content improvement and efficiency. For example, P2 stated that:

> I have done a lot of writing on power point slides. So, in that case, in some engineering classes you spend a lot of time drawing some of the problems. So instead, if you can click and get it out of the textbook if have the drawing right there. That is where I believe I could use the smart whiteboards. If you don't spend 10 minutes trying to draw something manually and trying to get this particular section or crossing right.

Time saved by the use of the smart whiteboard can be used to connect with students and to explain the lecture in more depth. It also appeared that the smart whiteboards could help with creating instructional materials and saving them for the next day review of the material:

> The only thing that I can think of is the convenience. If we just had as many smartboards as teams in a given section, they would write as many things as they want. Save it and bring it up the next day (Participant, 6).

The participants recognized that efficiency was an indicator how they viewed the benefits of the active learning technology tools, P1, for example, stated: "I like clickers because they are efficient. I can use [clickers] a lot because I know they can be simple and easy. […] I like the idea that I get immediate response and immediate feedback. It's like interactive video game, pretty interactive." He further illustrated how efficiency and simplicity of clickers could help in his teaching:

> So, with the clickers, once they [students] hit submit, I have the answers and know what they got. So, it's good for me, for my item analysis. If I know they [students] are getting the questions wrong, then I will look at the questions. I look at it right away, is it a question or is it me? I will look at the way the question is written, etc. It's good in both ways.

The participants' responses were clear about the potential benefits of using smartboards to increase students' learning experiences. Another advantage was in improving the flow of the lectures. For example, P7 said:

> … it [smart whiteboard] would have allowed me to have a better flow. When you have a class of 30 students, it helps listening and capturing their attention. Any interruption to that, you have to stop, walk to your desk, close/open that. With a smartboard, it helps to eliminate all of that. <...> If I had to choose, it would probably be the smartboards. The ability to stand in front of the classroom and not tied to my desk and a laptop.

P7 further described how the smartboards could have supplemented and supported his instruction:

> Even if I was using the specialized software that came with it [smart whiteboard], I'd have used it to make a use of the smartboard to make slides and to switch to different file instead of going to my desk which interrupts the flow, sometimes when working on interactive things, it interrupts the flow. Sometimes when you're middle of teaching, you want to close one thing and open up another screen, not a huge slow down, but it does interrupt the flow a bit. Stand here and

> use a mouse pad, and open things. I want to be able to write on it, save that. And if students came up and said something, interesting way of solving a problem, for example, so you'd click on it and pull it up right there and then.

Throughout the interviews, I also learned that the participants appreciated the fact that the availability of new active learning technology tools might have presented them with chances to improve and discover of different ways of teaching. P1 said that by using active learning tools they can also enhance the course materials. P1 stated that there were a variety of things that you could do with them: "…you can use it [smart whiteboard] with the apps. It is very interactive; teaching, editing, and this is what I want to do, and even show [click] with my finger. Saved it and screen shot it. And it is awesome."

Many participants felt that they have an obligation to develop and improve students' critical and problem solving skills. As such, P4 commented on how new technologies helped to illustrate the teaching points:

> I used to have an iPad that I was able to write on it. You can, be able to color for illustrations. It connects to various other things. I think it [smart whiteboard] enhances the use of technology to be able to write. That you want to be able to use for different teaching materials. The smart whiteboard gives you illustrations for pointing out things, with a pointer. You can also do videos and various animations for illustrations. Can do various things on there.

Engaging students in developing their critical and problem solving skills involves creating various teaching techniques in order to be flexible to the different learning styles of the students (Reid & Weber, 2008). The smartboard technology come already

equipped with interactive displays, making it ‘easy’ to use and incorporate to tailor to a class, that are designed to make learning engaging and interactive, as P6, for instance, stated:

> I guess if I were pulling up examples from the Internet, especially if I’m going to demonstrate something. It is as if it would illustrate a curve for you. You could move a diagram that will show you how much you have in between, for example.

He further explained the benefits by stating that:

> I would have used it [smart whiteboard] literally every day. Then eventually I would have used it to display to teach the TDI calculator software, if I had the calculator to click on it and would have displayed it on the board. Instead of going back to my desk and pressing buttons, would be nice to stand in the back and be able to explain the material, illustratively, by pressing buttons instead of going back and forth to my desk.

Theme 3. Perceived Barriers

Theme 3 addressed the following research question: “What are faculty members’ perceptions about potential barriers to implementing these active learning technology tools?” The third theme describes potential barriers to implementing active learning technology tools. Understanding faculty members’ perceptions of the potential barriers in using the tools can be an initial step in developing plans for assisting them to change their teaching methods (Michael, 2010). While the participants pointed out the potential benefits of the active learning tools, they were also concerned about: a) unforeseeable technical issues (subtheme 3.1); b) the possible distractions that active learning

technology tools could bring to the students (subtheme 3.2); and c) faculty members' potential resistance to change (subtheme 3.3).

Subtheme 3.1. Unforeseeable technical issues. Faculty members stated that new technologies often come with new technical issues that they also have to learn how to resolve them. They also believed that it is difficult to maintain a quality control of the class, as they cannot predict when the technical issues might arise. For example, P1 said:

> …first of all, you need to make sure that batteries are working. You have to test and make sure all is working. <...> sometimes you have to reset it as with any other technologies. You have those types of difficulties with it.

P2 made similar comments, such as, "if I'm writing, with a pen that works with the Surface, well, if the battery died on that pen, or even better, what if you lost that pen, what would I do? Then I have to go to the chalkboard."

Another layer of issues reflects the faculty members' views of active learning technology tools and it takes to use them. The majority of the participants voiced a concern that when technology stops working for any unforeseeable reasons, they had to have a backup plan (Participants 1, 3, 4, and 8). Faculty members perceived that they did not have sufficient technical skills to immediately resolve the technicalities and move on with the class. A few of them also felt that they would be doing things almost twice to deal with the technical issues. The most important concern was that because it takes too much time for preparation, that is if something breaks, they would need to spend time and effort to have a backup plan to teach in a traditional mode.

P4 agreed with that technical difficulties could be problematic, but also noted that many instructors overuse the technology tools. He stated that they [faculty] simply put too much emphasis on it, by adding too many videos, pictures, animations, and graphics, just for the sake of having something extra. On the contrary, P3 stated that he could deal with any of the technical issues: *"*I would find a way to work around and find a way to use it. The IT people help you to make it work, somehow. And, they're responsive to me. So, I don't have any major issues."

Subtheme 3.2. Student-related issues. Participants' views and perceptions about the potential barriers of active learning technology tools included that classroom technology, in general, can be a distraction tool. The most common concern was that students get distracted easily and faculty need to keep their attention. P5 noted that some students try taking notes with iPads. While he did not notice any issue with that, the participant felt that the notepads could be a distraction to the students because they [students] could be checking their emails or checking their social media accounts. "If you lose them at one point, you might lose them for the entire lecture."

P6 stated that a technology choice has to be thoughtful and mindful: "I feel like we shouldn't be just using for the sake of using it [active learning technology tools]. Feel like it should be used because it actually is needed and not just to be fancy."

P1 commented that not very many students in his class sometimes respond to new technology in the classroom. Students do not usually know what to do and what to expect with classroom technology tools, and "they do not usually like it when they do it – at

least initially" (Michael, 2010, p. 3). While this might be true in some classrooms, P2 was not sure if the tools are bringing a positive learning impact on students:

> … students, they're living in a video game world now, and everything is on the computer, they relate more to videos and pictures on the screen. A computer just feels normal to them. So, I don't know if using all these technology tools is making any difference to them and don't know if there is a good impact on student learning. I hope they are.

Subtheme 3.3. Instructor-related issues. The participants voiced a concern that they have to learn to overcome the technical difficulties during course material preparation and teaching. While overcoming technical difficulties is definitely a contributing factor, the most of the participants were not always encouraged to use any new active learning technology tools available to them. Seven out of eight participants stated that using active learning technology tools requires too much time and preparation. In particular, P3 said that using new technologies significantly increased the preparation time:

> For me it would be taking more time, possibly, to adjust the way I'm doing things at this moment. And, say, will this actually change the outcome? If I don't feel that I will have significant change to the outcome, and due to amount of work, unless it's going to change outcome, why change?

Additionally, P8 said, "would I need to spend 100 hours to try changing the way I'm doing thing? If you're still doing well how you're doing it, then leave it the same way."

However, P8 recognized that active learning tools "can be a little intimidating at first. Even if it [active learning technology tool] comes doing it with a laptop, start using it that way, get comfortable with it." P7 stated that the active learning technology environment can be in any physical environment and we [faculty members] need to be creative and flexible to be successful. And finally, the other interesting comment about perceived barrier was what P7 said:

> "...if the smartboard has a disadvantage, it does tie you to the board. So, if there is a disadvantage, it's a minor."

