UNDERSTANDING THE LIVED EXPERIENCE OF FACULTY THAT INTEGRATE INSTRUCTIONAL TECHNOLOGIES INTO THEIR TEACHING: AN INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS

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Abstract

Universities seek to educate students who come from a K-12 environment where they have developed 21st-century skills. Therefore, students expect faculty to be using technology to reinforce concepts, increase engagement, and help them learn. The purpose of this interpretative phenomenological analysis study was to understand the experiences of tenure-track university faculty when adopting instructional technologies into their teaching. The main question that the research sought to answer was: How do tenure-track faculty members in the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies into their teaching? Data were collected through interviews with nine faculty members in the College of Arts and Sciences at Lehigh University who had successfully adopted instructional technologies into their teaching and who had worked with the Center for Innovation in Teaching and Learning. The results indicated that the primary motivation for faculty members in using instructional technologies was to engage students and to increase efficiency. Faculty also expressed that students were generally enthusiastic about the use of instructional technologies. Additionally, participants expressed an overall lack of a supportive culture towards teaching and learning on Lehigh’s campus. Barriers to adopting instructional technologies included issues of academic integrity and the abovementioned lack of a supportive culture towards teaching. The participants underscored the importance of alignment between sound pedagogical goals and instructional technologies as being the key to successful adoption.

Keywords: adoption of technology, barriers, innovation, teaching and instructional technologies
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Chapter One: Introduction
The purpose of this interpretative phenomenological analysis (IPA) study is to understand the experiences of tenure-track university faculty when adopting instructional technologies into their teaching at a private northeastern university. The knowledge generated from this research study will serve to inform future faculty development efforts at universities and will provide new perspectives for instructional technology professionals who work with faculty to facilitate the integration of instructional technologies that can improve student learning.

This chapter begins with a statement of the problem with evidence from the literature supporting prior studies on the topic. Next, the significance of the study is discussed, drawing connections to potential beneficiaries of the work, followed by the research question. Finally, the theoretical framework that serves as a lens for the study is introduced and explained.

**Statement of the Problem**

Instructional technology use in higher education is a complex topic that has been explored by many researchers. The role of technology in enhancing the delivery of teaching is one that is acknowledged to have potential – when its use is well thought out – to transform the learning and teaching experience and support radical change (Keppell, Suddaby, & Hardy, 2015). However, despite the affordances and opportunities that exist as well as the huge investments in technology that institutions have put in place to support this (Buabeng-Andoh, 2012), barriers to the adoption of technology are acknowledged throughout the literature. While access to digital technologies in classrooms has significantly increased and some teachers have readily adopted digital technologies, many more have not (Lim, Zhao, Tondeur, Chai, & Tsai, 2013; Perrotta, 2013; Wang et al., 2014). Teachers’ uncertainties about integrating digital technologies have consistently focused on professional confidence in using new tools and the
resulting quality of student learning (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Fullan, 2007; Zhao & Frank, 2003).

There is much discussion about integrating technology into the pedagogy of all disciplines in higher education (Georgina & Olson, 2008). Institutions of higher education are challenged with providing technology-enriched learning environments for multi-generational students. It is important to remember that technology by itself will not guarantee true learning. However, the proper use of available technologies does have the power to enhance and transform education in today’s classroom (Firmin & Genesi, 2013). The majority of students are using emerging Web 2.0 technologies, such as social networking, text messaging, and more, in their private lives; however, many university faculty members are not incorporating these technologies to supplement traditional learning methods (Ajjan & Hartshorne, 2008). Faculty members’ perceptions of their abilities to integrate technological innovation are critical to the adoption of technology in higher education (Allsopp, McHatton, & Cranston-Gingras, 2009). Unfortunately, faculty is still not fully confident in their skills at providing instructional technology integration as part of the coursework. In a 2011 article by Onyia and Onyia (2011), out of 60 full-time education faculty members, only 44% felt confident in their use of word processing software, and 60% stated that they rarely or never used interactive content in their courses. Thus, faculty may not use technology in their teaching, which could potentially limit student academic outcomes. In a survey of the mathematics faculty at Texas Lutheran University, it was discovered that less than 50% used technology on a regular basis in their classes and only 37% reported that they frequently used computer technology to teach mathematics (Abbasian & Sieben, 2011).
Improving student learning is a key issue. Universities and the literature have shown that the use of instructional technologies can improve student outcomes (Burns, Klingbeil, & Ysseldyke, 2010; Keefe & Wharrad, 2012). Çelik and Keskin (2009) compared student learning outcomes for a set of learning objectives that were taught either with or without instructional technologies. They found that the effective use of instructional technologies decreased the amount of teaching time needed for the students to learn a set of learning objectives. As accountability for student success increases, technology adoption and comfort can play a crucial role in helping students to be successful.

The use of technology in the classroom has been shown to support and improve student motivation and student outcomes (Burns et al., 2010; Keefe & Wharrad, 2012; López-Pérez, Pérez-López, & Rodriguez-Ariza, 2011). A study by Daher and Lazarevic (2014) revealed that the extent of the use of Web 2.0 tools by instructors in the classroom relates to a) their level of education and b) their training in the use of the tools. The results indicate that the level of education and current use of Web 2.0 technologies in instruction are major determinants of the preferences of instructors toward different groups of Web 2.0 tools. Finally, the lack of faculty training opportunities was identified as the main barrier to using Web 2.0 technologies.

As universities try to determine how faculty training influences instructional technology integration, Georgina and Hosford (2009) surveyed faculty at 16 Midwestern colleges and universities. They found significant correlations between technological literacy and the pedagogical integration of instructional technology. In other words, faculty who were comfortable with and knew how to use technology were more likely to use it in their teaching than faculty who were not satisfied with it.
Successful faculty technology training recognizes the need to develop two essential areas of faculty expertise – technological skills and effective technology integration into pedagogy (Chuang, Thompson, & Schmidt, 2003; Guernsey & Young, 1997; Keengwe, 2007). Somekh (2008) reviewed research on the factors affecting instructional technology adoption and found that an essential key to the successful adoption of instructional technology was focusing the professional development on both technical skills and pedagogical practices. The focus on technical skills and pedagogy led to instructors embedding technology in the learning processes. Somekh (2008) found that another factor in the successful adoption of instructional technology in the classroom was the teachers themselves. Within this focus on educators, training and pedagogical support cater to individual differences and consider individual teachers’ personality types. Becking (2011) used a mixed-method approach to examine technology usage by university faculty at a large Midwestern university. She concluded that professional development and instructional technology training for instructors should be pedagogically oriented. She stated, “Instructors need to not only know where to click but also how, why, and when to use it.”

Kidd (2010) argued that there is not enough research done in the area of the lived experiences of faculty who are using instructional technology in their teaching methods and processes. This qualitative study asks more detailed “why” and “how” questions related to faculty experience with adopting new instructional technologies, for instance, questions on removing barriers and putting motivators in place to help faculty. What social and/or organizational structures have they experienced that affect how they approach adopting new technologies for teaching and learning? There is also a larger body of research that has examined barriers to adoption, but far fewer studies have explored what motivates the adoption of new instructional technologies. Hew and Brush (2007) delineated the three most frequently cited
barriers affecting technology integration: 1) resources (40%), 2) teachers’ knowledge and skills (23%), and 3) teachers’ attitudes and beliefs (13%). Therefore, this study seeks to understand the experiences of tenure-track faculty that have adopted instructional technologies into their teaching.

Significance of the Research Question

The rationale is expanding the research on the motivators and barriers related to the adoption of instructional technologies. Higher education has spent significant amounts of money on technology, yet these instructional technologies have not overwhelmingly transformed teaching in higher education. This study aims to better understand the experiences of tenure-track faculty that have adopted instructional technologies into their teaching. These insights will help to develop professional development opportunities for faculty that can have a profound impact on student learning. Universities seek to educate students, and students are coming from the K-12 environment, in which they have developed 21st-century skills, and thus they expect faculty to be using technology to do things such as reinforce concepts, increase engagement, and generally help them learn. Research supports the idea that student learning increases when instructional technologies are effective when used in teaching. Additionally, there have been very few studies that have sought to understand the experiences of faculty as most other studies have primarily researched attitudes or perceptions.

Research Problem and Research Question

In most educational institutions, a significant commitment has been made to the implementation of digital strategies through the introduction of new technologies in learning and teaching, as well as in the training of staff and students, to support effective technology usage (Bower & Vlachopoulos, 2018). The purpose of this study is to explore the experiences of
tenure-track faculty in the adoption of instructional technologies to support their instruction in the 21st-century learning environment. Despite research that supports the claim that technology adoption or integration in courses could help students learn, some research also suggests that digital technologies are not transforming the nature of university teaching and learning in profound ways as was originally hoped (Henderson, Selwyn, & Aston, 2017). Carmean and Haefner (2002) highlighted that multiple forms of technology have molded the new generation of students to learn more effectively in learning environments that are social, active, contextual, engaging, and student-owned, thus breaking away from the traditional lecture-based instructional paradigm. However, a challenge for organizations when instructors are adopting new technologies into their curricula to engage their students is to provide resources that minimize technical roadblocks and boost faculty members’ instructional environments with innovative solutions, robust training, and technical resources.

This research adds to the literature on faculty adoption and provides a different perspective or lens to understand how faculty experiences and training have shaped their willingness to adopt new instructional technologies. The research is conducted with a specific focus on what would help motivate them to try to use more instructional technology to further support student learning. Additionally, what organizational support or structures need to be in place to help faculty be successful is also determined.

This research question is influenced and shaped by only certain parts of the diffusion of innovation theory. This study is interested in the theory of perceived attributes, that is, the notion that faculty will adopt an innovation if they understand that the innovation has a relative advantage and can be compatible with existing values and practices if it is not too complex
(Botha & Atkins, 2005). The characteristics of innovations as perceived by individuals help to explain their different rates of adoption.

The research question is as follows: How do tenure-track faculty members in the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies into their teaching?

Definitions of the Key Terminology

The following are key terms used in this paper:

- **Instructional technologies**: These include clickers, use of learning management systems, e-portfolios, mobile technologies, Web 2.0, wikis, blogs, drones, lecture capture, audio, online web conferencing tools, WordPress, Scalar, virtual reality, and augmented reality.

- **Barriers**: Barriers include time, energy, fear of change, and lack of resources.

- **Motivators**: These include mentoring, reduction in teaching load, co-teaching, fees for software or new technologies, seed money, and time.

- **Technology-enhanced learning (TEL)**: This is used to describe the application of information and communication technologies to teaching and learning. Explicit statements about what the term is understood to mean are rare and it is not evident that a shared understanding has been developed in higher education about what constitutes an enhancement of the student learning experience.

- **Information and communication technology (ICT)**: This is an extensional term for information technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers, and the necessary enterprise software, middleware, storage, and audio-visual systems, enabling users to access, store, transmit, and manipulate information.
The following section of this chapter will include a description and discussion of the theoretical framework that will serve as the theoretical lens for this study.

Theoretical Framework

Diffusion of Innovation Theory

This study is focused on the experience of tenure-track faculty members that adopt instructional technologies into their teaching. The author used Roger’s diffusion of innovation theory to examine the experience and adoption of instructional technologies (Rogers, 1995). Diffusion is characterized as a process in which innovation is communicated through certain channels over time among the members of a social system. It is a particular type of communication in which the messages are concerned with new ideas (Rogers, 1995). Communication is the process in which participants create and share information to reach a mutual understanding. Many researchers from a variety of different disciplines have contributed to Rogers’s development of the diffusion of innovation theory. The diffusion of innovation theory has several different theoretical perspectives that relate to an overall concept of diffusion (Figure 1).
The roots of diffusion research extend back to the European beginning of social science. Gabriel Tarde (1903, cited in Katz, 1999), one of the forefathers of sociology and social psychology, was a French lawyer and judge at the start of the 20th century who kept an atypical eye on trends in his society, as represented by the legal cases that came before the court (Katz, 1999). Georg Simmel was a sociologist who was trained in philosophy. He served the role of an individual who was a member of a system but who was not firmly attached to the system. His research helped to highlight areas such as the importance of studying communication networks – an increasingly useful conceptual tool in understanding how innovations diffuse in a system (Johnson, 1990). There are many other seminal authors, such as Kuhn, who added to the field by introducing his revolutionary paradigm, which gave the research community the concept of the paradigm shift. Diffusion research has strong roots in rural sociology and agricultural research.

Researchers have found that people who adopt an innovation early have different characteristics than people who adopt an innovation later. When promoting innovation to a target population, it is essential to understand the characteristics of the target population that will help
or hinder the adoption of the innovation. Five main factors influence the adoption of change, and each of these factors is at play to a different extent in the five adopter categories. The characteristics of innovations, as perceived by individuals, help to explain their different rates of adoption (Rogers, 1995).

1. Relative advantage: The degree to which an innovation is seen as better than the idea, program or product it replaces.

2. Compatibility: How consistent the innovation is with the values, experiences, and needs of the potential adopters.

3. Complexity: How difficult the innovation is to understand and use.

4. Trialability: The extent to which the innovation can be tested or experimented with before a commitment to adopt is made.

5. Observability: The extent to which the innovation provides tangible results.

Innovations that are perceived by individuals as having a greater relative advantage, compatibility, trialability, and observability while having less complexity will be adopted more rapidly than other innovations. Past research indicates that these five qualities are the most important characteristics of innovations in explaining the rate of adoption. The first two attributes, relative advantage and compatibility, are particularly important in explaining the rate of adoption of an innovation (Rogers, 1995).

There are five established adopter categories, and while the majority of the general population tends to fall in the middle categories, it is still necessary to understand the characteristics of the target population. When promoting an innovation, different strategies are used to appeal to the different adopter categories.
1. Innovators: These are people who want to be the first to try an innovation. They are venturesome and interested in new ideas. These people are very willing to take risks and are often the first to develop new ideas. Very little, if anything, needs to be done to appeal to this population.

2. Early Adopters: These are people who represent opinion leaders. They enjoy leadership roles and embrace change opportunities. They are already aware of the need to change and so are very comfortable with adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. They do not need information to convince them to change.

3. Early Majority: These people are rarely leaders, but they do adopt new ideas before the average person. That being said, they typically need to see evidence that the innovation works before they are willing to adopt it. Strategies to appeal to this population include success stories and evidence of the effectiveness of the innovation.

4. Late Majority: These people are skeptical of change and will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this population include information on how many other people have attempted the innovation and have adopted it successfully.

5. Laggards: These people are bound by tradition and are very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups.

A social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. A system has a structure that is defined as the patterned
arrangements of the units in a system, which gives stability and regularity to individual behavior in the system.

The inclusion of time as a variable in diffusion research is one of its strengths. Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Given that decisions are not authoritative or collective, each member of the social system faces an innovation-decision that follows a five-step process (Rogers, 1995, p. 162):

1. Knowledge: The person becomes aware of an innovation and has some idea of how it functions.
2. Persuasion: The person forms a favorable or unfavorable attitude toward the innovation.
3. Decision: The person engages in activities that lead to the choice to adopt or reject the innovation.
4. Implementation: The person puts the innovation to use.
5. Confirmation: The person evaluates the results of the innovation-decision already made.

Criticism of the Diffusion of Innovation Theory

There are several well-documented limitations of the diffusion of innovation theory (Atkins & Botha, 2005). First, the theory does not consider the possibility that people will reject an innovation even if they fully understand it (Waterman, 2004). In addition, insufficient consideration is given to innovation characteristics and how these change over time (Wolfe, 1994). The assumption that the innovation should be adopted at some point and result in a positive outcome, often ignoring the possibility of reinvention, leads to a pro-innovation bias (Tolba & Mourad, 2011). It is challenging to track the changes in unsuccessful diffusion and unsuccessful innovations (Rogers, 2003). Fortunately, Baumann and Martignoni (2011) discuss a
method to ensure that the pro-innovation bias is limited in interviews by recommending a focus on both successful and unsuccessful projects of interest.

According to Kole (2000), pro-innovation bias implies that all members of a social system should adopt innovations and that this adoption should happen more quickly. To combat the issue of focusing research on an individual within the system, Ramsever and Winter (2013) encourage the researcher to keep an open mind and recommend incorporating questions to probe the individual’s perspective, including questioning individuals with varying levels of responsibility in the selected college while including the social unit as the unit of analysis.

Kole (2000) also indicates that 1) the diffusion of innovation theory does not consider the fact that diffusion and adoption may fail because something was a bad idea to begin with; 2) it associates the latest technologies with progress, thereby ignoring alternatives; and 3) it focuses on the individual adopter, thereby ignoring social structures. Specifically, within my research, the challenge with the diffusion of innovation theory is that it is not one all-encompassing theory but rather several theoretical perspectives that relate to an overall concept. Nutley, Davies, and Walter (2002) pointed out that the nature of the utilization of knowledge in the diffusion of innovations is further complicated by contrasting straightforward adoption (replication) with reinvention (adaptation). The diffusion of innovation theory can also result in an individual-blame bias, whereby an individual member of the organization becomes the focus of a failed innovation, rather than the organization itself (Rogers, 2003). Rogers (2003) offers several strategies to overcome individual-blame bias, such as including multiple members of the organization, keeping an open mind during investigations, involving those for and against the innovation, and considering the social and communication structures.
The social system element holds the greatest influence over the final adoption of a new innovation due to preexisting preferences and history (Ranjan, 2008). Within the social system, the opinion leaders of a social network are able to influence adoption among others in their group, particularly if the leaders are highly social (Cho, Hwang & 2012). To address this concern, Rogers (2003) recommended selecting interview candidates that have prior experience of initiating or being a member of an innovation as well as focusing the interview questions on the consequences of their actions – one of the main areas of concern within the social system.

The issue of recall leads to another area of concern wherein interviewees may incorrectly remember details of the time around the newly adopted innovation (Rogers, 2003). Some issues may be ameliorated by recalling concerns by researching a case study from a single institution, with multiple interviewees discussing similar events and thereby allowing for a cross-check of the acquired data (Colby, Clark, Rogers, Ramsey, Graham, Boergers, & Abrams, 2012). By also conducting interviews within a narrow time window with individuals at all levels of an organization, recall bias concerns may be further reduced (Rogers, Christensen, Welsh, & Faseru, 2015).

Although the diffusion of innovation theory has existed for decades, Rogers only briefly mentioned the impact of the Internet in the fifth (and last) edition of his work, which appeared in 2003 (Kardasz, 2013). Hence, not only does Rogers’ discussion of the theory not adequately address the Internet’s potential in diffusing an innovation, it predates social media and its potential impact on diffusion (Kardasz, 2013).

The final area of concern around the diffusion of innovation theory includes the issue of equality, whereby “socioeconomic gaps among the members of a social system are often widened as a result of the spread of new ideas” (Rogers, 2003, p. 135). To ameliorate this
concern, it is encouraged to include a diverse representation of interviewees spanning income, ethnicity, age, and time of employment (Fokkema, Teunissen, Westerman, van der Lee, van der Vleuten, Scherpbier, & Scheele, 2013). Furthermore, keeping the number of interviewees at less than ten allows for a smaller data set and produces a rate of adoption of the innovation (Shimogawa, Shinno, & Saito, 2012).

**The Rationale for Using Rogers’s Diffusion of Innovation Theory**

This study is motivated by the researcher’s interest in understanding the experiences of university tenure-track faculty members that have adopted instructional technology to enhance their teaching. In this study, the instructional technologies are thus considered the “innovation” and are supported by the theoretical framework. As an instructional technology professional and assistant director of the Center for Innovation in Teaching and Learning (CITL), I want to better understand the experiences of faculty that adopt new instructional technologies, including what motivates and hinders their use.

Several articles have applied various elements of Rogers’ framework to educational technology (Demir, 2006; Lu, Quan, & Cao, 2009; Shea, Pickett, & Li, 2005; Soffer, Nachmias, & Ram, 2010; Tabata & Johnsrud, 2008). The diffusion of innovation theory has served as a theoretical framework for researchers examining faculty attitudes toward using a new technology, such as online learning (Shea et al., 2005; Soffer et al. 2010; Tabata & Johnsrud, 2008) and Wi-Fi Internet access (Lu et al., 2009). Understanding what qualities make an innovation spread and understanding the importance of peer-peer conversations and peer networks is integral to being able to provide more useful professional development.
Why Diffusion of Innovation?

