IN-SERVICE ELL TEACHERS AND TECHNOLOGY ADOPTION: EXPLORING
DIFFUSION OF INNOVATIONS IN LANGUAGE EDUCATION

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A dissertation submitted in partial fulfillment of
the requirements for the degree of
DOCTOR OF PHILOSOPHY

WASHINGTON STATE UNIVERSITY
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JULY 2017
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To the Faculty of Washington State University:

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ACKNOWLEDGMENTS

This endeavor was made possible due to the contributions and support of several wonderful individuals. Firstly, I would like to acknowledge my sincere gratitude to my advisor, Dr. Joy Egbert. Dr. Egbert, you are a spectacular teacher and you know that. You were the first to believe in me and to know what I am capable of. Your guidance and support throughout this process will always be appreciated. Secondly, I would like to thank my committee members for their contributions. Dr. Barbara Ward, thank you for inspiring me through your willingness to be of service and for your detailed reading of the dissertation. I really appreciate your insightful contributions. Dr. Olusola Adesope, thank you for your kindness, compassion, and encouragement to help me reach this level. Additionally, I am also deeply grateful to all the teachers who participated in the study and to the program director Driss El Akrich who made it possible for me to work with the teachers. Finally, I would like to acknowledge my husband, Adel, who encouraged me, supported me and took on so many responsibilities to allow me to devote my time and energy to finish this work. My sweetheart, Murad and Jana, your love is invaluable. I appreciate your patience and allowing me to reach my dream and make you proud of me. Thank you, all.
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Abstract

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July 2017

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Based on the idea that the integration of educational technology facilitates changes in teaching and learning, this research study sought to draw an overall picture of the decision to adopt educational technology among in-service English language teachers in an intensive English language program. The main purpose was to understand how Diffusion of Innovations Theory reflects the decision-making process of the in-service language teachers. To accomplish this purpose, the study featured a qualitative design with semi-structured interviews, three online surveys, and anecdotal data to explore language teachers’ decision making around educational technology adoption within a context that applied scholarly recommendations for teacher professional development training. This study accomplished this purpose by identifying the in-service language teachers' individual innovativeness and exploring their perception of the attributes of educational technology after participating in workshops and other environmental enablers that include administration support, face-to-face and digital communications. Findings revealed that language teachers’ innovativeness and its link to their perception of the attributes of technology, mainly, relative advantage, ease of use, and compatibility were what shaped their decision to adopt technology in the context of this study. This is in addition to some other factors such as time, lack of resources, nostalgia, and over trusting technology. Further, findings showed
that female teachers were more frequently significant adopters of educational technology more than their male counterparts. In short, the study found that DIT explained the decision-making process of in service language teachers fairly well. Further, as the model for professional development indicates, educational technology adoption is not as likely to occur without expert and administrative support. The research concludes with implications of the findings for administrators, facilitators, and researchers.
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To the memory of my beloved mother, Fatima El Shafi, the true love of my life; my father Rajab El Shaban; my Godfather Farag; and my Godmother Tebra. Your love is still deep in my heart.
CHAPTER ONE

INTRODUCTION

The ubiquitous use of computer technology in our daily life has influenced the educational field (McGrail, 2005). General educational reforms to institute innovations have been a goal of the U.S. federal government for more than a century; the overall goal is to enhance students’ academic achievement and educational technology has been considered as part of the reforms (Fullan, 2007). The Association for Educational Communications and Technology (AECT) defines the term “educational technology” as the “ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources” (Januszewski, & Molenda, 2008, p. 1). Many educators believe that the use of educational technology in learning may bring about significant positive outcomes to students’ learning. For example, Drexler (2010) found that technology use could transform the traditional classroom environment. Specifically, the teacher shifts from knowledge provider where the students are the recipients of knowledge to implementing a differentiated classroom where students collaboratively work with the teacher to achieve individual, pair, and group learning objectives. Also, technology use may lead to learners’ autonomous learning (Terrell, 2011). Furthermore, the use of technology can help teachers create an engaging and interactive learning environment. It can provide second language learners with the opportunity to interact via speaking and writing in the target language and may motivate “learners to produce more language than they otherwise might have done” both outside and inside classrooms (Stanley, 2013, p.2). Despite these potential benefits, adequate examination of the process that leads to the adoption of educational technology by language teachers is still lacking (Allen, & Seaman, 2013; Brahier, 2006; Waxman, Lin, & Michko, 2003).
This study has two goals. First, it aims to understand the process of decision-making in educational technology by in-service language teachers, using Rogers’ Diffusion of Innovations Theory (DIT) as a theoretical framework. Second, it strives to support professional development facilitators in providing context-appropriate professional development in education technology.