Conclusion

The goal of the exploratory case study was to explore faculty members' views and perceptions regarding implementing active learning technology tools in the classrooms. It is a teaching technique and style of the faculty members in the use of the active learning technology tools that determined the nature of their perception of success, rather than the tools themselves. My own conclusion is that the faculty members will adapt to the active learning technology tools, whether it is their preferred style of teaching, favorite piece of technology, or to fit in with the external pressures within their professional careers. The point is that not all faculty members will use all of the active learning tools available to them all the time.

Overall, the participants agreed that the application of the active learning technology tools in the classroom setting was beneficial to both students and the faculty members. However, they also pointed out that the implementation of these technologies should not be uniformly applied to the classrooms. They urged to consider unique

demands of different disciplines, classrooms, and teachers. They believed that the smart whiteboards and clickers would have helped them to enrich the instructional process and make it more efficient. However, they also were clear that these benefits come with additional costs, such as extra preparation time, potential distraction to the students, and a necessity to deal with ongoing technical issues.

Finally, this study can be used as a "blue print" by the senior administration to provide a classroom experience that is consistent with 21st century skills for students and to support faculty members to use active learning technology tools in the classrooms. In the next section, Section 3, I will outline the project in more detail. In Section 4, I will describe the researcher's personal experience as a scholar and a practitioner as well as the project's strengths and limitations.

Section 3: The Project

Introduction

The goal of this project was to uncover the faculty members' views and perspectives about implementing active learning technology tools in the classrooms at the local university. The results of this project study will provide the local university's senior administration with the information that will help them understand the intricacies of updating classrooms with active learning technology tools, as perceived by the faculty members of the engineering college. The resulting project study is a position paper intended to deliver the results of the case study. The position paper includes recommendations to the senior leadership to increase an understanding from the faculty members' perspectives to better align the implementation of these tools.

I designed this project with one goal in mind: to share the research study's results with the senior leadership and with the faculty members at the local university. Sharing the results of the study requires defining an audience. Once the intended audience for the final report has been identified, it is important to include the written and visual materials by displaying enough information for a reader to reach his or her own conclusions (Creswell, 2012; Hancock & Algozzine, 2011; Merriam, 2009; Stake, 1995; Yin, 2009). I plan to present the project study and the detailed research results at two different venues. The first one will be a one-on-one presentation with the senior dean at the engineering college. The second presentation will be during one of the scheduled faculty meeting sessions.

The position paper, presented in Appendix A, not only summarizes the results of the research study but also provides the recommendations that could support and guide senior leadership through all aspects of the successful integration of the active learning technology tools. In this section, I also discussed the rationale of choosing this particular project genre by incorporating the literature review to demonstrate how it was appropriate to the research problem. Then, I provided the recommended strategies for implementation and evaluation of the project.

Project Description and Goals

The local university's senior administrators and the president have started a strategic planning initiative of updating classrooms and laboratories with the 21st century technology. The senior administration was targeting two major active technology tools: Cisco Spark and the Microsoft Surface Hub smart whiteboards, as well as clickers to start the upgrade of the classrooms. Integration and design of the active learning technology tools in the classrooms would change the nature of the instructional process and would have significant ramifications because of potential resistance from the faculty members if their input were not considered in this technology design and integration in the classrooms.

Recognizing this opportunity to explore the underlying factors of stagnation of classroom technology innovation at the local university, I conducted this exploratory case study to address the need to learn the faculty members' perspectives regarding the use of the active learning technology tools. The results of this study not only provided the needed information but also provided recommendations that could potentially serve as a

guide for the senior administration and the president to increase their understanding from the faculty members' perspectives to better align and facilitate the implementation of these tools.

The proposed project addresses the need that was cited in the local university's strategic plans for 2006–2016 and 2017–2027. Efforts to focus on the needs of updating classrooms and laboratories with the 21st century technology will help the senior administration successfully implement the active learning technology tools and achieve their strategic goals. The insights offered by the faculty members engaged in the study will provide the initial steps for the collaborative process leading toward updating the classrooms with the 21st century technology. Based on the participants' insights, I have developed four recommendations to help the local university's administration to achieve its strategic objectives:

1) The classroom space design should meet the needs of the faculty members' expectations;
2) The classroom active learning technology tools should fit the faculty members' preferred style of teaching;
3) Capture the best teaching practices with the active learning technology tools to influence and engage more faculty;
4) Identify technical issues experienced by the formal and informal use of classroom technology tools by the faculty members.

Table 3 shows how these recommendations connect to the research questions as well as to the themes and subthemes that resulted from the research study.

Table 3
Proposed Recommendations

Recommendations	Research Questions Addressed	Associated Themes/Subthemes
1. The classroom space design should meet the needs of the faculty members' expectations	RQ1	Theme 1; Subthemes 1.1; 1.2; 1.3 Theme 2; Subtheme 2.1
2. The classroom active learning technology tools should fit the faculty members' preferred style of teaching	RQ1; RQ2	Theme 2; Subtheme 2.1; 2.2.
3. Capture the best teaching practices with active learning technology tools to influence and engage more faculty	RQ1; RQ2	Theme 2; Subtheme 2.2
4. Identify technical issues that are experienced by the formal and informal use of classroom technology tools by the faculty members	RQ3	Theme 3; Subtheme 3.1

Rationale

I chose a position paper as the project genre for this exploratory case study because the results of this study combined with the goal of this study are a good fit for this type of project. The goal of the research study was to uncover the faculty members' views and perspectives about implementing active learning technology tools such as Cisco Spark, Microsoft Surface Hub and clickers in the classrooms. The goal of the position paper is to "elucidate the knowledge gap" by providing "evidence-based review of options" leading to recommendations (Bala et al., 2018, p. 1). I designed this project to convey the results of this study and provide with the recommendations that could support

and guide the senior leadership to think through all aspects of the successful integration of the active learning technology tools.

While there were other ways to document the findings from this study, I chose the position paper format for two main reasons. First, position papers are often used to discuss issues where there is a clear division of opinions that can also be argued with facts and inductive reasoning (Xavier University Library, 2014). Because the goal of this study was to uncover the faculty members' perspectives about implementing the active learning technology tools in the classrooms, this project provides the senior administration with the faculty members' opinions about these tools. Their perspectives about these tools will ultimately inform the senior leadership based on facts and evidence, not just tell the reasons why the classrooms needed to be updated and what classroom equipment needed to be installed.

Second, this genre was more appropriate for this type of research project than an evaluation report, a professional development, or a curriculum plan. Although the evaluation report could have helped to share key findings and recommendations, the report would have been practical and useful for evaluating existing programs (Spaulding, 2013). At the time of the study, there was no existing program to implement the active learning technology tools in classrooms. The curriculum design was not applicable to this study because the purpose of the study was to explore the faculty members' perspectives regarding implementing active learning technology tools in the classrooms. Similarly, the results of the study did not provide enough evidence-based support for the development of a strong and coherent professional development program; therefore, developing

professional training materials would not be practical. To conclude, the position paper genre was the best way to present the findings of this project study as well as the recommendations derived from them.

Review of the Literature

I conducted the literature review process to achieve two goals: to review the appropriateness of the genre to the local problem and to perform a thorough analysis of how the research supported the project. I used multiple databases to achieve saturation in the literature. Particularly, I reviewed Walden University library's databases, such as Academic Search Complete, ERIC, Ebscohost, and Education Research Complete. I also searched for peer-reviewed journal articles published in the last five years that focused on identifying the faculty members' perceptions about active learning technology tools. Keywords that I used were *faculty perceptions, active learning technology and classroom, active learning design, active learning technology and benefits, active learning technology and barriers, technical barriers and classroom technology, strategic implementation, strategic collaboration, students and classroom technology, position papers in qualitative research, position paper and case study,* and *white paper in qualitative research.*

Position Paper Goals and Guidelines

The term *white paper* is often used to refer to position papers (AIC Position Paper Guidelines, 2013). As explained by the Purdue Online Writing Lab (2015), a white paper is an official report with the purpose of advocating a certain position, providing an argument for a specific position, or recommending a solution to the given issue.

Similarly, the purpose of the position paper is to take part "in the larger debate on the issue by stating and supporting your opinion or recommended course of action" (Isenberg School of Management, n.d.). Both formats, however, offer an authoritative and informative layout to guide the readers about a complex issue (Purdue Online Writing Lab, 2015.). In this respect, I used both terminologies interchangeably in the review of the scholarly literature to create the efficacy of using the position paper for this project study.

My goal for the position paper for this project study is to educate, inform, and convince the senior leadership about the implementation of the active learning technology tools from the faculty members' perspectives. A part of my role will be to represent and clearly articulate the case study as telling a story, with a background of the problem as a starting point and ending with the study's findings and its recommendations. The use of visual diagrams and tables will help to supplement the presentation and discussion. Talking about the strength and challenges of the project study will also be helpful in describing the case study as a story (Owyang, 2008).