The diffusion of innovation theory is used as a lens to understand the experiences of tenure-track faculty members that have adopted instructional technologies. This study will interview participants that are identified as early adopters and the early majority. Understanding the experiences of faculty that adopted instructional technologies will provide an insight into who adopted innovations and why. Sahin (2006) believes that Rogers’ theory is the most appropriate lens for investigating the adoption of technology in higher education, and in educational environments in general. The rate of adoption of new technologies determines the successful and long-term diffusion of the implementation process based on where the users – in this case, the faculty – are in their approach to accepting the innovation (Gautrau, 2011).

Challenges and motivators for diffusing innovation and technology training are different for the various levels of adopters; these will be explored further in this study.

The diffusion of innovation theory provides a framework for the process of the adoption of instructional technologies. For this study, the theory was used to explore the experiences of tenure-track faculty members in the adoption of instructional technologies into the instructional paradigm. The diffusion of innovation theory also provides a framework to understand faculty experiences and assists in planning to help support teaching and learning.

Conclusion

Technological advances surround the modern university, and students coming from secondary education have grown up using instructional technologies in their classrooms. In many cases, when they enter college, students take a step backward regarding technology use as it relates to teaching and learning. This study will help to better understand the experiences that motivate professors to use technology to support student learning. There is far more research
about the barriers to the use of instructional technologies than there are studies that seek to understand what motivates faculty. Understanding motivators better can lead to increased student engagement and efficiencies for faculty as well as an increase in student learning. The next chapter is the literature review, and this will provide a foundation for the research in this study.
Chapter Two: Literature Review

The objective of the interpretative phenomenological analysis presented in this paper is to ascertain the implications of the adoption of instructional technologies. Specifically, the experiences of a tenure-track university faculty within a private northeastern university will be examined to develop insights into the experiences of faculty members that adopt instructional technologies. The vast majority of contemporary educational institutions have expressed a commitment to the application of digital strategies within learning interventions and have developed supporting training plans to ensure faculty members and students use the available tools to their full capacity (Bower & Vlachopoulos, 2018).

Technology is increasingly becoming a standard feature of classrooms in the United States. A recent report that was issued by the National Center for Educational Statistics found that there was a student to computer ratio of 1.7 in public schools across the United States (Gray, Thomas, & Lewis, 2010). Furthermore, in many states, students benefit from one-to-one laptop programs (Zheng, Warschauer, Lin, & Chang, 2016). As a result of their exposure to technology, many students are effectively progressing to higher levels of education with state-of-the-art computer skills (Vongkulluksn, Xie, & Bowman, 2018). Furthermore, many of them express an interest in extending these skills in the college setting.

The methods by which universities and colleges prepare students for their professional future are currently in a state of evolution. The 2010 National Educational Technology Plan (U.S. Department of Education, 2010) described how there was a distinct need for educators to increase the use of “innovative best practices in the use of technology in teaching and learning” (p. x) and to offer students “engaging and empowering learning experiences that prepare them to be participants in our globally networked society” (p. 9). It is important that universities are
provided with the latitude to investigate novel concepts and methods by which the latest
technologies can be harnessed within the learning environment (Clark & Estes, 1998), and there
can be no doubt that the effective use of the available technologies can transform learning
experiences (Firmin & Genesi, 2013). However, there is also a need to recognize that the use of
technology alone will not assure that students have learned and understood the concepts of
interest. The research question that underpins this study is as follows: “How do tenure-track
faculty members in the College of Arts and Sciences at Lehigh University make sense of the
experience of adopting instructional technologies into their teaching?”

This literature review is organized according to three distinct themes:

1) The use of technology to improve the learning process (subthemes: student
engagement and maximizing classroom learning),

2) Factors that affect the adoption of instructional technology (sub-themes: barriers to
adoption and facilitators/motivators for adoption), and

3) Understanding faculty identity and technology integration (subthemes: faculty self-
efficacy and perceptions, and strategies for optimal professional development).

**Improving the Student Learning Process**

University faculty members invest a significant amount of effort in developing strategies
by which they can ensure they deliver learning experiences that are effectively aligned with the
needs and learning preferences of the students they teach. A study on faculty and IT conducted in
2014 by the Educause Center for Analysis and Research (ECAR) (Dahlstrom, Brooks, &
Bichsel, 2014) found that the main factor motivating faculty members to use technology in their
classrooms was unequivocal evidence that it would be beneficial to the students. Developing an
understanding of the factors that motivate teachers to use instructional technology holds the key
to developing support strategies. Although studies have established that the adoption of technology can facilitate student learning, there is also significant evidence to suggest that digital technology has failed to significantly change university teaching and learning (Henderson et al., 2017).

This theme encompasses the following sub-themes: student engagement and maximizing classroom learning. Faculty members consistently seek methods of connecting with the students at their universities. Contemporary students are typically digital natives who have grown up surrounded by technology. The use of instructional technology can encourage them to engage with the learning material more actively. Faculty members frequently highlight how their use of technology in the classroom is driven by the fact that it encourages students to engage with the content more closely. Furthermore, there is evidence to suggest that the use of technology can also help students to develop a comprehension of the key material in less time (Çelik and Keskin, 2009). Reducing the time taken to master concepts can provide teachers with more time to deliver further learning experiences. Technology can also free up teachers’ time. For example, if a faculty member currently spends ten hours a week grading tests, this could be reduced through the use of online tests that are automatically graded.

**Student Engagement**

Although the application of digital technology to deliver learning experiences, connect with students, and offer flexible learning conditions is currently increasing, it remains challenging to fully engage students in technology-mediated learning. It is imperative that the use of digital instructional technology is underpinned by instructional practices that encourage greater engagement (Henrie, Halverson, & Graham, 2015). This section of the paper will
examine existing studies that support the notion that the use of instructional technology can enhance student engagement.

An existing body of literature supports the idea that teachers will be more inclined to incorporate technologies into the learning experiences they deliver if they believe that doing so will facilitate student learning. Several studies have described how the adoption of instructional technology can lead to enhanced student motivation and engagement. For example, Ajjan and Hartshorne (2008) surveyed 136 teachers from a university located in the southeastern region of the United States to gain insights into their view of the use of Web 2.0 tools in the classroom. Although some of the faculty members who participated were of the opinion that the use of such tools could enhance student learning outcomes, not many of them actually used the technologies that were available in their classrooms. The outcomes of the research indicated that perceived behavioral control and faculty attitude represent reliable indicators of teachers’ intention to adopt technologies in their classrooms. Furthermore, Ajjan and Hartshorne (2008) concluded that the use of instructional technology improves the effectiveness of the learning environment, enhances collaboration, encourages students to cooperate and share knowledge, and expedites the way in which students connect with learning experiences. Additionally, the teachers who participated in the research were of the opinion that the use of instructional technology in the classroom enhances students’ satisfaction with the course, increases their learning, enhances their ability to write, and helps students to communicate more effectively with one another and with members of the faculty (Ajjan & Hartshorne, 2008).

Additional studies support the view that the use of technologies in classrooms promotes student learning. Just some of the benefits of the use of technology include more diverse learning experiences, access to more learning experiences, and more efficient delivery of learning
objectives (Henderson et al., 2017). Furthermore, digital technology plays a fundamental role in undergraduate education and can transform how students experience learning (Henderson et al., 2017).

Han and Finkelstein (2013) examined the application of clicker assessment and feedback (CAF). The overall objective of their study was to develop a CAF approach that could effectively increase student engagement in undergraduate courses. A total of 74 professors and 5459 students participated in the study. The outcomes highlighted how CAF development directly influences students’ perceptions of their engagement and learning. The more the educators used CAF, the more experience of its use they acquired, and the more the students felt that the use of CAF enhanced their learning and engagement.

Research by Lumpkin, Achen, and Dodd (2015) further highlighted the benefits of the use of instructional technologies. They surveyed 153 undergraduate students across four courses and combined the quantitative and qualitative data from undergraduate and to ascertain which of several technology-nested instructional approaches had a positive impact on student learning outcomes. The data indicated that in excess of 80% of the undergraduate participants and 88% of the graduate participants thought that the use of technology “often” or “sometimes” had a positive impact on their learning outcomes. The authors concluded that college students appreciate the use of technology in the classroom.

In a different study, Lumpkin et al. (2015) also demonstrated how the application of a learning management system (LMS) to administer learning materials could increase learning and student engagement. They found that the use of video can support learning with real-world examples, blogs can ensure students perform the required reading, and games can cement their understanding. Furthermore, students also appreciate the chance to share their opinions and
interact with others through classroom response systems, like Lino and Poll Everywhere. Furthermore, technology-nested approaches can help to ensure students are actively engaged in their learning and can strengthen comprehension (Lumpkin et al., 2015). A number of scholars have argued that technology-nested teaching strategies, such as the adoption of PowerPoint slides, LMS, classroom response systems, blogs, and video clips, can have a positive impact on student learning outcomes. For example, videos have been shown to enhance the main course content (Wright & Abell, 2011) and improve student attitudes. According to Malm and Defranco (2011-2012), “The next generation of students will not just be concerned about if technology is used, but rather how it is incorporated into the educational experience” (p. 404).

Fonseca, Martí, Redondo, Navarro, and Sánchez (2014) found that the application of technology can enhance the extent to which students interact with the content and, subsequently, increase student satisfaction. They concluded that there is a strong correlation between the use of technology and student motivation and between the use of technology and academic achievement. A later study that was performed by Cheng, Lin, and She (2015) revealed that students who learn in a technology-enhanced classroom are more likely to retain knowledge and subsequently perform well.

**Maximizing Classroom Learning**

Technology pervades many elements of contemporary existence. One reason as to why it is so popular is that it can help people to manage tasks more effectively. Within the classroom setting, technology can help teachers to administer and grade assignments, offer support to students, and communicate more effectively with the student community. Xu and Meyer (2007) examined the factors that impact the use of technology in a university faculty. Their findings revealed that both access to the Internet and age are correlated with faculty technology use.
Furthermore, they found that teachers who employ instructional technology benefit from increased productivity and have more time available to develop teaching materials, refine their strategies, and offer students feedback.

Çelik and Keskin (2009) assessed the extent to which fifth-grade primary school teachers efficiently collected data within a more extensive investigation of the relationship between faculty members' technological literacy and student learning outcomes. Their findings revealed that the adoption of instructional technology reduces the amount of time it takes for children to learn new concepts. Furthermore, they also found no correlation between teachers’ technology-literacy skills and the success of the students (Çelik & Keskin, 2009). One interesting insight that was generated by this study is that there is a link between the use of technology and faculty productivity. This finding supported that of previous studies that have argued that technology has positive implications for productivity (Meyer, 1998). Although the use of email and web is by no means a “magic bullet” (Van Dusen, 1998), they can represent a means by which teachers can improve their efficiency and effectiveness.

Teachers have consistently found that the application of instructional technologies can enhance efficiency and productivity by providing them with a chance to include more content, reducing the time it takes for students to master key concepts and giving them more time to invest in other elements of their teaching (Hew & Brush, 2007).

Conclusion

There are many ways in which instructional technology can enhance student learning, motivation, and success. Contemporary students enter universities with a solid background in technology use and typically expect to find elements such as videos, blogs, and games infused into the curriculum. Instructional technology tools, such as LMS, video clips, real-world
examples, and blogs, can all facilitate increased engagement, personalize learning interventions, and help students to achieve. The outcomes of a study performed by Ajjan and Hartshorne (2008) found that the use of instructional technology can improve the effectiveness of the learning environment, foster collaboration, and provide students with a chance to share new knowledge. Lumpkin et al. (2015) extended this idea and highlighted how the use of instructional technology tools, such as LMS, blogs, video clips, and student response systems, within a technology-nested strategy can enable students to become more engaged and reinforce their understanding.

Faculty members who use instructional technologies are also discovering methods of becoming more efficient and productive in their teaching approaches. Instructional technology tools that provide teachers with a mechanism by which they can verify learning – for example, quizzes and student response systems – can improve the efficiency of learning interventions and give teachers more time to invest in the improvement of teaching. This can be very valuable to both students and teachers. Finally, Fonseca et al. (2014) found a strong positive correlation between technology and student motivation, and a significant correlation between technology use and academic achievement.

Factors that Influence the Adoption of Instructional Technology

The way in which faculty members perceive the technologies that are available is of significance as the use of technology within the classroom continues to be a teacher-level choice in many contemporary educational institutions. Existing research indicates that there is a gap between the technologies that are available and the actual use of those tools. For example, a 2010 study performed by the National Center for Educational Statistics (Gray et al., 2010) found that less than half of the 3,000 teachers who were surveyed made use of the available tools for
instructional purposes. Instead, technologies were largely employed for performing administrative tasks like tracking attendance and grading papers. Other studies have replicated these findings and demonstrated that the use of technology is largely associated with communication (Russell, Bebell, O’Dwyer, & O’Connor, 2003; Zhao, Pugh, Sheldon, & Byers, 2002) or the preparation of teaching materials (Cuban, Kirkpatrick, & Peck, 2001; Russell et al., 2003). The findings of studies of this nature have motivated people to question the amount of money that is being invested in the use of technology in learning establishments (Cuban et al., 2001; Machin, McNally, & Silva, 2007; Oppenheimer, 2004). One explanation as to why teachers do not make the most of the technologies available is that they encounter a number of barriers when attempting to incorporate technology in the classroom (Kopcha, 2012). This theme encompasses the following sub-themes: barriers to adoption and facilitators/motivators for adoption.

**Barriers to Adoption**

It is important to establish the reasons why teachers fail to make use of the technologies that are available to support learning and teaching. First- and second-order barriers typically hamper faculty members’ efforts to embrace instructional technologies. This section will explain the extant research that has examined the different barriers to adopting technology. Ertmer (1999; Ertmer et al., 2012) was among the first scholars to evaluate faculty adoption of technology and barriers to technology use. The barriers that were identified were sub-divided into either first-order or second-order barriers. First-order barriers are those that are beyond the control of educators and include a lack of support and resources. Early integration efforts have typically focused on getting rid of these barriers as they are usually easier to identify, measure, and address; for example, more money can be invested in training interventions (Ertmer, 1999,
Early assumptions were that technology integration is relatively easy to achieve once the appropriate hardware and resources have been put in place. Schifter (2000) ascertained that Ertmer’s first-order barriers continued to plague faculty members and he found that the most significant barrier educators encountered was a lack of technical support. Furthermore, many teachers believed that their institutions did not support the use of technology, and this caused faculty members to develop the assumption that the technology lacked stability and students to believe that appropriate levels of technical assistance were not available. Schifter recommended that faculty members need to be trained in the use of technology; however, not all teachers require the same level of learning. Although first-order barriers are not as pervasive as they once were, they are still a problem in many institutions.

According to Ertmer (1999; Ertmer et al., 2012), second-order barriers are those that are entrenched in a faculty member’s underlying beliefs. These views are typically not evident to external parties and may even not be recognized by the individual concerned. Although it is possible to overcome second-order barriers through tasks such as reflection and benchmarking best practices, the awareness that is needed for effective technology use represents an important factor that should be taken into consideration when developing technology adoption strategies.

Developing an understanding of both first- and second-order barriers is critical to increasing the adoption of instructional technology within educational facilities. Progressing the work conducted by Ertmer (1999), Kidd (2010) performed a qualitative study in which he interviewed 25 participants, evaluating the “lived” experiences of teachers who employed ICT in a higher education setting. The outcomes of the study indicated that adequate and quality resources, administration leadership, organizational support, faculty development, and change impacted teachers’ ability to employ ICT within the classroom. Fundamentally, the
organizational support challenges represented the most substantial challenges. These challenges included a lack of solid policies that govern the way in which technology use is supported, a lack of incentives to develop such policies, and a lack of resources within the department to develop the required skills.

The extant literature has reviewed the barriers that impact the integration of instructional technologies in depth (Ertmer, 1999; Hew & Brush, 2007). The findings of these studies are summarized below:

- **Access.** Teachers believe that they lack access to technology, even in situations in which it is available, because it does not work properly (Clark, 2006; Lim & Khine, 2006; Zhao et al., 2002) or because it does not add value to teaching interventions (Norris, Sullivan, Poirot, & Soloway, 2003).

- **Vision.** Teachers who possess a strong administrative vision as to how the technology can be used are less likely to abandon their efforts to integrate technology in the classroom when barriers emerge (Park & Ertmer, 2008; Sugar & Kester, 2007).

- **Beliefs.** The extent to which teachers use technology in the classroom is directly influenced by their perceptions of its usefulness and the challenges associated with using it (Inan & Lowther, 2010; Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010; Vannatta & Fordham, 2004).

- **Time.** Teachers believe that using technology in the classroom requires more of their time: a) to manage student misbehavior when using the technology (Bauer & Kenton, 2005; Lim & Khine, 2006; Wachira & Keengwe, 2011) and/or b) to plan for and learn to use it (Al-Senaidi, Lin, & Poirot, 2009; Clark, 2006; Lim & Khine, 2006).
Over the course of the last ten years, the use of technology in schools in the United States has attracted increasing attention amid efforts to foster innovation and develop the nation’s competitiveness on a global scale. In 2014, Congress initiated the nonprofit Digital Promise (2014) to support in-depth R&D that could help US students to acquire the knowledge, skills, and understanding they require to operate effectively in a global economy. In 2013, President Obama announced the launch of ConnectED, a program designed to ensure that over 99% of the schools in the United States were online by 2018 (Slack, 2013). Furthermore, in collaboration with the Federal Communications Commission and in excess of 300 educational thought leaders, the U.S. Department of Education developed a blueprint through which digital learning could be integrated into America’s K-12 schools (2013). Policies of this nature have led to the rapid adoption of technology in many schools (McKnight, O’Malley, Ruzic, Horsley, Franey, & Bassett, 2016).

Buchanan, Sainter, and Saunders (2013) performed an online survey of 114 teachers at a large university in London, UK, in which the respondents were required to complete a measurement of Internet self-efficacy, report their use of learning technology, and describe the barriers that impeded adoption. The findings revealed that the faculty members involved experienced two main obstacles to adoption: structural constraints within the educational establishment and the perceived effectiveness of the tools. The regression analyses highlighted
how these variables in combination with Internet self-efficacy were connected to the use of online learning technologies.

Reid (2014) performed a review of the existing literature on barriers to instructor adoption and ascertained that some issues represent more of a barrier than others. The literature that was included in this study spanned a range of topics including the absence of a solid definition of what successful adoption looks like, a lack of appropriate professional development opportunities, and opposition due to self-efficacy or conflicts with pedagogical perspectives (Reid, 2014).

**Facilitators/Motivators that Influence Faculty Adoption**

Groves and Zemel (2000; see also Ali, 2003) surveyed university faculty members who were responsible for training future teachers with the intention of gaining insights into the rewards and challenges associated with the use of technology. Within the survey, the faculty members were required to explain the motivations as to why they preferred to use one technology over another, such as ease of use, and/or the barriers, such as lack of time, that prevented them from taking advantage of the technologies that were available. The implementation of new technology relies on the same level of support as that required when the extant technology was introduced. In response to their findings, the researchers developed an online channel that offered training resources to support the introduction of new applications.

Sahin and Thompson (2007) surveyed 43 teachers from the College of Education (COE) at a large Midwestern university in the United States. They employed the learning/adoption trajectory model of technology adoption to ascertain the extent to which the level of adoption of instructional technology could be predicted according to the responses the teachers gave to a questionnaire that spanned four areas, namely participant demographics, computer experience,
instructional hardware used in teaching, and methods of learning about technology. The findings revealed that there is a significant correlation between the faculty members’ adoption of technologies and the availability of online sources, instructional courseware, up-to-date technology, self-directed informational sources, non-traditional operating systems, data analysis tools, collegial interaction, and management tools. However, the evaluation of the combined implications of these eight influences revealed that only three – data analysis tools, collegial interaction, and self-directed informational sources – were significant predictors of the level of technology adoption (Sahin & Thompson, 2007).

Many studies have focused on the adoption of new technology within classrooms; however, relatively fewer studies have examined the reasons why educators cease using the technologies that are available (Shelton, 2017). Shelton (2017) performed a multi-site case study involving university lecturers that examined faculty members’ adoption of technology. The study aimed to produce narrative profiles of eleven university lecturers’ engagement with technology through an indirect interview method. The findings revealed that there were three situations in which the lecturers stopped using the available technologies, namely when technologies were replaced, when they had a negative experience with the technology, and when the context changed.

The findings of this research reinforced the notion that technology use is “socially and historically conditioned” (Shelton, 2017, p. 32) and that there is a correlation between broader cultural values and technology use. Participants opted to cease using technology as a result of students’ responses to its application. Generally, the outcomes of the research demonstrate how it isn't enough to merely adopt the new technology: Its ongoing use relies on various social and technical factors. Furthermore, teachers have different perceptions of agency use.
Thanaraj and Williams (2016) examined the way in which the administrators of academic institutions can help academics to implement technology-enhanced learning (TEL) interventions and, through doing so, make a positive contribution to student learning outcomes. The findings of the research highlight how a contextual analysis of the aspects that motivate or constrain academics in implementing technologies is required to develop strategies that effectively transform student learning. Universities should explore how the motivators can be enhanced and the barriers can be removed to implement TEL in an institution according to its unique nature.

Studies that have examined the challenges associated with implementing TEL in universities (Beetham & Sharpe, 2013; Thanaraj & Williams, 2016) argue in favor of the sustained implementation of technology to improve learning, teaching, and assessment across various modes of delivery. Scholars suggest that it is imperative that educators look beyond the technology itself and instead focus on fundamental pedagogical and cultural aspects.

The practices that are in use in the majority of educational establishments around the world have endured, as many classroom undertakings remain focused on standards, outcome measures, and grades. Very few schools have increased their efficiency (reducing operational costs) or effectiveness (enhancing learning outcomes). In fact, contemporary technology may have increased the costs of running schools in a variety of ways (Lim et al., 2013).

Schifter (2000) surveyed full-time faculty, deans, and senior administrators to ascertain the motivational and inhibiting factors associated with the use of technological innovations within an inner-city, research-intensive state institution. They found that the most significant motivational factors that influenced technology adoption were personal in nature.

Additional scholars have reinforced the assertion that students are more successful when a combination of pedagogy and instructional technology is employed. A meta-analysis
performed by Tamim, Bernard, Borokhovski, Abrami, and Schmid (2011) supported the notion that technology-aided learning can have positive implications. Furthermore, the use of computer technology in K-12 classrooms has a more substantial effect than the use of technology in post-secondary classrooms.

**Conclusion**

First-order and second-order barriers were heavily researched by Ertmer (1999, Ertmer et al., 2012). His formative work laid the foundation for other researchers, like Thanaraj and Williams (2016), to investigate how universities can support academics to implement TEL strategies and, thereby, contribute to student learning. Several studies have researched the factors that act as barriers and prevent faculty members from adopting instructional technology; however, very few, if any, address what motivates faculty members to use instructional techniques to support or improve their pedagogy. In addition, enabling factors have not been researched to the same extent as barriers to implementation. Further research needs to extend the work of Sahin and Thompson (2007) by analyzing the combined effect of the eight factors that these scholars identified. It would be useful to ascertain whether the finding that only the use of self-directed informational sources, collegial interaction, and data analysis tools are significant predictors of the technology adoption level (Sahin & Thompson, 2007) can be replicated.

Very few studies in the field of technology adoption privilege the academic’s voice and lived experience. Further research should examine the adoption of TEL by exploring how the motivators drive TEL forward within an institution and the methods by which any restraining factors can be removed. Advocates believe that academics and academic leaders play a fundamental role in driving TEL initiatives and establishing the right conditions for the adoption of instructional technology (Thanaraj & Williams, 2016).
Understanding Faculty Identity and Technology Integration

Understanding how faculty members perceive technology is fundamental to understanding adoption. Hsu and Chiu (2004) found that faculty members who rated themselves high in an Internet self-efficacy report used more learning technologies than those who ranked themselves low. This result is connected with higher intentions to use technology and the actual use of online services. This theme includes the following subsections: faculty self-efficacy and perceptions and the strategies for optimal professional development.

Faculty Self-efficacy and Perceptions

Rogers (1995) found that the educator's perception of stereotypes can be a self-fulfilling prophecy. For example, change agents may fail to connect with non-adopters on the basis of the assumption that these individuals are not interested in change. However, as their input is not sought, non-adopters are even less likely to adopt the technology (Nicolle & Lou, 2008). Gall, Borg, and Gall (1996, cited in Nicolle & Lou, 2008) found constructs, themes, and patterns in a set of interview data that emphasized the importance of faculty members being supported by both the institution and their peers (Nicolle & Lou, 2008).

Nicolle and Lou (2008) performed a mix-method study in which they examined the implementation of technology within the classroom and the motivations and barriers to their adoption. Their research predominantly focused on mainstream faculty members’ endorsement of technology. They examined the institutional perspective that the lack of diffusion of technology can be attributed to the late majority or laggards described within Roger’s diffusion of innovation theory (Nicolle & Lou, 2008).

Buchanan et al. (2013) ascertained that there is a positive correlation between Internet self-efficacy and faculty members' use of technology. Furthermore, they also found that low
perceived usefulness and barriers are correlated with lower reported use. According to these findings, faculty members’ use of learning technologies is influenced by both individual and contextual factors alike (Buchanan et al., 2013). Structural factors, perceived usefulness, and Internet self-efficacy are all correlated with faculty members’ adoption of learning technology. The fact that structural constraints were determined as playing a significant role highlights the need to incorporate this variable in models of technology acceptance (Buchanan et al., 2013).

In terms of individual factors, those teachers that report high levels of Internet self-efficacy are more likely to use the technologies that are available than those who report low levels (Hsu & Chiu, 2004). This finding highlights the correlation between higher Internet self-efficacy and intention to use technology.

There is a significant relationship between Internet self-efficacy and faculty members’ adoption of technology. However, there is a need to explore causality in this context. It is feasible that higher Internet self-efficacy can be traced back to the extended use of the tools, as opposed to vice versa. This suggestion is consistent with the findings of Torkzadeh and Van Dyke (2002), who ascertained that engagement with technology (for example, during a training course) can enhance Internet self-efficacy levels. This indicates that increasing Internet self-efficacy by training teachers in the use of technology could promote the use of technology by increasing its perceived ease of use and faculty members perceived behavioral control.

Vongkulluksn et al. (2018) surveyed 624 teachers who taught students in classes ranging from sixth to twelfth grade together with 20 administrators from 16 schools located in a Midwestern state of the United States. The outcomes of their research highlighted the important role that teachers’ value beliefs play in the integration of technologies in the classroom. First, there was a direct correlation between value beliefs and the teachers’ technology integration in
practice. Second, the teachers who believed that technology would enhance their teaching invested more time in the classroom using the technologies that were available. The outcomes of the research highlighted how value beliefs represent a sounder predictor of integration than educators’ level of confidence with technology use, something that prior studies have demonstrated to represent a reliable indicator of technology integration (Wozney, Venkatesh, & Abrami, 2006). Furthermore, teachers’ value beliefs were also a reliable indicator of how effectively they integrated technology, including how they invested in technology to facilitate student-centered learning experiences and higher-order tasks. These findings are aligned with previous research into technology integration that highlighted the significant impact that educators’ value beliefs have on the use of technology within the classroom (Ertmer et al., 2012; Wilhelm et al., 2008; Wozney et al., 2006). Research has also ascertained that value beliefs have a salient influence on classroom technology integration practice through moderation and mediation. In addition, studies have found that the way in which educators internalize technology access and their value beliefs play a fundamental role in this process. Specifically, the outcomes indicate that value beliefs moderate the extent to which educators translate actual school support into perceived support. Teachers who perceive technology to be available in the classroom tend to intensify their access and place less focus on access constraints when they consider the external barriers that exist in the school context.

Ali (2003) examined the efforts that have been made to help faculty members integrate technology into their teaching practices by considering training interventions and interviewing faculty members. A focus was placed on teachers’ perceptions of technology and the role it can play in the educational setting. A series of suggestions for improvement were put forward that placed an emphasis on the requirement for enhanced support from the institution and the
appropriate administrative, technical, and instructional framework. Ali (2003) observed that while faculty members’ use of technology in colleges is increasing, it is not particularly pervasive. Many educators do not have the training, motivation or opportunity to make use of the technologies that are available. As such, a distinct focus needs to be placed on addressing these needs (Ali, 2003).

Salter and Hansen (2001) performed a case study on a web-based software application called Platform Web, in which they examined the diffusion and adoption of technology. Platform Web merges a content delivery system with an administrative software system in a way that is designed to enhance economies of scale (Hansen & Salter, 2001).

Kopcha, Rieber, and Walker (2016) performed a mixed-method study in which they aimed to gain insights into faculty members’ perceptions of the role of innovation in teaching in a school of education at a research-intensive university. They employed the Q methodology, which is a mixed-method approach that incorporates both quantitative and qualitative analysis of descriptive data. The outcomes indicated that distinct perspectives impacted the achievement of the goals of the initiative. Both the deeper understanders and the deeper-purpose seekers expressed beliefs about the role of innovation in teaching. Although both perspectives were positive, they were different in nuanced, yet important, ways. Deeper understanders were concerned with the way in which technology can enhance understanding, while deeper-purpose seekers were concerned with if and how technology facilitates an individual’s teaching philosophy, irrespective of the extent to which it facilitates understanding. The big picture reflectors were also positive about the role of innovation in the classroom. This group believed that the use of technology can help students to gain perspective on their immediate community
and that this enables them to focus more on social relationships as opposed to content (Kopcha et al., 2016).

Gebremedhin and Fenta (2015) examined educators’ views of assimilating information and communication technology within teaching-learning interventions. Their objective was to evaluate educators’ use of the technical tools available, assess other instructional resources and materials, and verify teachers’ preferences for professional development in terms of information acquisition. The outcomes revealed that there was a significant correlation between the educators’ perceptions of the integration of ICT in the teaching-learning process and the factors that promote ICT usage, suggesting that teacher’s perceptions of the integration of ICT within the teaching-learning process can be enhanced if the use of ICT is promoted, and vice versa. In addition, there was a significant correlation between the educators’ perceptions of the extent to which ICT applications can enhance the quality of learning experiences and their productiveness as a result of ICT usage. That is, the integration of ICT in teaching practices enhances the productivity of teachers (Gebremedhin & Fenta, 2015). Understanding the beliefs of faculty members can play an effective role in professional development strategies.

**Strategies for Optimal Professional Development**

Although important, teacher training and professional development are not always taken into consideration when introducing new technologies into the classroom. There should be a focus on supporting teachers to use technology effectively (Georgina & Hosford, 2009). A report that was recently published by EDUCAUSE disclosed that teachers who are dedicated to the use of ICT and motivated to implement it in their classrooms are increasingly calling for professional development opportunities that will provide them with the skills they need to introduce technology into the classroom environment (Dahlstrom et al., 2014). Green (2002) described
how assisting teachers to implement the integration of technology in classrooms continues to represent a major challenge for technology planners. Effective training interventions should focus on two main areas: The development of the appropriate technical skills and the effective use of the technology that is available in line with the pedagogy.

Spotts (1999) researched user levels of technology and identified three types of users according to their perceptions of the value of technology: high-, medium-, and low-level users. High-level users, for example, believe that instructional technologies deliver significant benefits to teachers and students, while low-level users hold an opposing view. Spotts concluded that in situations in which faculty members need to use technology, it is important that they are provided with an appropriate level of technological support (promotion and tenure considerations). Additional dynamics that play a role in the success of technology implementations include training and time.

Novitzki (2000) examined the levels of user proficiency associated with asynchronous learning tools. Again, he identified three levels: low-, moderate-, and high-use. These findings replicate those of Spott’s (1999) and provide a starting point from which it is possible to determine technological literacy proficiency. In combination, these studies provide a convincing tool by which it is possible to allocate user levels according to their technological literacy.

Fundamental to the comprehension of technology training is the notion that instructors prefer technology training that is aligned with their pedagogy as opposed to being purely focused on the ways in which the tools work (Georgina, 2007). The findings in this area support those of additional studies that have highlighted how there is widespread low-level use of technologically enhanced pedagogy yet a more sporadic high-level use (Ertmer, 2005). Georgina and Hosford (2009) performed a quantitative web-based study involving 237 faculty members. The outcomes
revealed that the faculty members believed that the most effective method of learning a new computer-based technology is to work in small groups with trainers (Georgina & Hosford, 2009).

The method by which technical training is delivered can be of significance. Technology in isolation does not enhance pedagogy. The effective use of technology relies on the successful integration of the tools that are available within the overall learning environment. Teachers need to undergo professional development so that they can access and use the tools to their full potential within a given learning intervention. Ertmer et al. (2012) performed a multiple case-study research approach in which they evaluated the similarities and differences between the technological practices and pedagogical beliefs of twelve K-12 classroom teachers. They employed two main data collection approaches, namely in-depth analyses of educators’ websites and one-on-one interviews. The websites were a source of information about the technology practices that were in use in the classrooms, while the interviews provided insights into the extent to which the teachers' beliefs were in support of those practices. The outcomes indicated that there was a close alignment between student-centered beliefs and student-centered practices. In addition, those teachers who had student-centered beliefs were likely to implement a student-centered approach irrespective of any assessment, technological or administrative barriers. Hence, the teachers’ perceptions of the role technology can play in student learning directly impacted success. Furthermore, the majority of participants revealed that internal factors, such as a passion for technology and the adoption of a problem-solving mindset, in combination with support from others played significant roles in determining their practices (Ertmer et al., 2012).

A multidisciplinary group at Butler University collaborated with representatives from Institutional Research to employ a collaborative training model with the objective of positioning technology training within a pedagogical context. As an outcome of the team effort, 27% of the
members of the university faculty underwent technology training over a three-month period (Friel, Britten, Compton, Peak, Schoch, & VanTyle, 2009).

Georgina and Olson (2008) assessed how the literacy and technology training that faculty members are exposed to can have an influence on their pedagogy by studying the relationship between the technical literacy of educators and their pedagogical practices. The outcomes revealed that there was a significant relationship between technological literacy and pedagogical practice. These outcomes replicate those of other studies that have found that educator technology training is most effective when it focuses on the use of the technology within the educational context and when the faculty members involved are trained in small groups.

Jorgensen et al. (2018) examined the technology-related pedagogical approaches that were employed by instructors who were of the perception that their students were excellent at using technology. The results revealed that male and female professors reported equal aptitude and comfort in the use of technology. The outcomes also highlighted that the educators’ teaching experience directly influenced their self-rating of their ability to use technology in the classroom. The majority of educators involved had taught themselves how to use the available technologies through accessing help from peers and students or through a process of trial and error.

Professional development efforts involving instructional technology are associated with a range of challenges. Although a large number of workshops are available to help educators adopt new instructional technologies, these are not commonly mentioned as a source of their proficiency. Furthermore, the training interventions that are available seldom meet the needs of the educators. Professional development opportunities need to progress beyond the concept that reducing barriers alone will be sufficient. Moreover, providing educational establishments with tools will not be enough to ensure that they are used effectively in a pedagogical context. The
challenges that most frequently emerge are institutional and technical in nature. Furthermore, there is evidence to suggest that professional development activities are failing to meet the needs of educators. Professors seldom refer to the workshops that are offered by the educational institution at which they work as their favored method of learning how to use new technologies. In addition, educators commonly say that they require more time to use technologies in their teaching. These findings replicate those of Reid (2014) and Gebremedhin and Fenta (2015).

Educational facilities need to actively invest in teacher training programs and the associated support services. It is also imperative that educators are motivated and rewarded for exploiting ICT in the classroom. There is a requirement to ensure that technology needs are taken into consideration during curriculum design and that focus is placed on developing an environment that is conducive to the use of the technological tools that are available. Baran (2016) conducted a comprehensive evaluation of the success factors and strategies that were critical in a faculty technology mentoring (FTM) program that was developed to support a graduate technology course. Their case study concentrated on the way in which twelve faculty members from different colleges adopted technology within a research university. By accessing both faculty members’ and their mentors’ perspectives and compiling information from multiple sources, they were able to drive meaningful insights into the implementation of technology in higher education classrooms. Each of the cases involved one pair: a mentor and a mentee. The researchers assessed the implementation of an FTM program as part of a university-wide professional development framework and sought to identify the success factors and important strategies that could facilitate teachers to adopt technology in their teaching approaches. The objective of the study was to foster evidence-based discourse of an FTM model that is specifically attuned to the needs of faculty members who operate in the university context. The
research participants consisted of twelve faculty members (mentees) and twelve graduate students (mentors), who were paired as part of the FTM program. The researchers evaluated the mentors’ weekly blog posts and complemented this information with an analysis of case reports and interviews with faculty members. As a result of this analysis, six critical strategies were identified: determining needs; exploring the affordances and limitations of the technology; scaffolding; sharing feedback; connecting technologies, pedagogy, and content; and evaluation (Baran, 2016). The factors that were determined to influence success included participant motivation, participant propensity to rise to challenges, the nature of the mentoring relationships, communication channels, and support. However, regardless of these success factors, high-level technology integration remains inconsistent and low-level technology use prevails (Ertmer, 2005).

The final topic that is worth discussing in relation to the professional development of educators is the lack of training opportunities. If university support staff do not know how to use a given technology, they will not be able to support students or other faculty members to use it. One common complaint is that there is a lack of support available to those who do wish to use contemporary technologies in their classrooms. However, it is not only professors who benefit from ongoing assistance. McLoughlin, Wang, and Beasley (2008) highlighted the need for all support staff to undergo training. Students may also encounter barriers when attempting to make the most of technological tools, and these problems can often represent further problems for faculty members. The lack of instructor capabilities and understanding represents a major barrier that impedes the adoption of instructional technology and the delivery of effective instruction. Even if the technology is perceived to be easy to understand, mastering the art of using it to enhance learning outcomes is a sine qua non.
Conclusion

The existing research indicates that there is a positive relationship between faculty members’ perceptions of technology and their willingness to employ instructional technologies within their teaching and learning approaches. Ertmer et al. (2012) examined the implications of a close alignment between student-centered beliefs and undergraduate student-centered practices (authenticity, student choice, and collaboration). They found that teachers who demonstrated student-centered beliefs typically delivered a student-centered curriculum, regardless of any technological, administrative or assessment barriers they encountered. Furthermore, there is evidence to suggest that educators’ perceptions of the relevance of technology in learning experiences ultimately impact the success of technology-based implementations. In addition, teachers’ value beliefs are also a reliable indicator of how well the teachers exploit integrated technology, use technology to foster student-centered instruction, and engage in higher-order tasks (Wozney et al., 2006).

There is a need for professional development to extend beyond the notion that reducing barriers will be sufficient to foster professional development. The adoption of technology is not purely related to the existence of barriers. Furthermore, simply providing institutions with technology is not adequate to ensure that those tools are effectively exploited in a pedagogical context. The challenges that most frequently emerge are institutional and technical in nature. The professional development opportunities that are currently available are failing to meet the needs of faculty members. Despite the availability of training workshops, professors rarely mention them when describing the approaches to learning technologies that are most effective. They also highlight how they need more time to familiarize themselves with the available tools before implementing them in the classroom context. These findings replicate those of Reid (2014) and
Gebremedhin and Fenta (2015). To optimize the outcomes of professional development opportunities, there is a need for teachers to participate in small-group training programs. To engender a holistic approach to development, both staff and students need to have access to training programs.

**Conclusion**

Significant investment has been made in offering technology-based learning experiences in contemporary education. However, gaps and barriers remain that undermine the efficiency and effectiveness of these technologies. Increasing investment in technology does not automatically equate to effective ICT adoption practices that enhance learning outcomes (Oppenheimer, 2004). Higher education facilities invest millions of dollars a year on instructional technologies; however, despite this investment, many educators do not make use of the tools that are available (Reid, 2014). This literature review focused on three main areas: improving the student learning experience, factors affecting instructional technology adoption, and understanding faculty identity and technology integration.