Merriam and Tisdell (2016) suggested that even before starting writing about the findings of the study, all the pertinent data and materials should be organized in some manner. One strategy was to have a clear outline. Following the AIC Position Paper Guidelines (2013), the typical outline of the position paper is as follows:

1. Introduction including the problem statement
2. Research Questions
3. Theoretical Framework

4. Methodology
5. Data Analysis
6. Results
7. Recommendations
8. Conclusions
9. References

Once the audience and the purpose of the position paper have been established, it is important to present the results of the research simply and clearly (Creswell 2012). Graham (2013) noted that white papers are the most powerful and convincing reports that can support your argument with facts to ensure the validity of the issues. The audience for the position paper will be the senior administration and the faculty members of the engineering college. To support the findings of this study, I will highlight key findings and will include a graph or table to provide an overview of the results. I will also include abstracts of key participants' direct quotes to support the findings.

Creswell (2012) noted that it is important to obtain clearances from the key stakeholders to deliver the results of a study. Thus, it was important for me to obtain permission from the senior leadership at the local university to present and disseminate the study to the faculty members in the engineering college after my project has been approved from Walden University. My goal for the position paper was to present the intended information in appealing and convincing ways to influence decision-making within the local university.

Presenting Research Findings through the Position Paper

The scholarly literature review showed that people in the medical field often use position papers to address and make recommendations on health topics. The position papers on variety of medical topics were published to provide important and key recommendations; however, it was noticeable that the position paper for qualitative or quantitative research was almost nonexistent. Regardless of the field, it was clear that the typical format of these position papers was structured to offer a persuasive and an arguable claim that provided a substantial evidence to support that claim (Brock University, n.d.).

According to Bala et al. (2018), a position paper should demonstrate a unified voice leading to solutions or recommendations. The researchers stated that the uniform process is essential to drafting and presenting the position papers for credibility and for preventing any misconceptions during transition to publication. According to Purdue Online Writing Lab (n.d.), the position paper should use logical reasoning and structure in support of the main argument. Therefore, the position paper for the research study that informed the project will follow these guidelines to present the findings in a logical and compelling way.

The qualitative exploratory case study was mainly involved the data collection, data analysis, and interpretation of data. The emerged themes and recommendations derived from this research study will be included in the position paper presented in Appendix A. It is important to “spell out” the recommendation course of action or provide with alternative solutions to the researched problem (How to read, analyze,

discuss, write reports and present case studies, n.d.). The findings of the research study that informed this project provide sufficient materials from the data collection to support the emerged themes and the proposed recommendations. The supporting evidence will be presented in a form of direct quotations from the interviews and excerpts from the literature reviews to illustrate a thorough understanding of the problem that supported the conclusion. Based on the proposed recommendations for this project study, it is also important to note potential barriers or possible negative outcomes. The position paper should therefore offer alternative solutions. In the position paper for this project study, I, as the result, also provide with a description of the limitations of the study and my proposed recommendations for future research.

Classroom Space Design to Meet the Needs of the Faculty Members

Classroom space design matters greatly for teaching and learning especially when converting the traditional space to the active learning classroom because it increases the positive effects of teaching and learning (Baepler, Walker, & Driessen, 2014). In the recent study, Rands and Gansemer-Topf (2017) demonstrated how a newly redesigned classroom space should be utilized by the instructors and students. Their findings offered a variety of ways of how classroom designs could be redesigned to be flexible and open in order to foster a student centered learning approach. Specifically, Rands and Gansemer-Torf (2017) suggested that classroom active learning design could actually create a "community of learners" mainly because the open space allows students to move freely and promotes open interaction (p. 29).

To understand the unique needs of the faculty teaching practices in the redesign of the learning spaces, Ramsay, Guo, and Pursel (2017) stated that active learning spaces could provide enriched teaching experiences in terms of flexibility. Their findings suggested that flexibility is essential for allowing the faculty to create the best teaching goals that they seek to achieve. The newly designed classrooms make students feel valued, as there is no separation between the instructor and the student (Ramsay, Guo, & Pursel, 2017), whereas in a traditional classroom format there is a "solid line" between the teacher and the students (Rands & Gansemer-Topf, 2017).

In the study conducted by Park and Choi (2014), they showed that there was tendency for sharing and exchanging information freely among students when they had a better classroom arrangement. The better classroom arrangement configurations were tested in a variety of ways in the study conducted by Park and Choi (2014) and the findings suggested that teaching and learning methods should always be customized to fit the newly designed classroom environment. As suggested by the participants' insights in this research study that informed this project, the redesign of the classroom environment at the local university with the active learning technology tools should be tailored to fit the faculty members' preferred style of teaching.

Active Learning Technology Tools and Preferred Style of Teaching

The universities have been promoting a "pedagogical shift" towards the use of the active learning tools in the classrooms to promote engaging student learning experiences (Holmes et al., 2015, p.1). The researchers reported that many instructors have started using technologies in their courses to increase focus on active learning technology tools.

The use of active learning technology tools in the classrooms supported a “natural fit” to teaching and these teaching practices were proven to improve and recognize the unique demands of the student learning needs (Holmes et al., 2015).

The Department of Education (2017) report described that teachers can tailor their course materials to fit the needs of the students when using the active learning technology tools in more creative and supportive ways. To meet the educational requirements of the 21st century learning, a flexible learning classroom environment capable of supporting various active learning technology tools should be designed to allow students to experience learning in more creative and innovative ways (Department of Education, 2017). Moreover, modifying and tailoring instruction with the use of active learning technology tools ensures student success in which students are engaged rather than inertly receiving knowledge (Coorey, 2016). In support of the perspectives given by the faculty members in this research study that informed this project, instructors must continually be adaptable and flexible to revise the lecture content in order to be adaptable to the needs of the students and to guarantee success (Brown, Ernst, Clark, DeLuca, & Kelly, 2017; Voith, Holmes, & Duda-Banwar, 2018).

The participants of the research study that informed this project often stated that they could integrate their own active learning technology tools to make their courses tailored to the students’ needs. Rands and Gansemer-Torf (2017) revealed that the instructors who integrated their own classroom teaching tools could collectively brainstorm with others to add more or to change the teaching approaches to increase engagement and support active learning. To engage and draw other faculty members’

interests to use active learning tools at the local university, the administration should capture the best teaching practices with active learning technology tools to promote the use of these tools.

Best Teaching Practices with Active Learning Technology Tools

The faculty members in the study of Clavel, Crespo, and Mendez (2016) mentioned that the use of active learning technology tools would have an impact on their teaching practices. Different teaching strategies enhance student performances (Clavel, Grespo, & Mendez, 2016; Liu, Chaffe-Stengel, & Stengel, 2013). In addition, for most universities it is challenging to effectively manage the use of the active learning technology tools in the classrooms (Peberdy, 2014). Metzger (2015) stated that it is important to foster, nurture, and promote collaborative teaching practices among instructors. While the collaborative teaching practices had challenges, as reported in the study conducted by Metzger (2015), this type of practice could have provided an important experience for both faculty and students. While the local university, that was the focus of the research study that informed this project, may not readily employ the collaborative teaching strategies, the findings of this study by Metzger (2015) are useful in considering alternative strategies for capturing best teaching practices through the use of collaborative teaching experiences.

Active learning technology tools, such as smart whiteboards and clickers, are interactive tools that can be applied in different ways (Hung, 2014; Peberdy, 2014). For example, showing an interesting scenario with multiple outcomes or approaching the problem with many different solutions may ‘wow’ the students (Herro, 2016). Several

researchers stated that using different teaching techniques with active learning tools were found to enhance student performance and increased student attention (Clavel, Grespo, & Mendez, 2016; Liu et al., 2013). Moreover, one of the best ways to capture the best teaching practices, Stephens, Battle, Gormally, and Brickman (2017) suggested using feedback approach to motivate faculty to improve teaching practices.

Technical Issues with the Use of Active Learning Technology Tools

Despite the benefits of the active learning technology tools, the participants of the research study that informed this project talked about the unforeseeable technical challenges. They stated that new technologies often come with newer technical issues. In fact, they needed to learn how to solve these issues in addition to their daily teaching responsibilities. Often, for example, they anticipated that the amount of time spent fixing the technical issue was time away from the students. Preparedness and confidence in using technology tools require special skills and know-how that can affect the faculty to integrate the tools into their teaching (Lederman, 2016). It was also found that technical issues could also sometimes interfere with the flow of the class (Deveci, Dalton, Hassan, Amer, & Cubero, 2018).

Several studies investigated the barriers of implementing the active learning tools in the classrooms (Akshit, Niemi, & Nevgi, 2016; Boles & Whelan, 2017; Negassa & Engdasew, 2017; Patrick, Howell, & Wischusen, 2016). One of the proposed recommendations was a professional development to help faculty members to develop technical skills to deal with every day technical dilemmas (Deveci et al., 2018; Gilakjani, 2013; Hur et al., 2016). Moreover, professional training with the technology and

classroom set up were required to ensure that there were smooth and reliable processes established in the classrooms (Deveci et al., 2018). In order to rectify technical concerns, Najafi, Rolheirser, Harrison, and Haklev (2015) stated that providing technical and instructional on-demand coaching could help prepare and provide necessary technical support for the faculty. It is essential to recognize that the faculty members of the research study that informed this project may indeed encounter many technical obstacles, neither one obstacle nor a sum of obstacles make the use of active learning tools impossible (Michael, 2010).