Further research needs to be performed to understand the barriers that impede the integration of technology from the perspective of faculty members. This would involve identifying which barriers are more critical than others through the development of some form of a definitive ranked list. By identifying which barriers faculty members are more likely to encounter and delineating how these barriers can be overcome, it may be possible to identify the best practices by which faculty members can be supported. The framework of categories of barriers presented in this paper could provide contemporary institutions with a starting point from which they can approach the adoption of instructional technology with a plan to mitigate
and minimize as many barriers as possible, thereby improving the chance of success (Reid, 2014).

There is a gap in the existing literature. While numerous studies have examined the barriers that impede the adoption of instructional technology, very few (if any) have examined the factors that motivate faculty members to adhere to or change their pedagogy. While many universities are investing a significant amount of money in the development of the infrastructure required to support technology in the classroom, there remains a chasm between the availability of technology and the way in which it is integrated into larger educational models. Institutional and administrative support are critical elements that can help faculty members to overcome barriers. Such support mechanisms include organizational support, adequate and quality resources, faculty development, administration, leadership, and change. There is a need to develop a more in-depth understanding of the experiences of faculty members and the elements that act as barriers to the adoption of technology in teaching and learning practices.

Studies have mentioned several key factors that influence professional development efforts. The connection between the perception of teachers’ own beliefs and attitudes relative to technology and the reality of student learning seem to have the most significant influence on the success of technology-based learning experiences. It is important that professional development is not an afterthought during the process of introducing new technologies; on the contrary, it should form a cornerstone of any plan to integrate ICT within the classroom. The professional development opportunities that are currently available are not meeting the needs of faculty members. Educators want professional development that is grounded in pedagogy and will help students learn their respective disciplines. Faculty find small-group or one-on-one mentoring-based approaches to be the most effective. They also appreciate online projects that allow them
to work at their own pace. The standard model of workshops does not appear to be meeting the needs of faculty members. A further factor that influences faculty member's perceptions of the use of technology in the classroom is that of institutional and peer support. Without training, a faculty member is much less likely to adopt new technology. There is also an awareness that faculty members are only one part of the puzzle of technology adoption, and staff and students are often involved and require training as well. Understanding educators’ experiences with professional development will help educational institutions to deliver more effective interventions.

Kidd (2010) also identified a gap in the extant research related to several key models of technology integration. The limitations of the current models, such as Roger’s theory and the other models described in Kidd’s paper, do not adequately address the experiences of faculty members during the adoption process, the social or cognitive variables that shape individuals’ abilities to adopt ICTs or the individual factors that may hinder or accelerate educators’ decisions or ability to adopt technology innovation. To address this gap, Kidd (2010) suggested examining the lived experience of educators who adopt ICTs for teaching and learning purposes.

Thanaraj and Williams (2016) investigated how universities can support academics during the process of implementing the university strategy on TEL, thereby contributing to the transformation of student learning. Their results suggest that individual universities should undertake a contextual analysis of the factors that motivate and constrain academics in their organizations to engage with technology in curriculum delivery and development. Enabling factors have not been researched with the same frequency as barriers. Furthermore, few studies in the field of technology adoption have examined the academic’s voice and lived experience.
Despite the existing work in this area, further study is needed to examine many outstanding questions regarding the adoption of TEL (Thanaraj & Williams, 2016).

The goal of this study is to research how tenure-track faculty members from the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies within their teaching. Chapter three will explain the methodology underpinning this study.
Chapter Three: Research Design

This interpretive phenomenological analysis (IPA) investigation is intended to examine the effect the adoption of instructional technology in teaching has had on tenure-track faculty. Although considerable finances in higher education have been allocated to professional development in terms of technology, numerous tenure-track faculty members still avoid using instructional technology for teaching. This research will examine the experiences of those who have adopted instructional technology in order to discover the motivation, in terms of attitude and skills, that can be passed on to those who do not use technology. It could be useful to gain an understanding of the type of hurdles those using technology had to surmount in order to introduce instructional technology into their teaching. It is essential for those attempting to encourage the adoption of instructional technology to gain an in-depth understanding of both what encourages adoption and what discourages it. The research question that this study will seek to answer is: How do tenure-track faculty members in the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies into their teaching?

Qualitative Research Approach

Qualitative research is a process whereby the researcher accumulates several forms of data, undertakes analysis, and employs inductive and deductive reasoning for the interpretation of the data in order to find a solution to actual problems (Creswell, 2013). Qualitative methodologies permit the researcher to demonstrate the importance of extensive data collection in increasing our comprehension of a particular topic (Patton, 2002). Miles and Huberman (1994) suggest that qualitative data, which focuses on “lived experience”, is particularly suitable for revealing how people interpret structures, processes, and events in life and how they connect
these interpretations to the society in which they live (p. 10). Maxwell (2005) stated that qualitative research possesses an "inherent openness and flexibility", allowing researchers to "understand new discoveries and relationships" (p. 22).

Creswell (2013) stated that there are eight elements to qualitative research. Researchers using this method amass their data in the participant’s natural setting, visiting the place in which the participants carry out the research topic. Researchers are the principal instrument for data collection, employing multiple methods to do so. Having collected the data, it is then the task of the researcher to interpret it. The identification of the participants’ meaning regarding the topic under investigation is not a set process for quantitative research design; design is emergent. In this research, the interview questions are semi-structured, but there must be a degree of flexibility built into the research as data gathered at one point may be influential for future points (Creswell, 2013).

Expanding on these eight characteristics of qualitative research set out by Creswell (2013), Miles, Huberman, and Saldaña (2014, p. 20) offered a list of analytical methods that can be employed in a variety of quantitative research:

- Coding documents, interview transcripts or field notes;
- Arranging and investigating coded data to find similarities in phrasing, the relationships that variables, categories, themes, and patterns have, notable variations for different subgroups, and shared sequences;
- Separating patterns and processes, what is shared and what is different, and using them to influence the next data collection initiative for fieldwork;
- Making a note of reflections and other statements with notes, journals, and memoranda;
• Expanding a small group of generalizations, propositions, and assertions that can explain any inconsistency found in the database;

• Making comparisons of these generalizations with the formal literature in terms of theories and/or constructs.

This research employs the constructivist-interpretivist paradigm. The paradigm specifically employs a qualitative approach to investigating problems, encompassing the recognition that there are a variety of realities, all of which have equal validity (Ponterotto, 2005). By means of in-depth investigation and conversation, researchers can gain access to the reality inside the participant’s mind. The aim is to reveal a story that has its basis in the lived experience, or *Erlebnis*, the participant has. The paradigm is very much emic and it has a focus on individuals and looks at the particular types of behavior and culture that are specific to the individual. Unlike post-positivism, interpretivism acknowledges the researcher’s personal values, provided they are kept in check. As the researcher/participant relationship demands contact between the two for a considerable period, it is virtually impossible for the researcher not to show some bias. A researcher may have a sense of identification with the experience of the participant. Also, as the participant and researcher interact over time, it may be possible for experiences buried deep in the participant’s consciousness to rise to the surface.

Hermeneutic phenomenology is supportive of ontological perspectives of lived experience, a place in which “reality is constructed, fluid, and relative” (Armour, Rivaux, & Bell, 2009, p. 106). Additionally, the “subjective nature of mankind can only be known or understood by interpreting the human experience of being” (Armour et al., 2009, p. 106).

This study is aligned with qualitative research approaches inasmuch as it attempts to gain an understanding of the reasons for the adoption of instructional technology by tenure-track
faculty members. The aim of this research is to comprehend their lived experience and the way in which these teachers interpret their experience of the adoption of instructional technology in their practice. It is suitable to employ the constructivist-interpretivist paradigms as this research aims to examine the subject from the point of view of these teachers.

**Methodology: Interpretative Phenomenological Analysis**

IPA encompasses three key areas related to the philosophy of knowledge: phenomenology, hermeneutics, and ideography (Smith, Flowers & Larkin, 2009). IPA implies a double hermeneutic approach, with the researcher attempting to interpret the subject, and the subject attempting to interpret the phenomenon. The above-mentioned research emphasizes that the researcher experiences the subject's story coming from the subject, but as interpreted by the experience of the researcher (p. 36). The most important part of the process is the subject's interpretation, with interpretations from the researchers being secondary (Smith et al., 2009).

There are three essential elements of IPA: phenomenological, hermeneutic, and ideographic. Smith et al. (2009) described IPA as “an approach to qualitative, experiential and psychological research which has been informed by concepts and debates from three key areas of philosophy of knowledge: phenomenology, hermeneutics, and ideography” (p. 11). Furthermore, IPA uses all of these theories to influence its unique epistemological framework and research methods. “Phenomenology is a philosophical approach to the study of experience” (Smith et al., 2009). Additionally, IPA is phenomenological in terms of having the aim of identifying what subjects feel their experience means and how they interpret such meanings (Smith, 2011). Essentially, IPA is focused on extracting meanings from human experiences (Shaw, 2010).

The second essential element of IPA is hermeneutics, i.e. the study of interpretation (Smith et al., 2009). Phenomenology, which Edmund Husserl created as an eidetic method,
involves examining the ways in which subjects perceive and experience. In essence, its purpose is to isolate the particular elements of a phenomenon or experience that make it individual or separate from other experiences. Phenomenological research is focused on the ways in which subjects view and communicate their view of events and objects instead of looking at phenomena using a preset system of categories established through the use of scientific/conceptual criteria (Pietkiewicz & Smith, 2014). The process of analysis employed in IPA is frequently referred to as a double hermeneutic, whereby first subjects interpret their world, and then the researcher attempts to extract meaning to interpret the ways in which the subjects have created meaning. In addition, IPA uses a synthesis of concepts from hermeneutics and phenomenology, which results in a descriptive methodology (as it deals with the appearance of things and allows them to state their own meaning) and an interpretive methodology (as it acknowledges that uninterpreted phenomena do not exist) (Pietkiewicz & Smith, 2017).

The third essential element is ideographic analysis, referring to the deep analysis of specific cases and looking at the personal perspective of subjects in their particular and unique settings. The ideographic methodology is based around undertaking an exploration of all cases prior to the production of general statements. This is in contrast to the nomothetic principles that are at the root of the majority of empirical psychological work, whereby groups/populations are examined in order to reveal the probability of particular phenomena appearing in specified conditions. Additionally, IPA is reliant on the ideographic methodology, causing researchers to focus on the specifics, not the general (Smith, Harré, & Van Langenhove, 1995).

This research uses IPA as its methodology. Phenomenology has its foundations in a pair of philosophical theories established by Heidegger (2011) and Husserl (1970). Researchers employing Husserl’s descriptive methodology follow the content closely as it arrives and
sequester any information, they had about the particular phenomenon beforehand (Giorgi, 2012). The interpretive (hermeneutic) phenomenology of Heidegger has its basis in the concept of “being there” (Giorgi, 2012), i.e. it is impossible to sequester or separate oneself from an experience. In this methodology, a researcher’s beliefs are not seen as a bias that must be removed but as something that is essential for the interpretation of individual encounters with phenomena (Heidegger, 2011). Selecting a qualitative hermeneutic (interpretative) phenomenological technology for research entails thinking carefully about ontological and epistemological prejudices (Slevitch, 2011). Whilst phenomenology examines the essential elements of phenomena, hermeneutics has a focus on how the phenomena are interpreted. Hermeneutic phenomenology also varies from other ways of approaching phenomenology as it permits the employment of theoretical orientation/conceptual frameworks as part of the research (Lopez & Willis, 2004). This research is focused on the exploration of the personal/lived experience of tenure-track faculty who have incorporated instructional technologies into their practice.

Participants

As every individual case requires a nuanced and thorough analysis (Smith, Flowers & Larkin, 2009), this form of research generally works with small sample sizes, usually 5 to 10 subjects (Smith, Flowers & Larkin, 2009). This approach has the advantage of permitting the researcher to acquire a thorough understanding of the subjects and the phenomenon. As this research is focused on a particular environment and cohort, the purposeful sampling method was deemed appropriate. Seidman (2006) proposed purposeful sampling in choosing subjects for qualitative studies, which allows researchers to select those participants who have the greatest familiarity with the phenomenon under investigation.
A report will be run from the enterprise resource planning (ERP) system (Banner) operated by Office of Institutional Research staff, providing a sample of faculty members who meet the required criteria for this research. The required criteria consist of membership of the tenure-track faculty (associate professor/assistant professor/full professor) in the College of Arts and Science at Lehigh University, and subjects must have been employed at the university for a minimum of two years. Other criteria are added on the basis of the work that the subjects have done with the Center for Innovation in Teaching and Learning at the university. The chosen subjects will be those faculty members who are seen as early adopters, innovators, and the early majority on the basis of Roger’s (2003) diffusion of innovation theory. Following selection, researchers will email a letter of intent (Appendix A) to those faculty members who have been shown to meet the aforementioned criteria. From those who indicate a willingness to participate, between eight to ten faculty members will be selected for interview.

**Study Population**

The study participants consisted of nine tenured faculty members from the College of Arts and Sciences at Lehigh University. Table 1 presents a high-level overview of the key demographics of the participants in terms of gender, years of teaching at Lehigh University, faculty rank, and the adopter category that was assigned to each participant according to the level of technology adoption they exhibited in their teaching and learning practices. The latter measurement was based on Roger’s diffusions of innovation theory (2003), which attempts to delineate how, why, and at what rate technologies and inventions are spread. It identifies five types of people within the context of innovation adoption: innovators (2.5%), early adopters (13.5%), early majority (34%), late majority (34%), and laggards (16%). These categories were used to classify the study participants. Several participants described how they were less
technical in their personal lives than they were in their professional lives and acknowledged that they needed to be more technologically advanced with respect to their teaching to successfully connect with students. All the participants were in the top three categories of the model: innovator, early adopter, or late majority. This means that this group of faculty members largely feel confident in their abilities to try new applications and are relatively open to the idea of adopting new technologies and innovations.

Table 1

*Participant demographics*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Years at Lehigh</th>
<th>Faculty Rank</th>
<th>Adopter Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex</td>
<td>M</td>
<td>29 years</td>
<td>Professor</td>
<td>Early Adopter</td>
</tr>
<tr>
<td>Betsy</td>
<td>F</td>
<td>24 years</td>
<td>Professor</td>
<td>Innovator</td>
</tr>
<tr>
<td>Carol</td>
<td>F</td>
<td>15 years</td>
<td>Associate Professor</td>
<td>Early Majority</td>
</tr>
<tr>
<td>Dan</td>
<td>M</td>
<td>11 years</td>
<td>Associate Professor</td>
<td>Early Adopter</td>
</tr>
<tr>
<td>Elliot</td>
<td>M</td>
<td>10 years</td>
<td>Associate Professor</td>
<td>Early Adopter</td>
</tr>
<tr>
<td>Frank</td>
<td>M</td>
<td>9 years</td>
<td>Associate Professor</td>
<td>Early Majority</td>
</tr>
<tr>
<td>George</td>
<td>M</td>
<td>6 years</td>
<td>Associate Professor</td>
<td>Early Majority</td>
</tr>
<tr>
<td>Holly</td>
<td>F</td>
<td>12 years</td>
<td>Associate Professor</td>
<td>Early Majority</td>
</tr>
<tr>
<td>Ian</td>
<td>M</td>
<td>11 years</td>
<td>Associate Professor</td>
<td>Early Adopter</td>
</tr>
</tbody>
</table>
Setting

Lehigh University is a private university established in 1865. There are 5075 undergraduate students enrolled, and 1942 graduate students. The university consists of four colleges: the College of Arts and Sciences, the College of Business and Economics, the College of Education, and the P.C.Rossin College of Engineering and Applied Science. The university plans to add an extra college in 2021. The largest college is the College of Arts and Sciences, containing around 40% of the students on roll. The university awards a number of different degrees, including BA, BSC, MA, MSc, MBA, M.Eng, M.Ed, and Ph.D. The university’s 17 academic departments contain 542 tenure-track faculty members.

Qualitative Research Approach

Data Collection

To undertake this research, the researchers had to gain approval for data collection from the Institutional Review Board (IRB) of both Northeastern University and Lehigh University. Possible subjects were identified from the databases at the Office of Institutional Research and Lehigh University. Once the approval of Lehigh and Northeastern had been obtained, the process of identifying and recruiting subjects began. Possible subjects received a letter of intent by email. This letter of intent detailed the fact that participation was entirely voluntary, how the data would be handled, how much time the subject needed to commit, and how the data were to be kept anonymous. Participants were requested to fill in a letter of intent, and interviews would then be arranged. The interviews were conducted on Zoom, a web conferencing platform, employing an in-depth, one-on-one, semi-structured approach. Semi-structured interviews permit subjects and researchers to speak together in real-time. In the course of the interview, leading questions were
employed to gain more detailed responses from the subject so that the situation of each subject could be completely understood and analyzed (Brocki & Wearden, 2006; Seidman, 2006).

**Data Analysis**

Each interview was recorded using the Zoom web conferencing platform employed for interviewing.

*Step one: Reading/rereading the data.* At this stage, the researcher must become immersed in the original data. This involves reading/rereading transcripts and listening to audio recordings with the aim of becoming fully aware of the participant’s voice (Smith et al., 2009).

*Step two: Initial coding.* At this stage, the researcher annotates and comments on transcripts, thinking about language choices and the meanings while studying them. Annotations/comments should note contradictions, differences, and similarities. Comments should flag phrases and keywords that are descriptive of subjects’ experiences and thinking. Conceptual comments permit the researcher to progress from descriptive analysis to deep analysis. Undertaking such analysis may involve the researcher questioning their own experience, but it is crucial that the subject remains the chief focus (Smith et al., 2009).

*Step three: Developing emergent themes.* The aim in this stage is to retain high-level concepts while undertaking a reduction in the quantity of information. Themes generally take on the shape of phrases that can be used to calculate the essential nature of the experience described (Smith et al., 2009).

*Step four: Finding connections through emerging themes.* This stage is focused on the identification of patterns/connections between emergent themes. Once common areas are discovered between the themes, they are listed and renamed, creating an overarching theme that
identifies the group. It can also be helpful to make connections through the comparison of divergent themes and assessing how frequently themes arise (Smith et al., 2009).

**Step five: Moving onto the next case.** Steps 1 to 4 are repeated for all of the transcribed interviews undertaken by the subject. The researcher must try to look at all the subjects’ transcriptions as stand-alone entities at this stage to make room for individuality (Smith et al., 2009).

**Step six: Searching for patterns through cases.** At this stage, the researcher searches for patterns across all cases, which may mean that some things have to be relabeled. The new themes, as well as the overarching themes, should be listed as a table. In order to undertake a closer analysis of the themes, a number of levels of interpretation must be applied, with a focus on the foundational research question. As this research uses a sample size of six to eight subjects, there may be a requirement to focus on the identification of emergent themes for all cases whilst looking at their frequency (Smith et al., 2009).

**Criteria for Quality Qualitative Research**

Guba and Lincoln (1981) replaced validity and reliability with the similar concept “trustworthiness”, which has four elements, namely confirmability, dependability, transferability, and credibility. These categories involve particular methods in order to demonstrate the rigorous tests of the qualitative analysis, e.g. audit trails, categorizing, checking members through coding, peer debriefs, result confirmation with subjects, structural corroboration, adequacy of referential material, and negative case analysis (Lincoln & Guba, 1985). The following section offers an outline of these four elements and the ways in which this research has considered confirmability, dependability, transferability, and credibility.
Ethical Considerations

Each subject signed an informed consent form (Appendix B) and was informed that they could exclude themselves from the study at any time. The study was highly focused on the maintenance of respect and open dialogue with the subjects so that every interaction would be of the highest quality (Nolan & Vander Putten, 2007). Every piece of personal data was kept confidential, with pseudonyms being employed. All of the data were stored on an encrypted hard drive kept within a locked filing cabinet. The researchers adhered to the IRB and NIH protocols and all participation was voluntary with the option of exempting oneself at any time. All of the recordings will be destroyed once the research is completed.

Credibility

The most important means of gathering data is detailed interviews with the subjects (Creswell, 2013). Phenomenological interviews are intended to elicit a description of the meanings of phenomena shared between several subjects (Marshall & Rossman, 2006). This research entailed two interviews with all of the subjects (Creswell, 2013. The initial interview took around 15 to 20 minutes and was based on gaining knowledge of the subjects and running through the protocols for the research. The second interview led on from what was established in the first interview; it was more detailed and lasted between an hour and an hour and a half.