Potential Resources and Existing Supports

The senior dean, the departmental chairs, and the faculty members at the engineering college are aware of my research study conducted as a doctoral student at Walden University. Throughout my research study, I have received positive encouragement and support from the departmental chairs, from the faculty members, and from the research community. Moreover, one of the associate deans has indicated that there were plans of building new classrooms for the engineering college that were scheduled to be open in late 2020. Hence, one of the potential resources for the project study's findings may be for those individuals who are interested to incorporate the faculty members' insights when implementing the active learning technology tools in the newly designed classrooms in the engineering college.

Potential Barriers

I do not anticipate any potential barriers in presenting my research at the local university. However, faculty members often face challenges that may or may not directly

influence the use of technology in classrooms (Hur et al., 2016). Instructors recognized that the learning outcomes are difficult to predict with the use of active learning tools (Michael, 2010). Class size could serve as a potential barrier for the use of the active learning tools by the faculty members in the engineering college. In addition, they have had expectations about teaching based on their prior teaching experiences. However, despite these barriers, the faculty members of the engineering college expressed a positive attitude toward the active learning technology tools. For this reason, I feel that these potential barriers may dissipate when the faculty members will start using these active learning tools.

Implementation and Timetable

The senior dean of the engineering college has asked me to share the summary of findings in a short and concise report. Throughout the interviews, some participants expressed that they would be interested in reading about the results when I am finished with the study. Therefore, I will present my findings when I meet with the senior dean and then, with his subsequent approval to present the findings to the faculty members in one of the faculty meeting sessions. Faculty meetings are usually held twice in one academic year i.e. one meeting will be scheduled in the fall semester and another one in the spring semester. Upon approval of this project study from both Walden University and the senior dean, I will arrange to present with the next planned faculty meeting session. The duration of the presentation will be an hour with additional time for questions and feedback.

Roles and Responsibilities

My primary responsibility will be the presentation of the position paper as shown in Appendix A. I will contact the senior dean of the engineering college at the local university to schedule a meeting during which I will let him know that I have completed my study as a doctoral student at Walden University. During my face-to-face meeting with the senior dean, I will share the position paper and provide him with an overview of the research findings and the recommendations in the proposed position paper. I will solicit for any feedback and will address any follow-up questions. After the completion of my one-on-one presentation, I will ask him for the best ways to share the report with the faculty members, during which I will confirm the time and venue for the upcoming faculty member in the engineering college.

Project Evaluation

The purpose of the exploratory case study that informed this project was to explore the faculty members' perspectives about implementing active learning technology tools in the engineering college in the local university. As noted by Albright, Howard-Pitney, Roberts, and Zicarelli (1998), the traditional project evaluation follows a rational, predictable, and measurable path. Since the strengths of this study are not based on that assumption and instead are based on the participants' insights, I believe this project represents an important opportunity for evaluation and assessment to guide the senior leaderships' decisions in their strategic initiatives.

The strategic objectives stated in both strategic plans for 2006–2016 and 2017–2027 clearly stated that the local university cannot conduct and deliver the 21st century

science in outmoded classrooms and laboratories and the classrooms must be equipped with the updated classroom technology tools. I plan to use the formative assessment with the faculty members after my presentation. I will use a Qualtrics® software to develop and administer a survey in order to receive feedback from the faculty members. In the survey, I will ask the faculty members not only for their feedback about this project but also to indicate the value of the proposed recommendations. The proposed project evaluation survey is included in Appendix D. After obtaining the survey results from the faculty members, I will provide the survey information to the senior dean and will continue discussions for taking the next steps.

Implications Including Social Change

Local Community

The local university is beginning to adopt the 21st century technology tools, which will allow the students to acquire critical problem solving skills that will lead to future careers. Overall, the participants in this research study viewed that the active learning technology tools may positively affect the implementation in the local university's classrooms. Active learning technology tools offer the faculty members the ability to completely renovate teaching methods in order to be flexible with students' learning needs.

The implementation of the active learning technology tools over the recent years have had a considerable influence on higher education institutions and has a possibility to change some of the existing teaching methods (Holmes et al., 2015; Gilakjani, 2013). As education technologies innovate, the study's insights suggest that the faculty members

will be inclined to experiment by using newer teaching methods and ideas and the local university will keep pushing for groundbreaking innovation in instructional delivery. This research study is an interesting step of social change and technology innovation because technology is changing the world from going beyond the traditional ways of doing things (Grindle, 2015). By successfully integrating active learning technology tools in the classrooms, faculty members may drastically improve the learning needs of the students. This project study will make a positive social change contribution by providing the local university's senior leadership a better understanding on how to successfully implement these tools in the classrooms.

Conclusion

I provided with a detailed overview of the project study and outlined the chosen genre in this section. I also discussed the rationale of choosing the project genre by incorporating the literature review to demonstrate how it was appropriate to the research problem. Four recommended strategies were proposed in support of the research questions for successful implementation of active learning technology tools such as Cisco Spark and Microsoft Surface Hub white smartboards and clickers.

Section 4: Reflections and Conclusions

Introduction

My goal for this case study was to explore faculty members' perspectives regarding implementing active learning technology tools in the classrooms at the local university. This section is a discussion of the project's strengths and limitations in addressing the problem including a discussion of recommendations of alternative approaches. Furthermore, I share my reflections on becoming a scholar along with the study's implications and applications for positive social change. My passion for learning about the classroom technology tools helped me understand the complexities of using these tools in the classrooms and ultimately allowed me to gain new knowledge and supported me in arriving to its possible solutions based on the study's findings.

Project Strength

I focused on exploring the faculty members' perspectives on redesigning classrooms with targeted active learning technology tools. The findings of this study revealed that it is a teaching approach and a style of the faculty members in the use of the active learning technology tools that determined the nature of their perception of success in the classrooms. The introduction of the classroom active learning technology tools to support the 21st century learning will have several strengths.

First, the implementation of the active learning tools will create a better teaching environment. One way or another the faculty members at the local university could ultimately create an interactive learning environment for students by using the latest technological tools, helping students to explore and build new knowledge. According to

the local university's commitment, quality education starts with quality teaching (Local University, 2017). In support of the use of the active learning technology tools that could potentially enhance student learning and provide quality education, the faculty members at the local university were in favor of using these tools if they were available. They could see why these active learning technology tools were important to implement. The favorable views expressed by the faculty members that participated in this study can offer pertinent information to the senior administration as part of the implementation process of the classroom technology tools.

Second, when I asked about the benefits of using active learning technology tools in the classrooms, the faculty members that participated in this research study noted that the tools had great potential to enhance students' motivation and engagement. The study's findings can present the local university's senior leadership with the opportunity for further exploration and experimentation with the use of active learning tools to enrich learning. Paving a path toward innovation and integration of newer technology tools, this study's provide a starting point for future work in advancing the experimentation and implementation of the active learning technology tools.

Third, some faculty members stated that they loved the experience of using any type of classroom technology tools. This encourages other faculty members and sends a positive feeling to other faculty members who might otherwise be reluctant to integrate new teaching tools in their lecturers. In addition, the focus on exchanging best practices and ideas will help promote collaboration as the faculty members continue to experiment with emerging technology tools. This study's findings could therefore also be viewed as a

spoken voice from the community of faculty members who currently use some type of technology tools as promoters within the larger university population.

Finally, this study's results and recommendations will bring a significant awareness about the faculty members' perspectives regarding the active learning technology tools to the local university. Further building a community of the faculty members committed to teaching with the active learning tools, the local university can start expanding on its mission of delivering quality education. However, I realized that bringing awareness of what other faculty members thought about using these technology tools is not enough. The project study's recommendations could certainly be used to build on the ideas to support the successful implementation of these tools.

Limitations and Recommendations for Alternative Approaches

The local university is a place that embraces a culture of continuous innovation. It continuously works to develop new instructional strategies, curricula, and new technologies to improve student learning, particularly in the engineering science. One of the limitations of the study was the sample size, which was limited to eight faculty members of one engineering college, and may, therefore, not be the true representative of the faculty population as a whole. The participants in this study represented only a fraction of faculty community in the local university. Likewise, the study was limited to the engineering college and the local university is composed of 10 academic colleges. Expanding the sample size beyond the exploratory nature of this study to include more faculty members and other colleges could have broadened the information collected and helped to fully explain the phenomenon.

To overcome these limitations, an opportunity exists for a further and expanded research. Perhaps a mixed-methods research approach can be conducted to measure faculty members' perspectives regarding the technology acceptance of the active learning technology tools in the classrooms. In any approach, it could also be beneficial not only to learn from the faculty members but also from the students to examine the impact on student learning. That way, the faculty and students' perspectives could have helped to explain the paradigm shifts about the integration of active learning technology tools, which at the same time, could have potentially resolved the limitation of one data source and significantly broadened the study.

This exploratory case study was undertaken to investigate and explore the faculty members' perspectives in order to report the findings in a concise manner. In this regard, while this study's findings certainly help to start the conversation within the local university, and the conclusions of the study may promote conversations between the faculty members and the senior administration across the entire university leading to innovative strategies and more targeted outcomes.

Scholarship

As a doctoral student, I learned about different research methods, planned and designed my research, and presented my findings in a position paper. More specifically, I learned to identify a research problem and created a proposal that described the problem that I wanted to solve. The process consisted of identifying the purpose of the study, developing my research questions, and proposing the methodology and design. The entire doctoral process made me realize that conducting research was a lengthy process that

involved identifying a research problem and then gathering a magnitude of information for analysis so that it could be drawn a conclusion or to develop a theory.

My lifelong goal was to obtain a doctoral degree in higher education leadership to advance my research skills and expand my knowledge within the field. I can proudly say that the doctoral process has expanded my skillset to examine, critique, and synthesize scholarly articles on a given topic. The literature review process was needed to be thorough to examine what was done in the past and what conclusions exist in the given problem. Throughout the literature review process, I not only learned about other studies that were done about integration of classroom technology tools but also learned about their conclusions, theories, limitations, and future work that needs to be done.

As a student and a learner, the doctoral process taught me what it takes to be a scholar. The definition of a scholar practitioner is a person who apply the scholarly research and knowledge into practice (Walden University, 2018). As budding scholar practitioner, my role is to continue conducting the scholarly research in order keep improving practice, challenge assumptions, and seek practical solutions (Walden University, 2018; Wasserman & Kram, 2009). Becoming a scholar during the doctoral process taught me more knowledge about the scholarly research about the active learning technology tools and its implementation process. By undertaking this study, it has also furthered my thinking that I could continue conducting research about active learning technology tools and could continue analyzing its impact on student learning in higher education after my graduation.

Project Development

The development of the project was a process that consisted of several stages. In the first stage, I conducted synthesis of the literature review, which was an essential part of the project because it provided the project with a background and a context about current use and implementation of the active learning technology tools. At the second stage, I worked through the data and the scholarly articles to support the emerged themes and to develop the proposed recommendations. I then realized that writing, composing, and refining the project's narrative were critical to accurately portray the research and its findings.

After I determined that the project study would be a position paper, it was important to develop a clear outline. At this stage, the ideal structure of the position paper was essential because the report needed to convey the results of the study and to convince the targeted audience. Because the position paper needed to be in a short and concise format, determining what type of information to include within the position paper took time. These stages involved some planning of the project's details, which in turn helped to carefully shape the final position paper.

I plan to distribute the position paper to the senior leadership and the faculty members in the engineering college. The position paper report will provide facts and information that are critical in planning and executing the strategic plan initiatives. The results of the project study will reveal the views and perspectives of the faculty members and recommendations for establishing the next steps for the continued collaborative discussions.

Leadership and Change

Working on this study has expanded my views and knowledge about the use of the active learning technology tools in the classrooms. The literature review about implementation of the active learning technology tools allowed me to learn about these tools and how the faculty members could effectively integrate them in their classrooms. Interviewing the faculty members was valuable in understanding how the active technology tools influence teaching and learning. Over the course of this project, it also became apparent how challenging and lengthy it is to influence change in a large organization. University-wide impact, large or small, can take time.

According to Astin and Astin (2000), the term *leadership* suggests a process that is eventually involves change. When there is change, there is also a movement (Astin & Astin, 2000). The change process of implementation of the active learning technology tools at the local university will involve the president, provost, the senior administration, departmental chairs, staff, and the faculty members. As previously mentioned, the local university's senior administrators and the president have already started a strategic planning initiative for updating classrooms and laboratories with 21st century technology (The Local University, 2017). They recognized that updating classrooms meant that they became increasingly aware and receptive to the students' needs. The concept of the leadership implies "intentionality, in the sense that the implied change is not random" (Astin & Astin, 2000, p.8). The change at the local university may take different forms, but in support of these changes, the plan to upgrade the classrooms is crucial to achieve the academic goals.

In summary, the local university's strategic initiative stated that "we cannot conduct and deliver world-class, 21st century science in outmoded laboratories and classrooms equipped with obsolescent instrumentation and 20th century computational capacity" (Local University, 2017, p. 15). The senior leadership will need to lead the local university's community to achieve its objectives by engaging the followers, including the faculty members. This research study and project may lead to fulfilling this shared vision in pursuit of this common strategic goal.

Personal Growth as a Scholar

My personal growth as a scholar practitioner throughout this doctoral research at Walden University has expanded my knowledge about conducting research and strengthened my scholarly writing skills. Throughout my doctoral study, I learned not only how to protect human subjects and adherence to ethical implications of the research study but also learned how to conduct a critical literature review of the peer-reviewed articles to expand my knowledge about the given topic. The challenge for me was in identifying the correct theoretical framework for the study. Choosing the right framework is important because it is what supports and informs a research study (Creswell, 2012). Miles and Huberman (1994) noted that the conceptual framework is the system of concepts and assumptions that can "explain, either graphically or in a narrative form, the main things to be studied" (p.18). By focusing on the local problem in a different way, I might have shaped this study differently by applying a different theoretical framework. To choose the right framework was a process of narrowing down using a very rigorous literature review process. Reviewing the course literature and relevant research studies

for the last five years helped in narrowing down the theoretical framework and in providing direction for my research study.

The literature review process was very challenging but I later learned that it was the essential part of the research process as it provided with critical evaluation in relation to the research problem. As Creswell (2012) stated, the literature review also creates "a need for the study" (p.14) because it helps in identifying the problem statement, purpose, and key variables and trends. Throughout the literature review process, I not only learned how to synthesize the relevant studies to gain a broader perspective about the chosen topic but also learned how to identify recurring concepts, methodologies, and frameworks.

Although the literature review was challenging, I am surprised to say that I enjoyed this type of work. The literature review for me was like a scavenger hunt in putting puzzles and pieces together for my research problem. Patience and time were of the essence in unveiling a new layer of information in understanding the research problem, in resolving gaps that existed in the literature, and in identifying areas and new ways of interpreting previous studies.

Personal Growth as a Practitioner

After fifteen years of experience working in higher education administration, I chose to continue my studies as a lifelong learner to pursue a doctor of education degree in higher education leadership. One of my personal traits have always been to be inquisitive and interested in various scientific and systemic inquiries that led me to want to learn the research process that was practical within my profession and experience. In

that sense, pursuing the doctorate degree for me was not only to further my education beyond the master's degree but to also be able to conduct research in my field. I can firmly say that I have gained and advanced my skills in conducting educational research and can now focus on the practical research applications going forward.

Personal Growth as a Project Developer

Knowing that the end goal of this study was to develop a project, I focused on the data collection and analysis from the beginning of this study. When I was clear that the position paper would be the best choice, it reaffirmed the results of the study. The objective of the position paper is to be able to advocate that a certain solution the best possible way for the given research study. My goal was to create the position paper that was persuasive and compelling so that it would draw the audience to read about the facts that were useful to understand the research problem.

I wanted to develop the position paper that was illustrative, effective, and substantive to educate my audience and prompt new and innovative ways to expand their knowledge. As Neuwirth (2014) stated that there is no substitution for a well-researched paper that provides with a thorough and detailed points of view on specific issues. Thus, I made sure that the findings of my research study were relevant to my audience and clearly communicated the important points of the study and its proposed recommendations.

Potential Impact of the Project on Social Change

The potential impact of this study will bring a positive social change because it will transform the lecture delivery and classrooms due to the integration of classroom

active learning technology tools, which also implies that this change affects particularly faculty members and students. To the faculty member, the positive social change may be in terms of adapting to newer active learning technology tools and may require being flexible and open-minded to new teaching styles. To the students, the positive social change may occur in a way in which students are exposed to an innovative learning environment in being able to solve problems by themselves (Jia, 2010).

As part of the local university's initiative, gaining knowledge about the faculty members' perceptions in implementing active learning technology tools encourages others in creative use of technology tools. Catalyzing conversations about the best role of classroom technology can enable faculty to simplify lectures, improve course designs, and to enhance the content. Many faculty members involved in this study have not previously considered the use of the active learning technology tools for their courses. Others have clearly expressed their support to enhance student-learning experiences necessary for the 21st century learning outcomes.

The study's findings, hopefully, will serve as a highway with an impact that could emphasize a social change in higher education system overall and build a bridge in implementing active learning technology tools to advance learning.

Implications, Applications, and Directions for Future Research

This study has practical implications because it relates to the use of classroom technology affecting the higher education organizations and it has a chance to transform teaching methods and expand knowledge. Due to the rising technological novelties, one of the ways the local university responded to this developing trend is by connecting the

innovation with the strategic thinking. Skiba (2016) wrote that in 2016 alone, higher education institutions experienced an increase of the emerging classroom technologies. Studying the meaning of the emerging technologies is beneficial to those who have not explored the use of the active learning tools but may be influenced to understand the 21st century student learning challenges.