It is impossible to completely exclude the background and professional and personal experiences of a researcher. This has been described (Maxwell, 2005, p. 108) as the “lens” of the researcher, demanding that the writer must acknowledge “possible biases and how you will deal with these.” Creswell (2005) stated that the researcher should attempt to bring into their conclusion “how their interpretation of the findings is shaped by their background” and “any negative or discrepant information that runs counter to the themes” (p. 192). Attempts to remove
the personal element from research has been described as “bracketing” by Smith et al. (2009), and its first use was by Husserl “to consider the consequences of our taken for granted ways of living in the familiar, everyday world of objects.”

There are certain techniques that can be effective in mitigating any possible bias from researchers. One of these methods is referred to as bracketing. Bracketing is useful in preventing researchers from making personal judgments whilst carrying out research (Ashworth, 1999). Bracketing also involves what Husserl (1970) referred to as the psychological-phenomenological reduction, in which researchers take no stance on how true or false a claim may be when it is made by a subject in relation to a judgment or viewpoint essential to their particular circumstances. Phenomena occurring within the circumstances should be acknowledged in terms of their own meaning systems (Ashworth, 1999).

Transferability

Qualitative data can be rich and holistic, offering great opportunities for demonstrating complexities. This type of data offers what Geertz (1973) described as “thick descriptions”. This data is strong, rooted in reality, and provides an element of truthfulness that can strongly impact readers. An effective study should “enable the interested reader to make links between the analysis in an IPA study, their own personal and professional experience, and the claims in the extant literature” (Smith et al., 2009, p. 51). This has been described as “Theoretical transferability rather than empirical generalizability” that “enables readers to evaluate its transferability to persons in contexts which are more or less similar” (Smith et al., 2009, p. 51).

Internal Audit

Independent audits are extremely useful ways of considering the validity of qualitative research. This research employed an internal audit to ratify the ways in which the researcher
moved from the raw data taken from interviews to the result interpretations (Shaw, 2010). Yin (1989) has proposed that a useful means of ensuring that research is valid is for all the data to be filed in ways that ensure that anyone could trace the line of evidence all the way from the initial documents to the final conclusions. Hence, this research collated the first notes regarding the research question, the proposal for research, the schedule of interviews, audio recordings, annotated transcripts, tables illustrating themes, all other devices, the draft report, and the final report.

**Self-reflexivity**

The researcher of this study has spent their entire career engaging with students and teachers on ways that technology can be incorporated into teaching and learning. The researcher has more than two decades of experience in education, initially teaching in K-12 and then moving on to higher education. The researcher has taken two master's degrees, in instructional technology and public health. The researcher currently works as assistant director at the Centre for Innovation in Teaching and Learning, working with faculty members to reassess their pedagogy and help them in the adoption of new teaching technology. In highly selective private institutions such as the one under consideration, faculty members must strike a balance between teaching duties and undertaking top-quality research. It can be the case that these requirements may militate against innovation or the introduction of new teaching practices, even when research demonstrates that it will be beneficial to student learning. Therefore, the aim of this research is to discover how faculty can be motivated to bring instructional technology into their pedagogy and to show how we can both increase motivation for this and reduce barriers to it.
Limitations

The outcomes of qualitative research cannot always be as easily generalized as quantitative studies regarding other eras, contexts or cohorts (Johnson, 1997). Every participant came from the College of Art and Science at Lehigh University. This was useful in establishing a homogenous cohort for sampling, but it also presented difficulties. Sample sizes for IPA studies are small, with deep analysis being undertaken, which limits the number of perspectives that can be explored.
Chapter 4: Findings and Analysis

The purpose of this study is to explore how tenure-track faculty members of the College of Arts and Sciences of Lehigh University describe their experiences of adopting innovative instructional technologies into the teaching and learning experiences they deliver to their students. The data analysis process resulted in the identification of three superordinate themes and associated subthemes. These are as follows:

- **Motivators for Faculty Adoption of Instructional Technologies** (1.1 Student Engagement, and 1.2 Faculty Efficiency).
- **Understanding Faculty Identity** (2.1 Role of Professional Networks and Vendors, 2.2 Challenges to Adopting, and 2.3 Pedagogical Considerations),
- **University Culture and Institutional Support** (3.1 University-level Support, 3.2 Departmental Support, and 3.3 Center for Innovation in Teaching and Learning [CITL] Support).

The superordinate themes and subthemes were identified as those that at least five of the nine participants discussed during the interview process. Table 3 provides an overview of the superordinate themes and subthemes that emerged during the analysis process, together with details of which participants referred to each theme during the interview process.

**Table 2**

*Identification of recurring themes*

<table>
<thead>
<tr>
<th>Superordinate Themes</th>
<th>Alex</th>
<th>Betsy</th>
<th>Carol</th>
<th>Dan</th>
<th>Elliot</th>
<th>Frank</th>
<th>George</th>
<th>Holly</th>
<th>Ian</th>
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</thead>
<tbody>
<tr>
<td>Subthemes</td>
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<td>What motivates faculty to adopt instructional technologies?</td>
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<tr>
<td>1.1 Student Engagement</td>
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<td>Yes</td>
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<tr>
<td>1.2 Faculty Efficacy</td>
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<td>Yes</td>
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<td><strong>Understanding faculty identity as it relates to adopting instructional technologies</strong></td>
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<tr>
<td>2.1 Role of Professional Networks and Vendors</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>2.2 Challenges to Adopting</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td>2.3 Pedagogical Considerations</td>
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<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td><strong>University culture and institutional support</strong></td>
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<tr>
<td>3.1 University-level Support</td>
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<tr>
<td>3.2 Departmental Support</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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</table>
3.3 CITL Support

Instructional Technologies

The study participants used a wide range of instructional technologies to support teaching and learning activities in their classrooms. All nine participants regularly used Course Site, a learning management system (LMS) that serves as the central repository for course documents and acts as a user interface through which faculty members can access the additional third-party software applications that are available on an institutional level. Figure 2 gives a word cloud that presents a visual representation of the data pertaining to the prevalence of technologies that the faculty members are using. As can be clearly observed, within the College of Arts and Sciences at Lehigh University, there is a particular emphasis on applications such as Course Site (Moodle LMS), Google Apps for Education, WordPress Blogs, Video, Socrative, and Zoom.

*Figure 2. Instructional technologies used by faculty.*
Adoption of Instructional Technologies: Motivational Factors

All of the respondents are highly experienced university educators who have progressed to the rank of full professor or associate professor. However, a variety of motivational factors influence the faculty members’ teaching pedagogies and adoption of technology. As such, the first subordinate theme that emerged captures the factors motivating the faculty members to adopt instructional technologies as a fundamental part of their pedagogy. The data analysis revealed that all the participants in the current study select those instructional technology tools they perceive to directly support the delivery of the course learning objectives. Two broad patterns could be observed across the participants’ experiences of adopting instructional technologies to support learning objectives. First, the participants underscored the importance of ensuring that there is a link between sound pedagogical goals and instructional technologies that help students to be more successful in their course work. In this regard, the participants disclosed that one of their primary motivations for using instructional technologies is that they help to encourage students to think innovatively and challenge the status quo. Instructional technologies can be integrated within learning experiences in carefully considered ways to reinforce student learning and foster developmental environments in which students are encouraged to be creative and take control of their own learning. As such, student engagement was identified as a significant subtheme of the wider motivational factors theme.

Second, the participants shared many insights into the factors that influence their decisions to select various instructional technologies. As such, faculty efficiency emerged as a subtheme that was worth examining in more depth. The motivational factor subthemes of student engagement and faculty efficiency are also explored in more depth below.
**Student Engagement**

The interview findings revealed that the participants perceive technology as representing an extension of their pedagogical process; specifically, it provides a mechanism that serves to augment their underlying teaching methods. The respondents involved in the current study regularly employ audience-response systems to maintain students’ engagement during large lecture classes. Specifically, technologies can provide useful platforms that ensure all students are given an opportunity to contribute to pre- and post-class discussions via interactive forums. The faculty members interviewed in the current study believe that the material they present during their courses should be supported by reliable written material that students can study outside the classroom environment to extend their knowledge and understanding. The faculty members also regularly use online quizzes to test students’ abilities to perform fundamental mathematical equations and enhance their problem-solving efficiency.

The LMS that the participants currently use to support their classes, Course Site, provides a one-stop application through which students and faculty members can access a range of tools including online quizzes, video content, plagiarism screening, etc. It represents a very useful pedagogical tool for engaging students outside of the classroom, and one of the faculty members surveyed, Dan, described how it facilitates discussion forums:

The discussion applications within the LMS are very useful pedagogical tools. I think it helps me level out the playing field. Some students participate in class; some don’t. I feel like I can use the discussion forums to get everybody engaged. You can never even participation out completely, but you can get it more even than it was.

There was a strong sense of agreement among all the participants that instructional technologies help students by giving them more options as to how they can demonstrate their
skills and practical learning beyond tests and assignments alone. The participants in the current study revealed that they believe that instructional technologies play a fundamental role in helping them deliver authentic learning opportunities. Frank captured these ideas as follows:

I am interested in harnessing innovation in my graduate- or upper-level courses, in which students are expected to take more ownership of their outcomes. I think about this in terms of a portfolio; students can consider how the material on the course fits into a larger portfolio of work. And I use the term *work* here in the largest context possible; in terms of their professionalization and development as a human being. I think technological innovation allows students to really expand their portfolio.

The participants indicated that their students are very flexible and supportive of the use of new instructional technologies within learning, assessment, and collaboration experiences. It was evident that the educators surveyed take every opportunity to elicit feedback from the students they teach and subsequently adjust how they harness technologies and applications in response to that feedback. For example, Ian asserted, “If I got negative feedback from students about a tool, I would get rid of it.” The participants also disclosed how the students really value and embrace sharing their projects and views with one another as part of a shared learning experience. In this regard, learning and development become a communal process through which students collaborate and benefit from communal success when they share their achievements with a larger audience. When more traditional forms of assessment are employed, such as essay-writing tasks, tests or exams, the only person who typically sees the end product is the professor. However, when innovative assessment methods are employed, the students share their outputs with a larger audience that consists of their peers, and this means that they tend to place more emphasis on the outcome.
The participants in the current study also acknowledged that their use of instructional technologies facilitates students to engage in more reflective and novel thinking about what is possible. The majority of the undergraduate courses offered at Lehigh during the regular academic year are delivered using a traditional face-to-face approach. However, through the implementation of innovative technologies, instructional elements of the courses offered at Lehigh can also be taught in new formats that provide participants with an opportunity to reassess traditional courses. With the addition of some instructional technology tools, the participants in the current study have been able to offer courses in new delivery formats; in this regard, some of the more traditional offerings have been completely reimagined and redeveloped. For example, the school can offer online or hybrid courses to remote students who are located overseas or in the school’s west coast office.

The participants did describe how some tensions emerged with regards to students’ use of technologies in the classroom setting. For example, some departments have completely banned students from using laptops and phones in classes because faculty members perceive them to represent a tool of distraction as opposed to a system that increases engagement. Some participants also expressed concerns that the availability of electronic devices entails that students no longer take notes using traditional approaches and, as such, are losing the ability to use pen and paper – a somewhat critical skill. Lastly, some participants expressed concerns that a failure to harness the novel instructional technologies that are available could lead to a situation in which the students do not gain sufficient exposure to technological tools or learn the skills they need to interact effectively with emerging applications. In this regard, a failure to exploit technologies could mean that students leave programs without the skills they need to compete in a dynamic landscape or meet the needs of contemporary businesses. These educators were of the
opinion that they really do not have any choice; it is imperative that they harness the innovations that are available within their teaching and learning approaches because they will play a fundamental role in the ongoing growth and evolution of Lehigh students. Elliot captured this sentiment as follows:

The adoption of technology is not a novelty; it’s a do or die situation. Either you get students on the path to using technology in their own processes, or they suffer down the line and intellectually die a slow death.

The motivators mentioned by the participants all underscore the idea that faculty think first about their pedagogy and then about the technologies they can use to support their teaching. This concept is very important because a significant amount of faculty development training is centered around a tool/application and doesn’t leverage the types of teaching that faculty are trying to use in their disciplines. None of the participants have ever selected a tool and then tried to force it into their teaching. The participants described the many methods they use to proactively involve students and explained how instructional technologies help accomplish those goals, whereby many of them made it apparent that one of their primary motivating factors is to engage students and make things more efficient for them.

Faculty Efficiency

Many instructional technologies provide faculty members with an opportunity to save time. Several of the participants in the current study referred to the concept of efficiency in one way or another. Some of the educators want to exploit innovative technologies to reduce the amount of time they spend on repetitive manual tasks, such as grading, homework or tests, while others use instructional technology tools on lower-order tasks as a means of saving time and,
thereby, providing them with more time to try additional techniques. For instance, Ian stated the following:

Technology does some things better than traditional approaches; for example, it helps us to do things more efficiently, and this frees up my time to do other things. For example, returning papers to students by hand is time-consuming. You have three papers, and it takes you 20 minutes to hand papers back each time; you’ve lost an hour of instructional time. In a class like Intro, I had 26 hours over the course of a semester. So, that’s a lot.

Several participants described how instructional technologies represent a further method of enhancing the efficiency in the classroom because they create more time for the participants to think about teaching their courses differently, for example, by using a flipped classroom model. By moving quizzes and assignments online, faculty are able to spend more time on other types of projects that could be more engaging for students.

In sharp contrast, several participants mentioned that they feel that the use of technology by students in the classroom actually makes students less efficient, and there were strong feelings about students using laptops in class and how students miss vital information or understanding by being on their laptops. Despite the fact that they feel that faculty can be more efficient with the use of technologies, they don’t believe the same is true in relation to students bringing technology into the classroom.

Faculty members were very aware that if they are going to rely on instructional technologies for, e.g., grading, the students would need very detailed directions for how to use the technologies and what parameters would need to be followed. The participants all seemed to acknowledge that if they are not thoughtful and clear with their directions and expectations, then students will have many questions or become confused, increasing anxiety and cutting into any
of the time saved. There was also the acknowledgment that there are several things that technology provides that aren’t possible with traditional assessments. Several participants reported that they allow students to work toward mastery on quizzes or use drafts so that they can learn from their mistakes before they submit a piece of work to a faculty member.

The world of higher education is becoming more and more demanding for tenure-track faculty and these participants expressed interest in finding efficiencies in their teaching by using instructional technologies. In some cases, it enables them to give feedback or offer multiple attempts because the technology better supports those options. A constant theme was that they are looking to re-invest the effort and time back into their courses but in a more active way. For instance, if they could move quizzing out of the class, then they could use the time that is gained for small group discussions.

**Conclusion**

The participants in this study are highly motivated to use instructional technologies when they believe that doing so helps them to engage their students, provides innovative means of delivering new content, or reduces their manual workload and, through doing so, provides them with additional time to work on tasks that add value within the classroom. The participants feel it is very important to stay current and to motivate students to fully harness the technologies that are available. However, they are also mindful of the need to ensure that technology does not completely replace more traditional classroom practices, for example, making notes using a pen and paper.

It is clear from the participants’ responses that they feel that technology introduces new opportunities and tools that improve students’ interactions and learning experiences; for example, forums provide a mechanism for students to engage in collaborative learning.
experiences and develop a collective mindset for the achievement of their ongoing goals. They also value the time that they are able to save by automating some tasks, such as grading assessments and distributing papers. Additionally, the faculty members who participated in the current study reported using instructional technologies to engage students in a living lab learning environment in which they can engage with content in new and novel ways. When students are involved in their own learning to this extent, the level of learning retention increases.

The Role of Faculty Identity

There are many different teaching roles at universities, and this research is specifically interested in the experiences of tenure-track faculty since they are the largest group involved in teaching at Lehigh University and they have to balance being productive in research, effective in teaching, and active in service. The faculty that participated in this study all have a well-defined sense of self. They are an experienced group of educators and have a wealth of knowledge on what they have witnessed as being helpful for their students, and what is not. They consider the promise of instructional technologies that they might provide a new way to help teach difficult content. The participants all have courses that include challenging concepts, and these tend to be the units where the participants have tried integrating instructional technologies to see if they can improve student learning. Additionally, the participants in this study collectively have a significant amount of teaching experience and even with that experience, they remain committed to continuous improvement. They are willing to try new things, including technologies, and adjust their pedagogy accordingly. The participants dedicate a significant amount of time to staying current and trying new technologies related to their teaching techniques. They do not necessarily want compensation to try new things, but rather are interested in things like course
release time or funding for a professional conference that would support them to learn new things.

The factors that faculty members perceive to be important and their previous training and experience have a direct and strong impact on how they conduct themselves as faculty members. The responses that the participants provided during this study indicate that they all care tremendously about their teaching and the student population and put a lot of thought into the underlying pedagogy and course content. Similarly, they are very mindful of the technologies they use and go to great lengths to ensure that they select technologies that they perceive will enhance student learning. For example, when describing how he decides whether or not to use a given technology in class, George stated the following:

My decision is driven by two questions: Will it enhance learning? And would it make my life and/or my students’ lives easier? My decision to use a tool is not at all related to an aspiration to connect to students or meet them on their technological terms. That’s never really part of it. It’s really about whether I believe the tool will help me meet the class and educational goals.

The interview responses revealed that, as a group, the faculty members involved in this study have extended their confidence over time by trying new things in different classes and evaluating the usefulness and value provided by novel instructional tools. If they encounter problems with an assignment or a technology, they change tact and try something different the next time. The humanists in this study reported being much more interested in creating student-centered learning experiences that provide learners with an opportunity to take more direct control over their learning by creating blogs and videos. These educators are also more likely to employ technology-based assessment methods as opposed to more traditional research papers,
assignments, essays, tests or exams. The participants from the sciences are more traditional in terms of the tools they want students to use and embrace. Their main mode of teaching is a more conventional form of delivery, such as lecturing, writing out problems or equations on a chalkboard, and instructing students to take physical notes. These educators have a general tendency to use instructional technology to reinforce learning as opposed to introducing new topics or ways of working. For example, they develop tasks that involve students repeatedly taking automated online quizzes until they have completely mastered the concepts. Holly explained why she feels that the use of automated assignments is beneficial for the students she teaches in her classes:

With the old-fashioned pencil-paper homework, you get one try; you turn it in and get your grade. However, I use the online system to give students three attempts at every homework. So, they can go through the entire assignment, submit it, and find out what their grade would be. If they’re happy with it, they can keep it. Or they can submit the work up to two more times.

Instructional technologies are selected and integrated by all the participants. Whether the goal for the faculty member is to reinforce concepts or to provide a platform for students to have opportunities to direct their own learning, this group of participants looks for ways to use technology to help students and to support learning. Vendors and professional networks play a significant role in how participants find out about new instructional technologies. There is a strong draw for faculty to reach out to other colleagues at different institutions in their discipline.
This theme has three sub-themes: 1) professional networks and vendors, 2) challenges that undermine the adoption of technology and 3) pedagogical considerations.

**Professional Networks and Vendors**

The analysis of the interview responses revealed that vendors play a relatively strong role in the decision-making processes when faculty members engage with new technologies and applications. In many cases, participants reported having encountered software and application vendors at conferences or receiving targeted marketing communications via email or post. For the most part, the participants are receptive to advertising and marketing activities and are happy to listen to pitches from different companies. In some cases, these pitches lead to faculty members adopting new technologies in their classrooms. For example, as a direct result of engaging in a conversation with a vendor during which they were persuaded to try a new application, faculty members used tools such as Perusall to create crowdsourcing opportunities for their students to explore difficult readings in more depth, Wikipedia to give students the experience of adding to living and evolving pieces of knowledge, and Hypothesis to verify understanding.

Participants seemed to use their discipline-specific networks when aiming to learn more or considering adopting new technology to support teaching and learning experiences in their classrooms. Given the significant range of technologies that are in use, faculty members find it useful to learn from the experiences of others and to base decisions as to what technologies to adopt on feedback of this nature. Their responses also revealed that they are more likely to share opinions and ideas with people outside the institution via their professional networks or social media contacts than they are to elicit the feedback of their peers from within the institution. This is a very interesting finding and demonstrates that the culture within some of the departments
isn’t one in which faculty members feel comfortable seeking out their peers to discuss how they approach or rethink their teaching. There appears to be an affinity for colleagues in the same discipline at other institutions. Overall, they are not afraid to talk about teaching and the adoption of instructional technologies, but they feel more comfortable with a degree of separation from Lehigh University. Faculty members turn to their colleagues at other institutions specifically in their disciplines when they are looking for ideas about what new things to explore or pilot in their classes. This was more significant with the sciences than the humanities. Furthermore, faculty don’t feel that teaching is supported at the university or department level and there is only a limited amount of opportunities for colleagues to share amongst themselves at Lehigh University. The analysis of the interview responses revealed that book publishers have also been very successful at enticing faculty to use certain technological sites that are associated with the textbooks they had adopted for their courses.

**Challenges that Undermine the Adoption of Technology**

The participants mentioned several barriers or challenges that hinder their adoption of a specific type of instructional technology or prevent them from using it on an ongoing basis. Some of the challenges that were mentioned are not having sufficient time to get to grips with a tool and the steep learning curve associated with mastering some software packages. One interesting finding was that several participants cited academic integrity issues related to the adoption of specific audience-response software. For example, as they started to shift to using Socrative, they discovered that they encountered academic integrity issues. The main difference between Socrative and Lehigh’s previous audience-response system is that Socrative involves students using their personal mobile devices. The previous systems used a separate device called
a clicker. The participants in the current study who had used Socrative all reported issues related to academic integrity. Dan expressed the following:

I’m not sure am I going to use Socrative again; I’m going to try something different.

Whatever I do has to be designed under the assumption that students are going to try to cheat; that they’re going to use their phones in ways I don’t approve of in class.

The participants described how they find it difficult to juggle the demands of their roles and they find themselves very busy in fulfilling their responsibilities in terms of their teaching, research, and service roles. As such, it can be difficult for them to change their approach because they don’t have the time to research, implement, and evaluate new tools. Furthermore, it takes time to explain the use of new applications to the student population. The time issues associated with adopting new technologies can represent a significant barrier that discourages faculty members from trying innovative instructional tools and applications. Additionally, technology can fail, even when the implementation has been intricately planned. A number of the participants in the current study described how it can be very demoralizing and frustrating when they have invested significant effort in planning a lesson that will leverage instructional technology only for it to go wrong. Once there is a negative experience, it’s hard to get faculty members to try new teaching approaches or use other technologies.

When it comes to the learning curve, several challenges/barriers were mentioned that are related to the relative advantage of the tool or application. Three participants specifically mentioned the steep learning curve associated with using highly specialized software that requires them to learn how to code or perform simulations. In each of their situations, they had to weigh the relative advantages of taking the time to learn the new software package or process against the potential benefits that could be gained from its use in the classroom. The participants
also disclosed that they would benefit from the assistance of library and technology services (LTS) to help them make the most of highly specialized data visualization software and architectural design software as well as support them in the use of coding languages, such as Python.

**Pedagogical Considerations**

The participants indicated that Lehigh students are very bright and have a lot of self-motivation, and they will do what faculty members ask them to do. However, they have predominantly been taught using very traditional educational techniques. As such, when new technologies are introduced, they may find it challenging to adapt to new ways of working. This is an ongoing issue that Frank described in-depth:

And to put this perhaps in a narrative fashion, the students at this institution are so amazingly well-prepared. They're so much better prepared than I ever was at age 18 to 22. That I don't think I'm exaggerating when I say that there have been times when I've walked into a room and thought to myself, I have nothing more to offer these students. They're really bright, they're very prepared, they're very dedicated. They have knowledge that exceed what I had in graduate school. And yet they're very slow-witted, they're very boring, they’re very uncreative in the ways in which they interact with one another and knowledge. And so, what I have to offer isn't nearly as important in terms of the knowledge I can provide. I think my use of instructional technology has really complimented and informed this experience, that what I am teaching isn't nearly as important as how I'm teaching.

The participants were acutely aware of the fact that academia is shifting, and knowledge transfer is no longer the sole role of the faculty member. Faculty are now competing with the fact
that content is readily available and students are keen to have more control over their own learning and development. However, in cases in which students have been limited to more traditional learning approaches, they need encouragement to be creative and explore more collaborative learning models. Many students are coming to college having been in schools with one-to-one laptop programs and they demonstrate a high level of comfort with productivity applications and having access to course content through an LMS.

The participants were all very thoughtful and introspective about their teaching methods. They are very knowledgeable about their specific disciplines and they described how, although they have had limited formal teacher training, their practical experiences have enabled them to evolve into thoughtful and reflective practitioners. They also revealed that they employ different approaches when teaching undergraduate courses compared to those they adopt when teaching graduate courses. In addition, they take every opportunity to specifically tailor their teaching methods according to the underlying objectives of the course. For example, Frank stated the following:

I’m not sure that I have any specific criteria for incorporating technology into courses; I am mainly concerned about whether it will fit with the content. For instance, I’m not really interested in adding innovation to the Introduction to Film class because I perceive it to be a content delivery class. And I know people from the College of Education or College of Arts and Sciences would be really angry at me for saying that.

The participants were very thoughtful about how they structure their classes. For example, in some cases, they may request students to work in small groups of the faculty members’ choosing. The compositions of these groups are regularly changed so that the students
gain experience in working with different people. Many of the participants highlighted how they believe the approaches that are employed are more important than technology. For example, Frank disclosed, “What I am teaching isn’t nearly as important as how I’m teaching. Sometimes instructional technology allows you to get the hell out of the way and really put the onus on students.”

It was clear in this study that these participants are thinking very critically about how they teach and how they are grounded in good, solid pedagogy. They aren’t chasing the latest tools or applications simply to try them, but they are critically evaluating what aligns with their beliefs and process for how they teach their classes. Effective faculty development for the adoption of instructional technologies will need to be grounded in good teaching in order for faculty members to want to buy in. There also appears to be a significant passion among these participants to be very critical of how they teach and in terms of evaluating what works and what doesn’t and to adjust accordingly.

Conclusion

The interview responses reveal that the faculty members who were involved in the current study continually reevaluate what they are teaching and how they can adopt new technologies or approaches within their classrooms. Their teaching pedagogies and approaches are often directly shaped by the disciplines from which they come, and their background influences how they teach and the types of technologies they are more inclined to adopt. The responses also reveal that the faculty members frequently encounter challenges that plague their adoption of new instructional technologies. Of these, the two most significant are time restraints and the need to follow a steep learning curve in order to effectively integrate instructional technologies into the courses. Some faculty members have not been entirely successful in their
efforts to harness technical tools and resources and have subsequently experienced a significant amount of frustration when things have not gone according to plan. All the participants appeared to adopt a similar approach to discovering new tools. Specifically, they do not explicitly seek out new tools or applications. Rather, they reflect on how they could explain their content in better ways to build more student-centered learning assignments. Quite often, they find the solutions they are seeking in instructional technologies.

**University Culture and Institutional Support**

The participants shared a great deal about how they perceive the culture and institutional support for teaching and learning at Lehigh. Lehigh is steeped in academic tradition and rigor and represents a focused environment in which faculty members, staff, and students are expected to perform to the highest standards at all times. The tenure and promotion process at Lehigh is specifically designed to evaluate faculty members according to their research productivity, service to the university, and teaching, but in reality, the faculty members perceive that the focus is on research productivity above all else.

The overall university culture of limited support for teaching and learning permeates to most departments as well. There were participants from specific departments that expressed that some colleagues are more helpful with each other and share ideas and support for teaching and learning. However, by and large, the participants believe that their colleagues have very little awareness of what they do in their courses and vice versa. The Center for Innovation in Teaching and Learning is filling a gap by supporting the faculty at Lehigh. There is highly trained staff that are willing to help faculty try new technologies or pedagogical techniques. The center holds events for all faculty to learn about new things and hear from their colleagues across all colleges.
to get a sense of what other faculty have found to be effective. This could be everything from using drones in a class to taking advantage of some of CITL’s facilities (e.g. Visualization Lab, One Button Studio, etc.). The participants shared their frustrations about the culture at a variety of levels. The three subthemes that will be discussed in relation to this are 1) university-level support for teaching, 2) support from colleagues in academic departments and 3) the role of the Center for Innovation in Teaching and Learning.

**University-level Support for Teaching**

All the participants in the current study disclosed that they feel that the culture at Lehigh is not sufficiently supportive or encouraging of faculty members who wish to think critically about, or aspire to be, innovative in their teaching and learning processes. They don’t feel that there is a culture around talking about teaching and learning, and several expressed almost an anti-sentiment, particularly the pre-tenured faculty. The participants expressed a strong push for research productivity, but there is much less discussion around teaching and learning. For example, Elliot said, “We’re not supporting teaching at all. There’s zero support… we have the resources; however, there is not systemic buy-in at the university level.”

The participants clearly have a positive view of the work that is being performed by the Professors of Practice in the various departments. However, Betsy shared her thoughts as to how the university could support teaching and learning in a more complete way: “Until it’s valued, there’s only going to be a couple of innovators, there’s going to be a couple of people that see the value.”

The participants also described how they would like to have more opportunities to hear about what other faculty members are doing in their classrooms and why. The idea of team teaching or providing a way to pair faculty members who have strong content knowledge with
colleagues who regularly integrate instructional technologies within their classrooms was consistently raised. Despite the apparent lack of support at the institutional level for teaching and learning development, it was apparent from the educators’ responses that despite not having senior leadership support, they all adopt instructional technologies and are eager to be thoughtful and reflective in terms of their teaching approaches. This means that the lack of support from the top doesn’t stop these participants from caring and wanting to improve their teaching and learning.

Support from Colleagues in Academic Departments

The majority of the participants’ responses revealed that they lack a general awareness of the methods and systems that their peers in alternative departments use to deliver teaching and learning experiences. Specifically, the faculty members who were surveyed revealed that the respective departments do not have formal processes in place for sharing information about their teaching methods with each other. For instance, teaching methods, pedagogy, and instructional technologies are not typically discussed at department meetings. However, the respondents were not able to elucidate on why this is the case; it is just not part of the current culture.

Moreover, the perspective of the participants was that, overall, university policies do not encourage the faculty to take the time to reflect upon or reassess their teaching practices or to place significant weight on teaching and learning from a faculty perspective. Faculty members who have a substantial research output have a lower teaching load based on course buyouts, essentially reducing the amount of instruction those participants engage in. When asked to express the role that their department or colleagues play in helping them to adopt instructional technologies, Carol said, “They are pretty much almost unaware. They don’t care; they don’t pay
attention. One of my colleagues came to my talk on what I did in my class this year… nobody else did.”

However, a couple of participants were of the opinion that the culture evidenced in their departments does support innovation. These participants are typically teaching in disciplines that are known for preparing students for fast-paced fields that are evolving at a rapid rate. However, even in situations in which there are appreciation and support for innovation on the teaching front, there is a lack of awareness concerning how much effort and time it takes to implement innovative technologies in the classroom. For instance, Frank stated the following:

There are plenty of faculty members here at this institution who don’t fully understand the work that goes into pedagogical innovation, especially when technology is involved. They are supportive, but I’m not sure they fully appreciate the extent of labor involved. Additionally, there appeared to be an underlying perspective that adopting new technologies represents a form of risk-taking and being creative or courageous. There was a sense that several participants in this study feel under an obligation to prepare students for a field that is being transformed by technology. Some departments at Lehigh are relatively advanced in terms of technology use in their curriculum and are preparing students for fields that are being transformed by technology. In such contexts, there was a prevailing view that it is crucial for students’ knowledge to remain current and for them to be provided with an opportunity to develop the skills that are valued by businesses in the contemporary era. These departments also tend to share tools, ideas, and approaches to teaching amongst one another. Additionally, some departments are thoughtful and supportive of faculty members taking risks and trying new things. The senior leaders in these departments are typically more lenient when evaluating pre-tenured faculty members and purposefully allow members of the team to experiment and try new
things. Even in situations in which student feedback is negative, senior leaders are more concerned with what the faculty member has been doing and are supportive of the fact that not every risk in the classroom is met with positive feedback from students or colleagues. However, to support ongoing development, there is a need to evaluate faculty more comprehensively. A couple of participants said that their departments are a positive force in their teaching and exploration. However, Betsy did not support this view and said, “They don’t care. They don’t even know if I’m teaching. Nobody comes to my class; nobody knows what I’m doing, and they don’t care.”

Some of the participants in the current study discussed the idea that their discipline does have educational journals related to teaching in their discipline, for example; however, they feel that this research isn’t really taken seriously among their colleagues. They are of the opinion that the research that is dedicated to teaching methods is second-tier and not perceived to be as valuable as empirical research in that same area. In this regard, they feel that while there is some good information available on research trends and teaching pedagogies, the research does not inform teaching methods and the use of technologies to the extent that the participants would like. The lack of support for both the institution and the departments has created a void in having meaningful discussion and support for teaching on Lehigh’s campus. However, on a positive note, the Center for Innovation in Teaching and Learning (CITL) has played a significant role in helping faculty that do want to be innovative and to think differently about their teaching.

The Role of the Center for Innovation in Teaching and Learning

The people who were interviewed during this study revealed that they feel that the institutional support for teaching is not significantly high. Furthermore, they were of the opinion that innovation in teaching and learning represents more of an individual endeavor that is not
directly supported by the higher-level academic departments. The Center for Innovation in Teaching and Learning helps to bridge that gap by providing workshops, consultative services, and specialized technical support that is designed to meet discipline-specific needs. Additionally, the center supports and maintains a host of instructional tools and innovative labs and teaching spaces. The participants have all had some exposure to the work of the center; however, they have leveraged the resources differently. Several participants have benefitted from staff members from the center working with their courses in a direct way to help support their pedagogical goals. For instance, Dan stated:

I feel like what LTS and CITL have been doing has been very helpful to me. I don’t like to learn things online… let’s say, hypothetically, that LTS hadn’t had somebody to support me with Hypothesis software; I’d had to go to a website and learn.

Working directly in collaboration with faculty members has been a cornerstone of the Center for Innovation for Teaching and Learning, and the participants expressed being very supportive of the different types of consulting, training, and technical expertise that they have been able to access through the CITL. The faculty members who have been beneficiaries of all the varied efforts by library and technology services and the Center for Innovation in Teaching and Learning have found the support and various expertise that the center offers to be collaborative and transformative. However, a significant number of faculty members do not avail themselves of the central resources.

The participants in the current study really appreciate the Symposium on Teaching and Learning that the CITL holds on an annual basis. This is a unique event for Lehigh because it is one of the few opportunities that focus directly on faculty and teaching. Many other events take place on campus that focus on research and student projects, but the symposium brings faculty
from all five colleges together to support their colleagues. All the participants disclosed that they really enjoy hearing about the teaching and learning strategies and instructional technologies that their colleagues are implementing in their respective disciplines. In fact, the participants mentioned the Symposium on Teaching and Learning multiple times and consistently described it as a great mechanism through which they can share new ideas with faculty members. For example, Holly stated:

Yeah, I try to go to the teaching and learning symposium every year. A couple of times, my schedule just hasn’t really allowed it, but I usually get a lot out of hearing the different talk from faculty across the university. It always makes me think more about what I’m doing, even if it doesn’t directly impact my instructional technology.

When asked to provide their opinions and what steps can be taken to help encourage and support the adoption of instructional technologies, time, support, vetting of applications, and workshops were all mentioned as being potentially helpful to educator efforts in this domain. Interestingly, faculty members called for more release time so that they have more time and space to explore and try new things. In addition, the staff who were interviewed were consistently opposed to the implementation of incentive schemes for the sake of incentives. They believe that some release time would be beneficial as it would provide them with the time and space they need to engage in planning and implementation tasks. They disclosed that they find it challenging to find time to innovate or reflect on their pedagogies. One of the key themes that kept reemerging in the interviews concerned the concept of CITL staff acting as partners in the teaching and learning processes. CITL has staff members who are trained in pedagogy as well as instructional technology, digital scholarship, research computers, classroom design, etc. Faculty
are looking for partners in their teaching and learning journeys, and several participants mentioned this synergy to be unique. Frank touched on this idea as follows:

I often find when I go to conferences, the professional conferences that were ahead of the curve are doing things in ABC discipline and in our classes that other people are just starting to experiment with a little bit. I certainly feel like the Lehigh faculty feel like LTS people are just as much educators as we are and that we’re sort of in this enterprise together.

The majority of the participants in this study were very satisfied with the level of support and applications that are provided by the CITL and they described how they believe they have a myriad of instructional technology tools and support at their disposal. For instance, participants mentioned using instructional technologies, such as Course Site (Moodle), Zoom, Panopto, Socrative Software, Google Apps, and so on. However, the interviewees did express some frustration about the fact that they feel very much at the mercy of a centralized organization, such as LTS (e.g., if the organization decides to no longer support a tool, they will no longer have the ability to use it to its full potential). There were many comments that described the positive support the participants have received. This level of assistance was commonly attributed to the fact that the people who work in the Center for Innovation and Teaching and Learning are academics who have extensive experience and, as such, can function beyond a basic role as a support agent; they can offer true support that shows consideration of the unique challenges that educators encounter in their attempts to fulfill their day-to-day roles.

A couple of participants mentioned that there is an inherent need for more specific expertise to be available for specific software or a specific discipline, and these educators also described a need for the personnel who work in the center to develop a more in-depth
understanding of the discipline-specific applications that faculty members are trying to use with their students. They also highlighted how Lehigh has a growing number of labs that incorporate specialized software, and it is challenging to keep all the clients up to date.

CITL is going a great job with the faculty they work with, and the current faculty can identify many new ways to support departments and faculty as they try to meet the demands of growth. There are even more things that CITL could offer.

**Conclusion**

The faculty members who participate in the current CITL program and consultations are largely satisfied with the support mechanisms that are on offer through this provision. The majority of the faculty members who participated in the current study were of the opinion that the CITL is very well supported from multiple directions in terms of content knowledge, pedagogical knowledge, scheduling, integration with library staff, use of high tech, and new, innovative classrooms and labs. The faculty working with CITL has established strong partnerships with staff, and they collaborate closely to support classes. Furthermore, there is a suite of tools and applications available for faculty to help them learn about new technology and pedagogical approaches. However, the interview participants did highlight some areas for improvement. Specifically, some of the respondents were of the opinion that CITL could improve by ensuring staff is provided with specialized training in very specific software and cutting-edge innovations.

CITL provides much-needed consultations on campus and supports innovation in teaching and learning. This is of particular importance given the fact that many of the faculty members did not feel that they are provided with sufficient support to foster innovation in teaching and learning approaches at the university and department levels. The participants
described how the existing culture that can be observed within the university is not very encouraging of new teaching strategies and that the broad perception is that research and even service are more important than teaching and learning. Most departments have not put mechanisms in place that encourage faculty members to collaborate on a cross-disciplinary basis and to benefit from discussions about teaching methods and how they approach their teaching. One of the most interesting observations to emerge during the interviews was that despite the perception that there is a lack of support at the university and department levels, the participants are still motivated to innovate in the classroom and they endeavor to try new and interesting things because they believe it would help engage students, prepare them for the next chapter on their academic journey, and ensure that they are provided with a relevant and up-to-date education.

**Conclusion**

The research question for this study aimed to understand how tenure-track faculty members in the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies into their teaching. The participants reported feeling that instructional technologies provide new opportunities and tools that improve student interactions and learning experiences. The participants in this study are highly motivated to use new ways to teach, such as instructional technologies, when they believe it would help engage their students. They are also motivated by the time savings that come from automating some tasks, such as grading assessments and distributing papers. The participants feel that it is essential to stay current and to motivate students to use available technologies. However, they also pointed out the need for traditional classroom practices, for example, making notes using a pen and paper.
Faculty members who were involved in the current study continually reevaluate what they are teaching and how they can adopt new technologies or approaches within their classrooms. Their goals are to help students better understand the content of their course and to allow students to be more involved in their learning, and they have found instructional technologies to be helpful.

Their teaching approaches are often directly shaped by the content areas from which they come, and their background influences how they teach and the types of technologies they are more inclined to adopt. Faculty members frequently encounter challenges that make it harder for them to adopt new instructional technologies. Of these, the two most significant barriers are time and the need to follow a steep learning curve to effectively integrate instructional technologies into the courses. Some faculty members become frustrated when things don’t go according to plan.