The goal for this study was to explore the faculty members' perceptions surrounding the redesign of the local university's classrooms with active learning technology tools. The opportunities for future research can be viewed from two different viewpoints. First, as previously mentioned, this study can be expanded to measure the faculty members' perspectives from the mixed-method approach. Additionally, it can be also helpful to learn from the students to investigate the effect on how students learn. Second, a closer look at the unforeseen technical barriers that were mentioned by the participants would be beneficial. The participants of this study discussed that the unforeseen technical difficulties in using technology could have potentially hindered or discouraged the use of these tools in the classrooms. With that, I believe experts specializing on classroom technology structure should have an influence and involvement on the faculty member's use of active learning technology tools. Perhaps, an evaluation study measuring the usefulness and effectiveness of these tools will be critical to ensure the successful integration in its entirety.

Conclusion

Using PowerPoint presentations in a projector and showing to the students in order to deliver knowledge hardly catches and engages students' attention. Yet, helping

students find their strengths by providing them with the opportunities to study in a dynamic and engaging classroom atmosphere, can be an added benefit. This qualitative exploratory case study was conducted by interviewing eight faculty members to gain an in-depth understanding of the implementation of the active learning technology tools in the classrooms of the engineering college. The findings of this study will be presented in a form of a position paper to the senior administration and to the faculty members. My goal that this study's findings will be used as an information to support and continue collaborative process in implementing active learning technology tools in the local university's classrooms.

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Appendix A: Project Study

Faculty Perspectives on Redesigning Classrooms with Active Learning Technology Tools

The goal of the project study

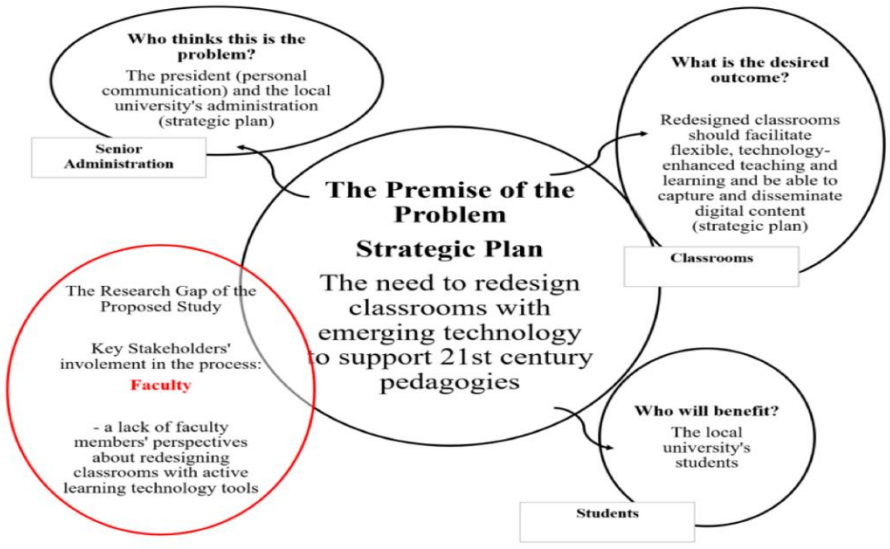
The goal of the position paper is to convey the results of the research study and provide with the recommendations that could support and guide the senior leadership of the local university with faculty members' perspectives regarding the implementation of the active learning technology tools such as Cisco Spark and Microsoft Surface Hub smart whiteboard and clickers in the classrooms.

The Problem

At the local university, the lack of technological capacity in the classroom was identified as a need in the strategic plans for both 2006–2016 and 2016–2017 (Local University, 2006, 2017). The local university's President indicated:

"*…we are living in a digital revolution. It has changed all aspects of our lives, and those changes are just now approaching us in higher education. I think the opportunity for us is to seize these new technologies, redefine the way we teach, and redefine our classrooms*" [italics added] (Local University, 2016).

As indicated by citing the need for addressing the lack of technological capacity in classrooms in the local university's plan for 2006–2016 and 2017–2027, there were barriers to making changes regarding instructional technology implementation. Ultimately, the local university invested in active learning technology tools, it is the faculty's role to then use these tools to support learning. Therefore, understanding faculty's perceptions was essential to ensure the most effective implementation of active learning technology tools in the classrooms



.Figure 1. The visual diagram of the research gap of the project study

Research Questions

The research questions were focused on exploring faculty members' perceptions about the main benefits and barriers of upgrading the local university's classrooms with active learning technology tools. Specifically, the first question addressed the faculty members' views and perceptions about the importance of implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in the classrooms. The second and third questions intended to discover the main benefits of and barriers of enhancing classroom experience by using active learning technology tools respectively.

Theoretical Framework

The Technology Acceptance Model (TAM) framework was used to explore perceptions of eight faculty members. The research questions were focused on exploring faculty members' perceptions of the main benefits of and barriers to upgrading the local university's classrooms with active learning technology tools.

Participants

The study was conducted in the engineering college at the local university. The engineering college has four academic departments and employed approximately 130 full time faculty members at the time of the study, typically teaching at least 1-2 classes per semester.

The sampling process was implemented in two steps (Merriam & Tisdell, 2016). First, the faculty members from the engineering college were selected as they have first-hand knowledge of the scientific, computational, and laboratory technology requirements of the engineering students. Second, a stratified strategy to ensure a proportional representation of faculty members from each department in the engineering college. Two main criteria was used for selecting the participants for this study: 1) faculty members actively teaching at least 1-2 classes per semester, and 2) several participants from each of the four departments of the engineering college proportional to the size of the department. As the result, eight participants were recruited to participate for this study.

Research Design

A qualitative exploratory case study was chosen to explore in depth the underlying local problem of stagnation in technology innovation in classrooms at the selected university by uncovering the views and perceptions of the faculty members about redesigning classrooms with the active learning technology tools. The exploratory research design helped to acquire new insights from the faculty members. Furthermore, the case study approach helped to gain a deeper understanding of the strategic objective related to the stagnation of classroom technology at the local university, as mentioned in the university's strategic plans

Data Collection and Analysis

The semistructured interviews with open-ended questions were conducted to explore the faculty members' perceptions. I transcribed verbatim interviews, coded, and then analyzed for themes and patterns.

I used the process described by Bogdan and Biklen (2007) as a basis to guide me through the data analysis. I also used an inductive approach to support and guide the data analysis. The inductive data analysis approach helped with the development of themes and subthemes from the raw data. Interviews were the primary source of data, and in addition to the interviewing data, I also used observational notes to support the analysis. The observations helped in supporting and in corroborating specific points resulting from the interviews.

For member checking, the verbatim transcriptions from audio-recorded interviews were returned to the participants in a Word document via email to check for accuracy with what they intended to say. To further establish credibility of the findings, I asked a colleague with a Ph.D. in Engineering to assist with reviewing the data collected throughout my study.

Results

Three themes emerged, aligning with the research questions: 1) choosing a fit technology; 2) perceived benefits; and 3) perceived barriers. The summary of the themes and subthemes is shown in Figure 2 below.

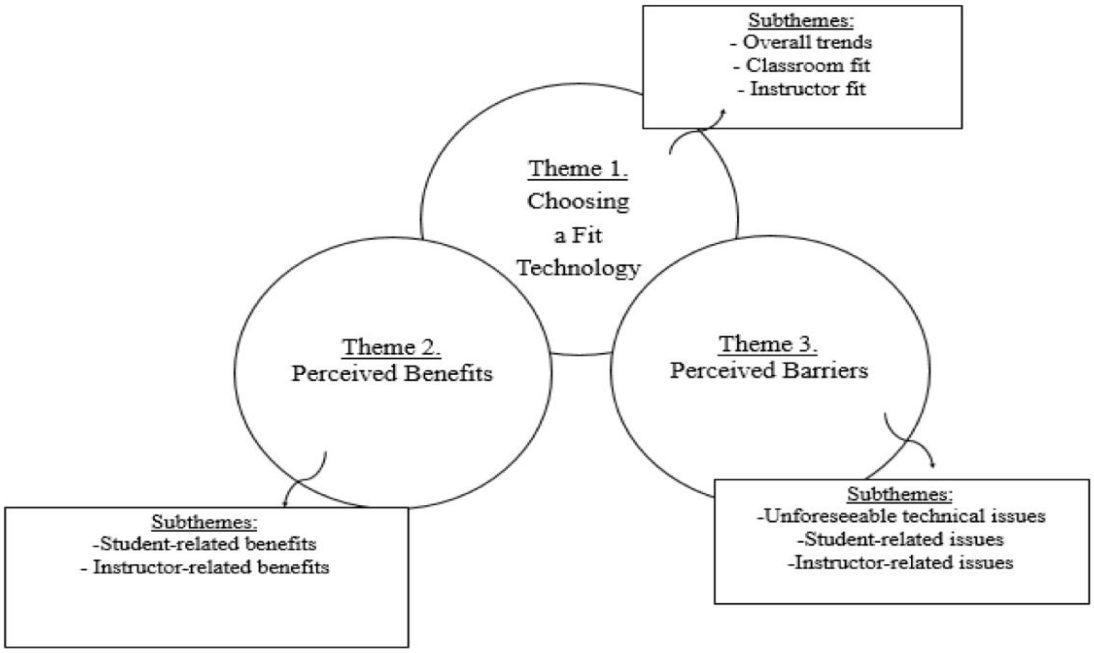


Figure 2. Graphic illustration of the themes in the study

Choosing a Fit Technology

Theme 1

Theme 1 addressed the following research question: "What are the faculty members' views and perceptions about implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers?"

To answer the first research question, the theme revealed a general trend of overall views and perceptions of faculty members about the importance of implementing the smart whiteboards and clickers in the classrooms (subtheme 1.1). The analysis of the interview data that suggested that the participants felt comfortable using technology; however, the use of these tools was associated with the fact that: a) these active technology tools should not be uniformly imposed across diverse classrooms (subtheme 1.2) and b) faculty members' teaching practices often influenced decisions in using the active learning technology tools (subtheme 1.3).

1.1 Overall Trends

The participants not only commented on using their technical skills effectively but they also seemed to value use of any type of technology tools in the classrooms. The participants generally expressed a positive attitude toward the active learning technology tools such as the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers.

"…definitely going to the positive direction. The update of the classroom technology is going to the right direction and definitely a trend."

For a better understanding of the importance of the active learning technology tools, one of the participants noted that these tools often provide more opportunities to improve student learning by having additional resources and information available to students. The readily information was helpful "during a class so they can make a use of the lecture." Others, for example, added that active learning technology tools make teaching better and efficient.

They acknowledged that they would be able to effectively use those tools if they were available. For example, one participant described that it would definitely help him to "mix things up" during a class. Although, he stated that the new technology implementation process was not always smooth, he said: "I would prefer technology, but technology is not always available. So, it is okay for me.

1.2 Classroom Fit

This subtheme emerged from various views and opinions that were shared among the participants that using and implementing active learning technology tools should not be developed and implemented as one unique strategy. Instead, it should be tailored to demands of different disciplines, class sizes, and students.

"If we were given the chance but not for every single class. When I need to explain some of the concepts visually and doing things together in groups."

The active technology tools have a potential to change the teaching methods.

It was evident that some faculty members had the ability to move from the traditional methods of delivering lecturers to become an enabler to motivate their students in becoming active learners. For example, one participant explained that using active learning tools could be helpful in presenting complex learning materials to the students and allowing the students to work independently. Another participant thought that new active learning technology tools might be appropriate for some disciplines more than for others.

"I'd highly recommend for science type classes."

The instructional approach must be flexible enough to adjust the lecture in order to engage students' minds (Gilakjani, 2013). Class size was another factor that frequently came up during the discussions. A class size was an important consideration when choosing a technology for the classroom.

1.3 Instructor Fit

The relationship between faculty members' teaching approaches and the use of the active learning technology tools, such as Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers, is one of the factors that stood out from the interview analysis. Faculty members' teaching styles and their teaching practices often influenced decisions about using classroom technology tools (Gilakhani, 2013).

It was apparent from the conversations with the faculty members that the successful use of the active learning technology tools in the classrooms was also affected by one's teaching experiences.

"I just think everybody should know what works best for them. It depends on person's personality <…> It depends on the instructor. You can really have a great class with a chalkboard and a horrible class with the smartboards; it all depends on the instructor or the content."

According to Gorder (2008), the teaching experience is directly related to the actual use of classroom technology. One participant stated that younger professors already come more skilled and proficient in using computer technology tools. He explained that the 'seasoned' professors are not focused on changing their pedagogical approaches because of the comfort level and the one's computer experience.

Perceived Benefits

Theme 2

Theme 2 addressed the following research question: "How do faculty members describe the main benefits of enhancing the classroom experience with instructional technology by using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in their classrooms?" The second theme includes the perceived benefits of to what extend using the smart whiteboards and clickers will help with the implementation of active learning technology tools in the classrooms.

2.1 Student-related benefits

This subtheme describes the participants' views on how the active learning technology tools could benefit the students in the classroom.
For instance, anonymity was one of the factors that arose from the discussions on being able to submit responses anonymously helped some students to participate in the class discussions. Most participants believed that, in contrast to the traditional classroom discussions, an opportunity to submit answers to the questions without a risk to be embarrassed in front of their peers promoted students' engagement.

Asking students to raise their hands can diminish learning by limiting the time to which a student engages (Levy, Yardley, & Zeckhauser, 2017), enable the faculty members to effectively manage, particularly in larger size classes.

An introduction of the clickers can completely change the traditional ways, since all students have an opportunity to quickly submit an answer to a question in an anonymous way. In addition, it would have helped the instructors to discuss in details wrong answers and to correct misunderstandings.

Furthermore, several participants expressed a general sense that the use of active learning technology tools helped to motivate and engage students. For example, one participant recognized that the use of the active learning technology tools helped to engage the students.

"If I ask students to answer questions, if 10 students raise hands and I have 30 students in the class, I can't call every one of them to tell the answer…"

Another participant felt that the smart whiteboards might work for some students better than for others. He thought that a traditional way of teaching might be somewhat boring to students, because "that it's basically me speaking the entire time. "

2.2 Instructor-related benefits

The participants' views on how the active learning technology tools would benefit them for instruction were also strong indicators of their planning, decisions, and classroom practices. One of the first important elements of these indicators, the participants talked about its potential content improvement and efficiency.

Time saved by the use of the smart whiteboard can be used to connect with students and to explain the lecture in more depth. It also appeared that the smart whiteboards could help with creating instructional materials and saving them for the next day review of the material

The participants recognized that efficiency was an indicator how they viewed the benefits of the active learning technology tools, one participant, for example, stated: "I like clickers because they are efficient. I can use [clickers] a lot because I know they can be simple and easy. […] I like the idea that I get immediate response and immediate feedback."

The participants' responses were clear about the potential benefits of using smartboards to increase students' learning experiences. Another advantage was in improving the flow of the lectures.

Throughout the interviews, I also learned that the participants appreciated the fact that the availability of new active learning technology tools might have presented them with opportunities to improve and explore new ways of teaching.

One participant said that utilizing technology-based active learning tools is an effective approach to dramatically enhance the course materials.

The faculty members have a unique responsibility to advance their students' critical and problem solving skills, as well as increase the students' understanding of the material.

Engaging students in critical reasoning and thinking requires a variety of creative techniques to enhance and adapt to the various learning needs of students (Reid & Weber, 2008).

Visual media, such as videos, have the advantage of being "easy" and accessible in most classroom environments. The smartboard technology come already equipped with interactive displays, making it 'easy' to use and incorporate to tailor to a class, that are designed to make learning engaging and interactive.

"…you can use it [smart whiteboard] with the apps. It is very interactive; teaching, editing, and this is what I want to do… Save it and screen shot it. And it is awesome

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Perceived Barriers

Theme 3

Theme 3 addressed the following research question: "What are faculty members' perceptions about potential barriers to implementing these active learning technology tools?"

The third theme describes potential barriers to implementing active learning technology tools.

Understanding faculty members' perceptions of the potential barriers in using the tools can be a first step in developing strategies for helping them change the way they teach (Michael, 2010).

While the participants pointed out the potential benefits of the active learning tools, they were also concerned about: a) unforeseeable technical issues (subtheme 3.1); b) the possible distractions that active learning technology tools could bring to the students (subtheme 3.2); and c) faculty members' potential resistance to change (subtheme 3.3.).

3.1 Unforeseeable Technical Issues

Faculty members stated that new technologies often come with new technical issues that they also have to learn how to resolve them. They also believed that it is difficult to maintain a quality control of the class, as they cannot predict when the technical issues might arise.

Another layer of issues reflects the faculty members' views of active learning and the requirements it makes on them. The majority of the participants voiced a concern that when technology stops working for any unforeseeable reasons, they had to have a backup plan. Faculty members perceived that they did not have sufficient technical skills to immediately resolve the technicalities and move on with the class.

A few of them also felt that they would be doing things almost twice to deal with the technical issues. The most important concern was that because it takes too much time for preparation, that is if something breaks, they would need to spend time and effort to have a backup plan to teach in a traditional mode.

Participants' technical difficulties could be problematic, but a few participants also noted that many instructors overuse the technology tools. One participant stated that they [faculty] simply put too much emphasis on it, by adding too many videos, pictures, animations, and graphics, "just for the sake of having something extra."

3.2 Student-Related Issues

Participants' views and perceptions about the potential barriers of active learning technology tools included that classroom technology, in general, can be a distraction tool. The most common concern was that students get distracted easily and faculty need to keep their attention. One participant noted that some students try taking notes with iPads. While he did not notice any issue with that, the participant felt that the notepads could be a distraction to the students because they [students] could be checking their emails or checking their social media accounts.

Another participant commented that not very many students in his class sometimes respond to new technology in the classroom. Students do not usually know what to do and what to expect with classroom technology tools, and "they do not usually like it when they do it – at least initially" (Michael, 2010, p. 3).

While this might be true in some classrooms, one participant was not sure if the tools are bringing a positive learning impact on students.