Faculty members do not feel they are being provided with sufficient support to foster innovation in teaching and learning approaches at the university and department levels. The participants described how the existing culture within the university is not very encouraging of new teaching strategies and that the broad perception is that research is more important than teaching and service. Most departments aren’t encouraging faculty members to collaborate across departments to learn about other teaching methods and how they approach their teaching. CITL provides much-needed consultations on campus and supports innovation in teaching and learning. Despite the perception that there is a lack of support at the university and department levels, the participants are still motivated to innovate in their courses. They want to try new and exciting things because they believe it will help engage students and prepare them for the next chapter in their academic journey.
The faculty members who participate in the current CITL program and consultations are mostly satisfied with the support mechanisms that are on offer through this provision. The majority of the faculty members who participated in the current study highlighted that CITL offers support in multiple areas in terms of content knowledge, pedagogical knowledge, scheduling, integration with library staff, use of high tech, and new innovative classrooms and labs. The faculty working with CITL has established strong partnerships with staff, and they collaborate closely to support classes. Furthermore, there is a suite of tools and applications available for faculty to help them learn about new technology and teaching approaches.

This study interviewed nine tenured faculty members using the standards of the interpretative phenomenological analysis methodology by meeting all the Institutional Review Boards' principles; hence, this study offers valid and trustworthy results. The final chapter will present the discussion and implications for practice by aligning the findings with the research literature on faculty adoption of instructional technologies.
Chapter 5: Discussion and Implication for Practice

This interpretive phenomenological analysis (IPA) research is intended to foster an understanding of the experience of the incorporation of instructional technology in teaching practices for tenure-track university faculty members. Employing the double hermeneutic of IPA gives the researcher the opportunity to interpret the ways in which those participating interpret their personal experience. This research focuses on tenure-track faculty members' experience of incorporating instructional technology into their teaching processes. The theoretical foundation for this paper is Roger's of innovation theory.

Using a combination of the IPA methodology and the theoretical lens of Roger’s of innovation theory, nine transcripts were analyzed. The data analysis process resulted in the identification of three superordinate themes and associated subthemes. These are as follows: Motivators for Faculty Adoption of Instructional Technologies, (1.1 Student Engagement, and 1.2 Faculty Efficiency), Understanding Faculty Identity (2.1 Role of Professional Networks and Vendors, 2.2 Challenges to Adopting, and 2.3 Pedagogical Considerations), University Culture and Institutional Support (3.1 University-level Support, 3.2 Departmental Support, and 3.3 Center for Innovation in Teaching and Learning [CITL] Support). In this final chapter, each of the three findings is discussed and situated within the context of the literature. The final outcomes are also discussed, with the researcher presenting practice recommendations. Finally, suggestions will be made regarding further research related to the ways in which faculty members adopt instructional technology.

Motivations for Adopting Instructional Technology

Students currently arriving in higher education institutions will have encountered many different uses of technologies in their previous K-12 education careers. Malm and Defranco
(2011-2012) stated, “The next generation of students will not just be concerned if technology is used, but rather how it is incorporated into the educational experience” (p. 404). The students who now arrive in higher education institutions are accustomed to employing technology for learning support and engagement; however, many higher education institutions have not changed their teaching to reflect this new dynamic.

Overwhelmingly, faculty members expressed that their interest in using instructional technologies in their teaching is driven by a strong desire to offer the best pedagogical methods for their courses and that they only select tools or applications that align with those goals. All respondents have a solid vision for their teaching and are accustomed to undertaking reflections upon it. These faculty members incorporate instructional technologies into their courses as they feel that these technologies will lead to enhanced student engagement and learning. The respondents all wish to incorporate instructional technology when they feel that it would boost students' chances of success. The respondents employ various forms of instructional technology, e.g., web conferencing, video, blogs, drones, AV/VR, LMS, and audience response systems. These teachers invest considerable time and resources to create a strategy ensuring that they are offering learning experiences that are appropriate for the requirements and learning methods of their students. This is in line with current research. Research related to faculty IT adoption (Dahlstrom et al., 2014; Brooks, 2016) shows that the chief driver of faculty members incorporating technology into their lessons is if they can be shown indisputable evidence that the students will benefit. It is central to the development of support strategies that we understand what motivates faculty members to incorporate instructional technologies into their courses.

The faculty members that participated in this research stated a number of reasons why they adopt instructional technologies. The primary reason, overwhelmingly, is to engage
students. Every participant mentioned engaging students and the key role this plays in their interest in the adoption of instructional technologies. Research by Henderson et al. (2017) supports the idea that faculty members that use instructional technologies in their courses promote a greater diversity of learning experiences for students, with the more efficient delivery of learning objectives being among the benefits cited.

Additionally, research suggests that employing technology can assist students in becoming familiar with essential materials more quickly (Çelik and Keskin, 2009). If students can grasp central concepts more quickly, then teachers have more time for additional learning opportunities during class time; for instance, students can be given more innovative and less prescriptive tasks. In addition, technology can also promote student collaboration. The participants in this research experiment with instructional technologies in various forms to discover the most effective means of assisting students in acquiring and retaining knowledge. They also employ methods such as crowdsourced class readings, instant feedback, audience response systems, authentic assessment, and making room for greater creativity and individuality in learning styles. Digital technologies are now central to educating undergraduates and can be transformative in terms of the students' learning experiences (Henderson et al., 2017).

A finding is that, on the whole, students are generally enthusiastic about using instructional technologies in their courses as they express no reservations about using these technologies in their courses. Students show an understanding of the worth of such technology and work to employ it to enhance their comprehension of high-level concepts. Research findings, e.g., Lumpkin et al. (2015), have agreed that the deployment of instructional technology is beneficial. Their research undertook a survey of 153 undergraduates in four subject areas and incorporated it with their quantitative and qualitative findings from several graduate students to
discover what forms of teaching that incorporate instructional technology positively impacted the students’ results. The findings demonstrated that more than 80% of the undergraduates and 88% of the graduates believed that employing technology either frequently or occasionally positively impacted their results. These researchers reached the conclusion that both undergraduates and graduates are appreciative of learning styles that incorporate technology (Lumpkin et al., 2015).

A theme that emerged in this study was the desire of faculty members to employ technology for efficiency enhancements. For example, a faculty member might have to spend a considerable part of their week on test grading; hence, using online testing with automatic grading could significantly reduce this. A finding was that faculty named increased efficiency as one of their motivations for introducing technology. Çelik and Keskin (2009) showed that there is a link between the use of technology and faculty productivity. This finding supports that of previous studies that have argued that technology has positive implications for productivity (Meyer, 1998). In certain instances, this was related to the desire to employ automatically graded quizzes, automated homework assignments or videos that provided automated feedback on homework, which could create extra time for collaborative working, responding to queries or offering peer support activities. Other faculty members simply wished to effect reductions in the time spent on repetitive work and to provide students with a variety of assessment opportunities rather than simply the standard offering. Teachers stated that they generally discovered that employing instructional technologies makes them more efficient and productive because they allow for the inclusion of extra content, allow students to attain mastery of central concepts more quickly, and provide extra time that could be invested in other areas of their pedagogy (Hew & Brush, 2007).
Understanding Faculty Identity

A finding is that the participants in this study are acutely aware of the fact that academia is shifting, and knowledge transfer is no longer the sole role of the faculty member. Faculty are now competing with the fact that content is readily available in multiple forms and students are keen to have more control over their own learning and development. Many faculty members in this research feel that there is an expectation for them to find novel and innovative pedagogies and employ more instructional technologies with their students. In many instances, this change is necessary to satisfy the requirements of students who have been exposed to a high level of instructional technology throughout their K-12 education careers. Research offers support for this, demonstrating that student exposure to technology has been so great that they now arrive at higher education with very high levels of technological competence (Vongkulluksn et al., 2018).

Student enter higher education wanting to be able to enhance 21st century skills within their college education. The participants interviewed for this research study have consciously chosen to incorporate instructional technology in their pedagogy. Research from Gebremedhin and Fenta (2015) has demonstrated that there is a significant relationship between the ways in which educators perceive Information and Communication Technology (ICT) and the promotion of ICT use. There is a symbiotic relationship in that if ICT is promoted, faculty are more likely to incorporate it, and if incorporated, it is more likely to be promoted. The teaching of faculty members in general is highly influenced by what they experienced in graduate school, and they tend to imitate the teaching they have received.

The findings in this study do not support that access is a barrier for participants as they reported having sufficient access to good quality resources and they did not cite poor access as preventing them from introducing instructional technology. Most participants are very happy
with the suite of applications available to support teaching and learning (e.g., Panopto, Zoom, Turnitin, Gsuite). There were only a few comments reflecting that participants have run into issues with classrooms that do not properly work or that faculty have sought more highly technical support for discipline-specific software. Previous research, however, has demonstrated that the reliability of instructional technologies can be a major factor in its adoption. Faculty frequently feel that their access to technology is limited, even when substantial amounts are provided, if it does not work adequately (Clark, 2006; Lim & Khine, 2006; Zhao et al., 2002) or if they do not feel that there is any added value to their teaching because of it (Norris et al., 2003).

While access to tools was not frequently cited as a barrier, a finding is that access could be improved if there were more experienced staff provided to offer training or support with particular types of software that faculty wishes to incorporate into their courses. Since software applications and systems have new versions on a regular basis, participants sometimes find it hard to stay up-to-date on the latest versions. At present, the LTS support structure is around a general suite of programs, with limited technical expertise in discipline-specific software applications.

Time was frequently cited as being a central problem in this area. Faculty members have numerous demands on their time, including providing services, writing, undertaking research, etc., and other research has reflected this as well. Teachers stated that introducing technologies into their classrooms is more demanding of their time because they have to be aware of and prevent students from misusing the technology (Bauer & Kenton, 2005; Lim & Khine, 2006; Wachira & Keengwe, 2010) and at the same time devote time to learning about it and planning its use themselves (Al-Senaidi et al., 2009; Clark, 2006; Lim & Khine, 2006).
A significant finding is that several participants in this study cited issues of academic integrity as it relates to their use of a new audience response system. Unfortunately, several participants discovered after using the instructional technology that students had found ways to cheat the system. Several faculty members were unaware until the semester was over and students mentioned this fact in course evaluations. Since these faculty members experienced academic integrity issues, they expressed their frustration with the fact that the instructional technologies they had introduced created additional ways that students could assist each other in cheating, which left teachers feeling disappointed and frustrated. This experience made these participants much more aware of issues with academic integrity related to the use of instructional technologies. This finding uncovered the complexity in integrating instructional technology. In these cases, the introduction of instructional technology created academic integrity issues, which was an unintended consequence.

Faculty members demonstrated considerable thoughtfulness and reflection regarding their pedagogy and the ways in which instructional technologies could improve it. The chief motivation for these teachers is not the technology per se, but how it can improve their teaching. They do not simply adopt new technology for no reason; they need to know exactly how it will add value to their students' education or they are open with students about the experimental nature of some applications. The faculty examined in this research demonstrated a considerable variation between undergraduate and graduate courses as well as courses involving large-group lectures and those involving seminars. Their approaches are very different, depending on the level of the course and where that course fits into the academic journey for the students.

A finding is that faculty members rely heavily on vendors and colleagues from other institutions, as well as staff from CITL, to determine which technologies to implement.
Participants stated that they frequently discuss instructional technologies with faculty members in the same academic areas at other institutions. In addition, vendors can be very targeted and assertive at trying to convince faculty to try their products. Since these are usually targeted asks, if faculty members think that something will help their students learn, they are often willing to try it out. For the faculty members from the sciences, there was a clear tension between using instructional technologies in some cases, like automating quizzes, and wanting to make sure that the students still develop certain traditional, nondigital skill sets. For example, they stated that students learn better if they have to write on boards or take notes manually; these participants also said that books retain a primary place in education.

This research aligns with the interviews undertaken by Jorgensen et al. (2018), which looked at the use of technology in pedagogy when teachers feel that their students are highly competent in the use of technologies. Their findings showed no variation between competence and willingness to employ technology between male and female teachers. This research also showed that the ways in which the teachers rated their competence in the employment of classroom technology were directly influenced by their previous teaching experiences. Teachers who were more interested in learning that centered on students had a greater likelihood of adopting instructional technologies. Support for this in the literature is offered by Ertmer et al. (2012), who found that there is a significant correlation between a belief in student-centered learning and student-centered teaching styles. Additionally, teachers who believe in student-centered learning generally use student-centered approaches, even if the administration, technology or assessment requirements do not support them. The ways in which a faculty member perceives the assistance that technology can give to student learning has a direct impact on their success. Most participants in this study demonstrated that their own individual
perceptions, for example, how passionate they feel about technology and whether they themselves have a penchant for problem-solving, alongside how supportive other faculty members are, have a significant influence on their practice. As well as those personal elements that have an influence, the culture of the institution at a number of levels is important for faculty members’ perceptions of support.

**University Culture and Institutional Support**

An important outcome of this research is that all nine participants in the current study disclosed that they feel that the culture at Lehigh is not particularly supportive or encouraging of faculty members who aspire to be innovative in their teaching and learning processes. The participants expressed that they don’t feel that the senior leaders value teaching as much as they value research and that there is a culture of apathy towards knowing what is happening in the classroom. The participants expressed that the university is moving towards higher goals in terms of research productivity, while there is much less discussion around teaching and learning. Additionally, there is a fear from pre-tenured faculty members that if they try something new or innovative with their teaching, they could be exposed to harsh judgment via student evaluations. The faculty members in this study did specifically acknowledge two departments that are very supportive of pre-tenured faculty members experimenting with innovative teaching techniques and adopting instructional technologies. These departments also allow more latitude when reviewing tenure and promotion materials. Nevertheless, even though the overall culture at the university and in most departments lacks support for teaching and learning, every participant in this study expressed a strong commitment to the art of teaching and wanting to continually hone their teaching and attempt to try new approaches. They are committed to engaging students in
their learning and also look for new ways to do so. For this group of participants, the adoption of instructional technologies plays a key role in how they approach their teaching.

Extant research is lacking in this respect: Although many studies have been undertaken into problems that prevent teachers from adopting instructional technologies, little research has focused on the motivations of teachers in terms of whether they support the status quo or modify their teaching.

A finding is that the faculty members in this study expressed that when it comes to faculty development efforts, they appreciate having documentation available as well as knowledgeable staff to help them integrate instructional technologies. Most of the faculty members are self-taught in terms of employing the technology available, either by experimentation or by asking for assistance from their peers or CITL staff. Very few respondents mentioned workshops provided by the institution as being the best way to learn about new technology as faculty members are not interested in learning more about specific tools, but rather about teaching concepts, such as active learning or the flipped classroom or digital film creation and learn about the instructional technologies in this way. Additionally, faculty members did express that time and competing interests are always a challenge. There are many more offerings of programs for faculty, and their overall schedule is packed with new programs, such as lunch and learns. It is becoming more of a challenge to make professional development relevant and meaningful to faculty members. This mirrors the research of Reid (2014) and Gebremedhin and Fenta (2015).

In addition to participants expressing a lack of support from the overall university leadership, they also expressed a lack of support at the departmental level. However, participants from two departments did make it clear that they feel their colleagues in their departments create
a collaborative culture within the department, i.e., they have some discussions with colleagues about program design/pedagogy. Departmental meetings are more for logistical matters and lack the mechanisms for mutual reflections on teaching processes. The majority of departments are not particularly collaborative or supportive of their colleagues in trying new teaching strategies or adopting instructional technologies.

A significant finding is that the Center for Innovation in Teaching and Learning plays an integral role for the faculty members that avail themselves of its resources. All participants have worked in some way with the Center of Innovation and Teaching and Learning and they expressed that they are very grateful for all the different types of support or training they have received from the CITL. The faculty expressed that CITL plays a significant role in bringing faculty across campus together, providing outstanding support for new ways of thinking about their teaching, and offering technical integration support for software, hardware or classroom space. CITL creates and maintains several classrooms that are different from other teaching spaces on campus, with multiple ways to share content, such as huddle groups, web conferencing and digital and writeable surfaces, AV/VR and video creation. The new teaching and learning spaces help to facilitate different types of learning. These faculty members all found that CITL is central to the integration of instructional technology in their pedagogy. Numerous universities have invested large sums in developing the necessary infrastructure for instructional technologies, but there is still a significant gap between the technology provided and the integration of it into the wider educational scheme. If faculty members are to overcome obstacles to introducing instructional technologies, it is crucial that they receive support from their institution and its administrators. In research by Shelton (2017, p. 32) the author reinforced the notion that technology use is “socially and historically conditioned” and that there is a
correlation between broader cultural values and technology use. When teachers with strong knowledge of a subject are combined with specialist staff, very significant progress can be made. CITL has staff with expertise in both pedagogy and instructional technology; it also provides a strong collection of software apps. This makes CITL crucial to increasing the visibility of instructional technology and creating a forum for the discussion of it within institutions.

Events such as the winter workshop, new teacher orientations, and the academic Symposium on Teaching and Learning have assisted teachers in sharing best practices. The respondents said that they frequently engage with CITL staff if they wish to introduce an innovation using new technology. CITL has a central part to play within the institution as it is the main access point for knowledgeable staff who can assist in the integration of learning technologies in teaching programs and provide technical know-how.

When considering the adoption of learning technology, the way in which training is offered can be extremely important. Teaching is not enhanced by the provision of technology without integration. To be effectively employed, technology is reliant on the available resources being successfully integrated into the overall teaching of an institution. Teachers must be offered professional development activities allowing them to learn how to gain access to and deploy the available technology to its best advantage in any particular learning environment.

Researchers have examined the ways in which technology is used within pedagogy by teachers who believe that their students have considerable expertise in the use of technology (Jorgensen et al., 2018). The outcomes of this research demonstrated no division between the sexes in terms of expertise or willingness to employ technology. It was also demonstrated that the teachers' perception of their own expertise regarding new technologies in the classroom is directly related to their own experience of teaching. Most of the faculty members interviewed in
this research are self-taught regarding new technology, either via trial and error or assistance from students or peers.

**Conclusion**

The intention of this research was to gain an understanding of the real-world experience of teaching staff in the College of Arts and Sciences at Lehigh University. A substantial amount of existing research is focused on the problems or barriers that faculty members experience when attempting to incorporate new technology into their teaching. Contrastingly, this research has examined the motivations of faculty members that have successfully used instructional technologies in their teaching. The aim was to achieve an understanding of the experiences of faculty members that have adopted instructional technologies. Having a better understanding of the motivations and the experiences of faculty regarding the incorporation of instructional technology is central to the development of effective strategies for their support.

Even though there were only nine participants, this study does add to the literature in terms of providing a better understanding of what motivates faculty members to adopt instructional technologies and what types of faculty development and support are needed in order to help them to be successful. Faculty members, for the most part, never start with an instructional technology or use it just for the sake of trying something new. They are motivated to use or experiment with instructional technologies when they believe that using this technology will enhance student motivation or success. This has been actively supported by many research studies (Ajjan & Hartshorne, 2008; Han & Finkelstein, 2013; Henrie et al., 2015).

Research that has looked at the obstacles to introducing instructional technology in universities (Beetham & Sharpe, 2013; Thanaraj & Williams, 2016) has advocated the continuous introduction of technology for the improvement of teaching and learning as well as
its assessment through a number of different strategies. Researchers have suggested that it is crucial for those in education to see beyond the simple hardware and software of technology and to acknowledge how it can provide pedagogical and cultural enhancements.

This study confirms that motivators are not simply an absence of barriers. There are still a great number of barriers to integrating instructional technologies that are highlighted in the literature, but most participants in this study did not feel that there are significant barriers to them adopting instructional technologies (Ertmer, 1999; Schifter, 2000; Ertmer, 2012). However, this study did find that issues of academic integrity were expressed as a barrier, something that the previous literature has not discussed. Specifically, the introduction of a certain instructional technologies contributed to academic integrity issues, with faculty stating that introducing technologies into their classrooms is more demanding of their time because they have to be aware of and prevent students’ misuse of the technology (Bauer & Kenton, 2005; Lim & Khine, 2006; Wachira & Keengwe, 2010) while also devoting time to learning about it and planning its use themselves (Al-Senaidi et al., 2009; Clark, 2006; Lim & Khine, 2006).