3.3 Instructor-related Issues

The participants voiced a concern that they have to learn to overcome the technical difficulties during course material preparation and teaching. While overcoming technical difficulties is definitely a contributing factor, the majority of the participants were not always encouraged in favor of using any new active learning technology tools available to them. Seven out of eight participants stated that using active learning technology tools requires too much time and preparation. In particular, one participant said that using new technologies significantly increased the preparation time.

"...can be a little intimidating at first..."

One participant stated that the active learning technology environment can be in any physical environment and they [faculty members] need to be creative and flexible to be successful.

Finally, the other interesting comment about perceived barrier was what one participant said:
"...if the smartboard has a disadvantage, it does tie you to the board. So, if there is a disadvantage, it's a minor."

Summary of Findings

Overall, the participants agreed that the implementation of the active learning technology tools in the classroom setting was beneficial to both students and the faculty members.

However, they also pointed out that the implementation of these technologies should not be uniformly applied to the classrooms. They urged to take into account unique demands of different disciplines, classrooms, and teachers. They believed that the smart whiteboards and clickers would have helped them to enrich the instructional process and make it more efficient. However, they also were clear that these benefits come with additional costs, such as extra preparation time, potential distraction to the students, and a necessity to deal with ongoing technical issues.

Proposed Recommendations

As mentioned, the local university's senior administrators and the president have already started a strategic planning initiative of updating classrooms and laboratories with the 21st century technology. The senior administration was targeting two major active technology tools, Cisco Spark and the Microsoft Surface Hub smart whiteboards, as well as clickers to start the upgrade of the classrooms. Integration and design of the active learning technology tools in the classrooms would have changed the nature of the instructional process and

would have had significant ramifications because of potential resistance from the faculty members if their input were not considered in this technology design and integration in the classrooms.

The proposed project addresses the need that was cited in the local university's strategic plans for 2006–2016 and 2017–2027. Efforts to focus on the needs of updating classrooms and laboratories with the 21st century technology will help the senior administration successfully implement the active learning technology tools and achieve their strategic goals.
The insights offered by the faculty members in the study will provide the initial steps for the collaborative process leading toward updating the classrooms with the 21st century technology.

Based on the participants' insights, I have developed four recommendations to help the local university's administration to achieve its strategic objectives:

- The classroom space design should meet the needs of the faculty members' expectations.

- The classroom active learning technology tools should fit the faculty members' preferred style of teaching.

- Capture the best teaching practices with the active learning technology tools to influence and engage more faculty.

- Identify technical issues experienced by the formal and informal use of classroom technology tools by the faculty members.

Significance

The project study was unique to the local university. The results of the study added to an original contribution because there was limited knowledge within the university regarding how faculty members viewed the use of active learning technology tools in the classroom setting.

The results of this study will increase understanding of the faculty members' views and perceptions on redesigning the classrooms with active learning technology tools, specifically by implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers.

This understanding will also ensure that the administration's initiative to provide a classroom experience was consistent with 21st century skills for students and continued contribution to scientific knowledge. Insights will support both the university leadership and faculty members to integrate faculty members as essential stakeholders in the process and facilitate effective integration of active learning technology tools in classrooms.

Conclusion

The goal of the position paper was to inform and convey the results of the research study to the senior leadership at the local university about the implementation of the active learning technology tools from the faculty members' perspectives.

Their perspectives about these tools will ultimately inform the senior leadership based on facts and evidence, not just tell the reasons why the classrooms needed to be updated and what classroom equipment needed to be installed.

Moreover, this paper also includes the proposed recommendations that could support and guide the senior leadership to supplement the successful integration of the active learning technology tools.

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Appendix B: Interview Protocol

Title of study: Faculty Perspectives on Redesigning Classrooms with Active Learning Technology Tools.

Time of Interview:
Date:
Method: In-person interview
Interviewer:
Interviewee:
Script:

My name is Zhanat Burch and I am conducting a qualitative case study as a part of my doctoral requirements for Walden University. I would like to thank you again for your willingness to participate in my study.

First, I would like to go over an Informed Consent Form with you. After you had the chance to review the form, please sign. If you have any questions about the form or this study, please let me know at any time throughout this session.

The purpose of this interview is to find out faculty members' views and perspectives on redesigning classrooms with active learning technology tools. The data collected will be kept confidential, in order to protect your identity please refrain from using your name at any point in this interview. The interview session should be no longer than 45 minutes. I will be recording this interview in order to obtain a permanent record. Is it okay with you if I begin recording now?

Start the recording.

Interview Questions:

In relation to Research Question 1: What are faculty members' views and perceptions about implementing the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers?

1. If the most advanced classroom technology tools, for example, the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers, were available for you to teach a lecture, what would that be? (perceived usefulness –PU)
    Probing: Please describe how you would use this tool if it were available? What are some of your reasons for liking this particular active learning technology tool?

2. Please describe what is your experience using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers to engage students during the lectures? (PU)
   Probing: Can you describe how you used…? Can you provide more details on the impact of …in your classroom?

3. Please describe, what do you know about the Cisco Spark and Microsoft Surface Hub smart whiteboards? (PU; perceived ease of use - PEU)
   Probing: Do you have any examples? Can you give me more details of …? Can you describe how you used or would have used them if these tools were available to you?

4. What do you know about clickers? (PU; PEU)
   Probing: Can you elaborate more? Do you have any examples? Can you describe how you used or would have used them if they were available?

In relation to Research Question 2: How do faculty members describe the main benefits of enhancing the classroom experience with instructional technology by using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers in their classrooms?

1. How do you feel coming to a traditional classroom with a blackboard and chalk to explain the material? (PU)
   Probing: What makes you feel that way? What are the benefits of having a blackboard and chalk classroom?

2. Could you describe how you use a computer/laptop when preparing to teach?
   Probing: Could you give me some examples? (PU)

3. In your opinion, what are the advantages do you perceive using smart whiteboards during a class? (PU)
   Probing: Can you tell me in more detail…? Please elaborate on…

4. How do you see the benefits of using clickers during a class? (PU)
   Probing: Can you tell me in more detail…? Please describe…

In relation to Research Question 3: What are faculty members' perceptions about potential barriers to implementing these active learning technology tools?

1. In your opinion, what is the single most important disadvantage do you perceive using the Cisco Spark and Microsoft Surface Hub smart whiteboards and clickers during a class? (PEU)

Probing: Can you explain in what ways?

2. What obstacles currently exist in using these tools to accommodate student learning? (PEU)
   Probing: Please tell me more about that.

3. What have you done to overcome these obstacles? (PEU)
   Probing: Do you have any specific examples?

4. From what you know and maybe experienced, what would you tell another faculty member if they asked you about the use smart whiteboards for teaching? (PEU)
   Probing: This is what I thought I heard… did I understand you correctly? Could you clarify about…?

5. From what you know so far and experienced, what would you tell another faculty if they asked about the use clickers in classroom? (PEU)
   Probing: This is what I thought I heard… did I understand you correctly?

6. What are the biggest changes you have seen lately in the use of smart whiteboards for educational purposes? (PEU)
   Probing: What are some of your reasons for these changes?

7. What are the biggest changes you have seen lately in the use of clickers for educational purposes? (PEU)
   Probing: What are some of your reasons for these changes?

I greatly appreciate your cooperation and willingness to participate in this study. Is there anything else you would like for me to add before the interview concludes? Again, thank you for your time and your responses will remain confidential.

Appendix C: Invitation Email Text

Dear faculty,

My name is Zhanat Burch and I am conducting a qualitative exploratory case study as a part of my doctoral requirements for Walden University. The purpose of the study is to explore faculty members' views and perspectives about implementing active learning technology tools in the classrooms.

A full-time faculty member teaching 1-2 classes per semester is invited to participate in this study. If you are interested and willing to share your experiences and perspectives in a face-to-face interview with me, please respond by XXX date. The interview session should not take more than 45 minutes of your time. Thank you so much for your consideration. I'm looking forward to your reply.

Zhanat Burch

Appendix D: Proposed Project Evaluation Survey

Project Evaluation Survey

On the scale 1-5, please indicate 1) strongly disagree; 2) disagree; 3) neither agree or disagree; 4) agree; and 5) strongly agree.

The goals of the project were clearly presented	1 2 3 4 5
The objectives of the project study were clearly defined	1 2 3 4 5
The problem was presented with credible evidence and was relevant	1 2 3 4 5
The content was organized and easy to follow	1 2 3 4 5

What recommendations do you provide to successfully upgrade the classrooms with active learning technology tools?

The classroom space design should meet the needs of the faculty members' expectations.	1 2 3 4 5

What recommendations do you provide to meet the needs of the faculty members' expectations?

The classroom active learning technology tools should fit the faculty members' preferred style of teaching.	1 2 3 4 5

What recommendations do you provide in choosing the active technology tools to fit the teaching style of the faculty member?

Capture the best teaching practices with active learning technology tools to foster collaborative teaching experiences.	1 2 3 4 5

What recommendations do you provide to capture the best teaching practices?

Identify the technical issues that are experienced by the formal and informal use of classroom technology tools by the faculty members.	1 2 3 4 5

What technical barriers do you anticipate will be experienced during the use of these tools?
What recommendations do you suggest to overcome them?