Although the respondents expressed strong feelings that the institutional culture is becoming incrementally less supportive of teaching and learning and colleagues in departments are not supportive of each other in terms of teaching, individual faculty are still innovating and working hard to be thoughtful about their teaching. Proponents of new technology state that academics, particularly senior academics, are essential for encouraging the use of new technology and for creating an environment where it is easily and effectively adopted (Thanaraj & Williams, 2016). The next section will discuss the recommendations that can influence practice.
Recommendations for Practice

Students are engaged and supported when instructional technology is deployed in the classroom. Faculty members have the motivation and self-efficacy to incorporate instructional technologies in their teaching when it is aligned to their pedagogy and the desired learning outcomes for their courses. The faculty in this study expressed that they are motivated to use instructional technologies when they have a clear reasoning for how the technology will benefit student learning, save them time or provide students with a unique/different opportunity to interact with the course content. The faculty members also want to help students learn and to be able to model technologies or software applications that their students will encounter when they leave the university to work in a particular field. The university has a great sense of pride and tradition for preparing the next generation of students for success in their post-university lives.

The findings of this research will be useful as guidance for developing professional development programs at Lehigh and other universities. Additionally, it offers fresh insights for professionals in the field of instructional technology, who can work in partnership with faculty to make it easier for them to adopt instructional technologies that enhance teaching and learning. This section will describe some recommendations for institutions of higher education to consider in order to support faculty in adopting instructional technologies.

Addressing the Institutional Culture Around Teaching

Faculty members need support from the organization, such as sufficient high-level resources, faculty developmental programs, supportive administration, direct leadership, and a willingness to transform. Institutions need to gain a better comprehension of the faculty’s experience and what might prevent them from adopting and being motivated to use learning technologies in their pedagogy. The faculty members that participated in this research study were
extremely forthright regarding their perception that the tenure/promotion processes in this institution are not particularly interested in the support of teaching and learning. Faculty members expressed that the message is clear that research work comes first and that teaching and service are less important. This university is a highly competitive mid-sized top-ranked private institution that takes pride in the fact that faculty are undertaking research and teaching students. In other larger institutions, top researchers are less likely to be doing actual teaching.

This research revealed that in addition to the lack of university support around teaching, departmental support is also inconsistent and weak. The recent strategic initiatives have these faculty members feeling as though the research aspirations of the university are being achieved at the expense of quality teaching. CITL seems to be a very important part of the fabric supporting teaching and learning efforts at this university. The participants mentioned that it is probable that teachers without tenure do not wish to be innovative because they are worried that this will negatively impact their ability to get tenure; when a faculty member experiments with new instructional technologies or assignments, they fear that if they receive less than positive student evaluations, they will not get tenure.

The researcher will meet with the Deputy Provost of Faculty Affairs to explain the faculty members’ experiences regarding the overall culture at the university and department levels with regard to support for teaching. Next, the researcher can also share the findings and recommendations with the Office of Research, the Office of the Provost, and the Center for Innovation in Teaching and Learning so that they can more fully understand the challenges that faculty are experiencing.

The next step for the researcher will be to recommend that a university committee be charged with reforming the institutional culture from the top down, including a strategic plan for
how to support faculty in collaboration with several offices, including the Center for Innovation in Teaching and Learning, the Provost’s Office, and the Office of Research.

**Enhancing CITL Outreach**

This study’s findings indicate that offering professional development efforts that address not only the implementation of technological tools but also new teaching approaches (such as active learning, flipping classrooms, and peer learning) is very important to faculty members. They are interested in tools or applications that will improve student learning and engagement or will save them time in their teaching and grading. Faculty expressed that they don’t specifically need incentives; however, in the case of a complete course overhaul or shift or a course that is to be offered online, providing a course release or summer salary would be very helpful and would provide them with some concentrated time and resources to focus on their teaching. Some of the grants presently offered through CITL are not substantial enough to change behavior or incentivize systemic change. Several participants recommended summer money or a course release to provide them with more time to focus on their teaching. Additionally, mentorship opportunities that connect an early-career faculty member with a more seasoned faculty member in a similar field could be of great value to the development of teaching and learning. There are other mentorship programs that this institution provides; however, the scope is more about a general transition into the professoriate and establishing a faculty member’s research agenda.

CITL helps all faculty, regardless of which college or whether they are seeking help with graduate or undergraduate teaching. The neutrality is helpful and it allows staff to work one-on-one with faculty in a supportive environment outside of a specific college or stem. The faculty that work closely with staff in CITL have them working side-by-side with them in courses by supporting both the faculty and the students. CITL staff provides support for video creation,
podcast creation, drone footage, geospatial tools, blogs, wikis, data visualization, etc. The faculty members in this study have participated in CITL initiatives, including internal grants, workshops, and consultation with staff at CITL for their course development. Recently, the center has partnered with other departments of the institution, e.g. the Office of International Affairs and Creative Inquiry, providing small grants to encourage teaching and learning. Historically, opportunities have been lacking; it is encouraging that more are available, but it would be useful if faculty members could revise the application process and the support received.

Closely related to motivating faculty, the researcher’s next step is to recommend an expansion of the role of the Center for Innovation in Teaching and Learning. The researcher will present the findings and recommendations of this study to the Director and Assistant Director of CITL as well as the Vice Provost for Library and Technology Services. Doing so at this institution will play a significant role in helping faculty to have a place where topics related to teaching and learning are being discussed and supported. The next recommendation will touch on expanding the input and communication loop that helps shape the programs and initiatives in the Center for Innovation in Teaching and Learning.

**Establishing a Faculty/Student Advisory Group**

Numerous faculty members in this institution are undertaking fascinating work with their pedagogy and some of them will approach LTS CITL to inquire about fresh strategies and tools, but this research believes that it would be useful to have more input regarding future directions and initiatives by CITL. This researcher will work with the director of CITL and the LTS leadership group to explain the findings and recommendations, specifically the importance of mentoring related to teaching and learning. Other valuable partners could include the newly established Faculty Senate and the Student Senate. These partners will be instrumental in
extending the reach of CITL and helping to diversify the disciplines participating in programming and CITL programs. Additionally, this advisory group could provide advice regarding faculty initiatives, classroom technology, and different pedagogical strategies. If the committee incorporates representatives from every college as well as students, it could be a useful forum for innovative suggestions and strategies. The faculty could be helpful in providing further insights into professional development efforts, and the student representatives could advise on the instructional technologies that they find most useful in their courses. Additionally, both groups could provide feedback on the opportunities and challenges in relation to using instructional technologies. This committee would be beneficial in shaping future initiatives for CITL.

**Recommendations for Future Research**

Based on the conclusions and recommendations for practice, other opportunities for future research have been defined. Firstly, the same kind of research could be undertaken with other institutions and it could question a wider range of faculty roles (e.g., adjuncts, pre-tenure, professors) as well as faculty from different colleges. Another potential area for subsequent research would be to study students and their experiences in courses where faculty members are embracing the integration of instructional technologies in their teaching. This expanded research could lead to a better understanding of the role that instructional technologies combined with sound pedagogy can have on student retention.

This research has expanded the narrow range of the literature related to the ways in which faculty members adopt instructional technologies. Considering the scope of time over which this type of research has been conducted, higher education culture remains slow to change. This research has shown that those faculty members who have an interest in the adoption of
instructional technologies do so to enhance student engagement and motivation. If faculty members are given more support and are encouraged to support each other through systems for sharing successful innovations and receiving feedback, others will be encouraged to seek out those forms of technology that are useful and appropriate for their subject areas. In addition, centers such as CITL must persist in their endeavors to unite faculty in sharing best practices and experiences. If faculty could present their colleagues with information intended to encourage the adoption of appropriate instructional technology that would improve student learning, much could be achieved.
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Appendix A: Recruitment Email

Subject Line: Ilena Key Requests Your Participation

Dear Faculty Member,

My name is Ilena Key, and I am an assistant director for the Center for Innovation in Teaching and Learning, which is part of Library and Technology Services. I am a student in the Doctor of Education program at Northeastern University. I am currently conducting a study for my doctoral dissertation and I am requesting your time to participate in my study.

My research study focuses on faculty in the College of Arts and Science at Lehigh University and their experiences with using instructional technologies in their teaching and learning.

The following criteria will be used to identify potential study participants:

- Employed at Lehigh for two years;
- Has worked with the Center for Innovation in Teaching and Learning Center at Lehigh University.

**Participation is voluntary and completely confidential.**

If you choose to participate in this study, I will be interviewing you about your experiences with adopting instructional technologies in your teaching. The expected time commitment is one web-based interview lasting 60-90 minutes. Your participation is completely voluntary, and you can exit the study at any time. All information gathered during the interview will be confidential, and a pseudonym will be used in place of your name. All interview data will be destroyed once the study is complete.

If you are interested in participating in this study, please complete this participant form, which should only take about 5 minutes to complete. If you do not complete this form to volunteer, you will not be contacted again regarding this research.

Thank you for your consideration to participate in this study. If you have any questions, feel free to contact me at key.i@husky.neu.edu.

Sincerely,
Ilena Key
Appendix B: Informed Consent Form

Northeastern University, Graduate School of Education

Name of Investigators: Brian Bicknell, EdD – Principal Investigator; Ilena Key, Doctoral Student Researcher

Title of Project: Motivators and Barriers of Tenure-Track Faculty Adopting Instructional Technologies in Their Teaching

Informed Consent to Participate in a Research Study

We are inviting you to take part in a research study. This form will tell you about the study, but the researcher will explain it to you first. You may ask this person any questions that you have. When you are ready to decide, you may tell the researcher if you want to participate or not. You do not have to participate if you do not want to. If you decide to participate, the researcher will ask you to sign this statement and will give you a copy to keep.

Why am I being asked to take part in this research study?

We are asking you to be in this study because you are a faculty member who is either tenured or on the tenure track in the College of Arts and Science at Lehigh University who has worked with the Center for Innovation in Teaching and Learning.

Why is this research study being done?

The purpose of this study is to investigate the experiences of tenure-track faculty that have adopted instructional technologies in their teaching. Having a deeper understanding of the barriers and motivators to adoption is key for professional development efforts aimed to help increase adoption of instructional technologies in teaching and learning. The research question that this study will seek to answer is: How do tenure-track faculty members in the College of Arts and Sciences at Lehigh University make sense of the experience of adopting instructional technologies into their teaching?

What will I be asked to do?

If you decide to take part in this study, we will ask you to participate by allowing the student researcher to interview you.

Where will this take place and how much of my time will it take?

There will be one 60-90-minute interview that will last 60-90 minutes; both will be conducted via Zoom video conferencing at a date and time of your convenience. You will be provided a link to access the video conferencing once the interview has been scheduled.
Will there be any risk or discomfort to me?

There are no anticipated risks to participants.

Will I benefit being in this research?

There are no direct benefits offered to participants of this study. However, the findings of this research may inform higher education leadership and the Center for Innovation in Teaching and Learning on how to better support tenure-track faculty members’ use of technology in their teaching.

Who will see the information about me?

Individual data will only be accessible by the student researcher, the principal investigator, and the professional transcription service. Files with participant’s information will be de-identified, and pseudonyms will be used in place of participant’s names. A Transcript Confidentiality Statement will be signed by the professional transcription company to ensure the confidentiality of participants. The data will be used for this doctoral dissertation and future journal articles or presentations. The data will be kept confidential for all participants. A copy of each interview recording will be saved to an online storage account. To ensure confidentiality and security, all files will be encrypted and password protected using a professional online storage service. Transcripts will be saved and de-identified in the same manner as recordings and will be accessible by the student researcher and principal investigator only. Hard copies of consent forms will be stored in a locked file cabinet in a locked office only accessible by the student researcher. Upon completion of the study, all data will be transferred to an external hard drive and stored for three years in a locked file cabinet owned by the student researcher.

All data and associated documents, including all signed consent forms, will be permanently destroyed or deleted three years after completion of the study. In rare instances, authorized people may request to see research information about you and other people in this study. This is done only to be sure that the research is done properly. We would only permit people who are authorized by organizations, such as the Northeastern University Institutional Review Board or the Lehigh University Institutional Review Board, to see this information.

If I do not want to take part in the study, what choices do I have?

Participation in this study is voluntary, and you are free to withdraw from the study at any time.
What will happen if I suffer any harm from this research?

No special arrangements will be made for compensation or for payment for treatment solely because of your participation in this research.

Can I stop my participation in this study?

Your participation in this research is completely voluntary. You do not have to participate if you do not want to, and you can refuse to answer any question. Even if you begin the study, you may quit at any time. If you do not participate or if you decide to quit, you will not lose any rights, benefits or services that you would otherwise have as a member of faculty.

Who can I contact if I have questions or problems?

If you have any questions about this study, please feel free to contact Ilena Key at key.i@husky.neu.edu, the person mainly responsible for the research. You can also contact Brian Bicknell, EdD at b.bicknell@northeastern.edu, the principal investigator.

Who can I contact about my rights as a participant?

If you have any questions about your rights in this research, you may contact Nan C. Regina, Director, Human Subject Research Protection, Mail Stop: 560-177, 360 Huntington Avenue, Northeastern University, Boston, MA 02115. Tel: 617.373.4588, Email: n.regina@neu.edu. You may call anonymously if you wish.

Will I be paid for my participation?

There will be no remuneration offered to participants.

Will it cost me anything to participate?

There will be no cost to participate in this study, other than your time.

I agree to take part in this research.

Participant Signature ____________________________ Date _____________

Printed Name of Participant ____________________________

Researcher Signature ____________________________ Date _____________

Ilena Key

Printed Name Researcher ____________________________
Appendix C: Interview Protocol

**Objective:** This section of the interview will describe the study, review some interview basics, such as recording, confidentiality, IRB requirements, etc.

**Interviewer:** You have been selected to speak with us today because you have been identified as someone who has a great deal to share about your experiences using different instructional technologies. My research project focuses on the experience’s tenure track faculty in the College of Arts and Sciences at Lehigh University. Through this study, we hope to gain more insight into what barriers and motivators that faculty experience as they integrate instructional technologies into their teaching. Hopefully this will allow us to identify ways in which we can provide better professional development efforts that help to support the integration of instructional technologies into teaching and learning.

**Interviewer:** Because your responses are important and I want to make sure to capture everything you say; I would like to record the audio of our conversation today. Do I have your permission to record this interview?

- **If yes, thank the participant, and start the recording**
- **If no, explain this is a requirement of participating, thank the participant and end the interview.**

**Interviewer:** I will also be taking written notes. I can assure you that all responses will be confidential and only a pseudonym will be used when quoting from the transcripts.

**Interviewer:** To meet our human subjects’ requirements at both Northeastern University and Lehigh University, you have already signed the Informed Consent form. Essentially, this document states that:

1. all information will be held confidential
2. your participation is voluntary and you may stop at any time if you feel uncomfortable
3. we do not intend to inflict any harm

**Interviewer:** To review a few more items

- The only people who will be privy to the recordings are myself, my dissertation advisor and principal investigator Dr. Brian Bicknell, and the transcription service.
- Physical and electronic documents will be kept secure and will be destroyed 3 years after completion of the study.

**Interviewer:** Do you have any questions about the interview process or how your data will be used?
**Interviewer:** This interview should last about 60-90 minutes. During this time, I have several questions that I would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning. Do you have any questions at this time?

**Interviewee Background**

**Objective:** To establish rapport and obtain the story of the participants’ background in general

1. Please share your current faculty rank, home department, and college.

**Interviewer:** I can see from your questionnaire that you are in X department in the College of Arts and Science [Review data submitted from questionnaire].

**Interviewer:** One of the things I am interested in learning about is why you use instructional technologies in your courses. Specifically, I am interested in what factors contribute to the adoption of instructional technologies, what instructional technologies you are using, why you have adopted those instructional technologies into your teaching processes and methods, and who you look to for guidance when adopting instructional technologies into your teaching. I would like to hear about your perspective/experience about your journey in your own words. To do this, I am going to ask you some questions about the key experiences you encountered. If you mention other people, please use do not mention names. As a reminder, I will be using a pseudonym for you as well.

2. **In Roger’s diffusion of innovation theory, lists five adopter categories: (Innovators, Early Adopters, Early Majority, Late Majority, and Laggards). Which category best describes your work with technology and teaching? Possible Prompts:** Define each category if necessary.

- Innovators - These are people who want to be the first to try the innovation. They are venturesome and interested in new ideas. These people are very willing to take risks and are often the first to develop new ideas. Very little, if anything, needs to be done to appeal to this population.

- Early Adopters - These are people who represent opinion leaders. They enjoy leadership roles, and embrace change opportunities. They are already aware of the need to change and so are very comfortable adopting new ideas. Strategies to appeal to this population include how-to manuals and information sheets on implementation. They do not need information to convince them to change.

- Early Majority - These people are rarely leaders, but they do adopt new ideas before the average person. That said, they typically need to see evidence that the innovation works before they are willing to adopt it. Strategies to appeal to this population include success stories and evidence of the innovation's effectiveness.

- Late Majority - These people are skeptical of change, and will only adopt an innovation after it has been tried by the majority. Strategies to appeal to this
population include information on how many other people have tried the innovation and have adopted it successfully.

- Laggards - These people are bound by tradition and very conservative. They are very skeptical of change and are the hardest group to bring on board. Strategies to appeal to this population include statistics, fear appeals, and pressure from people in the other adopter groups.

3. **What are the titles of the courses that you taught this year? Possible Prompts:** Fall? Spring? Summer?

**Interviewer:** Let’s start with gaining an understanding of what instructional technologies you are using.

4. **Why did you choose those particular instructional technologies? Possible Prompts:** Past Experiences with them? Recommendation from a Colleague or Professional Organization?

5. **Please describe what instructional technologies you use to teach in those classes. Possible Prompts:** (i.e. lecture capture, streaming video, LMS, Blogs, online quizzing).

6. **What are some success stories from your technology integration? Possible Prompts:** Are the particular tools that worked better than others?

7. **What are some stories of failure from your integration? Possible Prompts:** Did you try something that didn’t go as well as you hoped?

8. **Why did you select those particular instructional technologies? Possible Prompts:** Past Experiences with them? Recommendation from a Colleague? Student Encouragement?

9. **How did you select the classes that you would integrate instructional technology in? Possible Prompts:** Class size? Type of Content? Publisher content?

10. **Why did you choose those particular instructional technologies? Possible Prompts:** Past Experiences with them? Recommendation from a Colleague or Professional Organization?

**Interviewer:** These questions address your experiences with different factors that influence the adoption of instructional technologies.

11. **What motivates or encourages you to use instructional technologies in your courses? Possible Prompts:** Increasing Student Learning? Deeper learning? Support learning?
12. What barriers have you experienced when trying to integrate instructional technologies? *Possible Prompts: Time? Resources?*

13. How do your colleagues and department supportive or hinder of your use of instructional technologies in your teaching?

*Interviewer:* These next set of questions asks you to reflect on the impact that adopting or integrating instructional technologies has on your teaching.

14. What have you learned about your teaching from the adoption of instructional technologies? *Possible Prompts: Is your approach to classroom management different? Has technology adoption influenced your teaching philosophy?*

15. Has your approach to creating lessons changed with the introduction of instructional technologies in the classroom? *Possible Prompts: How?*

16. How do the students respond to using instructional technologies in your courses? *Possible Prompts: Do they find it challenging, helpful, etc.*

*Interviewer:* These next few questions asks you to reflect on professional development efforts and offered at the Center for Innovation in Teaching and Learning.

17. How can technology training or professional development be made more meaningful for you as an individual faculty member? *Possible Prompts: Do you prefer face-to-face workshops? Group meetings? Online? Communities for Practice, faculty focus groups*

18. How has the Center for Innovation in Teaching and Learning been a practical resource for you? *Possible Prompts: What workshops/events have you attended or have you consulted with staff?*


20. Do you have any recommendations for what additional programming or incentives to help faculty integrate instructional technologies into their teaching? *Possible Prompts: New programs? Mentoring?*

21. Do you have any final thoughts or is there anything else you would like to share regarding instructional technologies and teaching and learning?
Interviewer: This concludes today’s interview. Thank you so much for your participation in my study.