**Statement of the Problem**

The probability that technology will be adopted and used efficiently and effectively by teachers is low (Buchanan, Sainter, & Saunders, 2013; Murray, 2005). Even though this is the case, many education institutions spend large amounts of money on new versions of hardware and software (Guerard, 2001; Li, 2014) to bring technology into the classroom. This low probability may stem from the lack of professional development about how to use educational technologies that in turn might affect the adoption of technology by teachers. Kessler (2006) emphasized the value of educational technology as a part of teaching a foreign language; however, he also noted that many language teacher education programs lack technology training. As Kessler notes that language teachers need to be trained openly in Computer Assisted Language Learning to be capable of making their decisions about how to implement technology. In particular, the lack of language teachers’ familiarity, experience, knowledge, and practice with technology has been pointed out as a challenge in implementing technology (Egbert, 2006; Kassen, & Higgins, 1997; Kitade, 2015).

**Purpose of the Study**

Based on the gaps in the research, the focus of this study was to examine the decision to adopt educational technology by in-service ELL teachers. As noted above, there is evidence that knowledge and familiarity with educational innovations, in this case, educational technology, are
highly related to the decision to adopt it by the in-service ELL teachers (Brahier, 2006; Gragurović, 2010; Rogers, 2003). However, there is a lack of research that examines the process supporting the diffusion and the adoption of technology by in-service ELL teachers. This gap in the literature suggests a need for further investigation. Thus, this study explores participants’ self-reported innovativeness and their perceptions of the characteristics of educational technology as an innovation. Their responses on where they perceive themselves in the innovativeness categories that Rogers proposes in his theory (2003) and what kind of attributes (also based in DIT) they desire in an innovation might help to understand how Diffusion of Innovations Theory informs the process of teacher development in education technology.

**Research Question**

Based on the problem statement and purpose noted above, this study was designed to respond to the following broad question:

To what extent does the Diffusion of Innovations Theory explain the adoption decisions of in-service ELL teachers?
CHAPTER TWO

REVIEW OF LITERATURE

Education technology as an innovation needs further study to better understand its adoption by language teachers. It is crucial to understand how and why language teachers make their decisions about adopting or rejecting technology integration in their teaching practices because of the important role technology can play in classrooms. Despite the reluctance to try new approaches to teaching, Language teachers’ adoption of technology into their teaching practices could provide “new ways for languages, cultures, and the world to be represented, expressed, and understood” (Chun, Smith, & Kern, 2016, p. 76). To support investigation of educational technology adoption or teachers’ decision making issue, this chapter reviews the research literature on the use of technology in education, technology integration and effectiveness, some of the barriers to teachers’ technology integration, the attitudes of language teachers toward technology integration, and the best practices in language teacher professional development. The framework for this study, Diffusion of Innovations Theory, also warrants a full description. In addition, a model for teachers’ professional development that is based on the best practices from the teacher education literature with technology is included in this chapter.

The Use of Technology in Education

The ubiquitous growth in the use of technology, in general, in developed and developing countries has brought significant changes to our daily lives in the 21st century. Technology has become an inseparable part of work, education, and even our social communications. In addition, the increased use of technology by many students, who have grown up surrounded by technology (e.g., digital cameras, video games, smart phones), has changed the expectations of today’s students from past generations. (Oh, & Reeves, 2014; Prensky, 2001). For instance, Delić (2012),
who uses videoconferences with K8 students from all over the world, stated that today’s “students need to explore. Their passion for research should be used in education. They must learn to be knowledge navigators — finding information from different sources, evaluating it and making sense of it” (para. 1). Many of today’s students are “active experiential learners, proficient in multitasking, and dependent on communications technologies for accessing information and for interacting with others” (Bennett, Maton, & Kervin, 2008, p. 776). Therefore, as educators such as Stanley (2013) suggest, the incorporation of technology in education could be a valuable asset to the academic development of students to prepare them with the knowledge and skills to meet the needs of the 21st century. This preparation would include, but is not limited to, communication skills, creativity, critical thinking, and collaboration. Thus, technology integration and technology-enhanced learning have been topics of discussion among researchers, educators, and administrators to emphasize the importance of bridging the gaps between the current educational system and students’ needs (Hlynka, & Jacobsen, 2009; Lowther, Strahl, Inan, & Ross, 2008; Thompson, & Mishra, 2008).

**Technology Integration and Effectiveness**

In order to be effective, teachers must understand and use technology based on the best evidence available. Currently, one of the important concepts that educational technology programs can emphasize during teachers’ professional development is integration. The concept of integration of educational technology refers to two important components that need to be considered when using technology in classrooms: content and pedagogy (Thompson, & Mishra, 2008; Earle, 2002). For example, when students simply receive educational software or technological tools which do not promote the students’ content learning, teachers do not integrate technology because they neglect the content and the pedagogical aspects of teaching
and learning. Simply, teachers can use technology effectively as a tool to assist students’ content and language learning (Egbert, 2005), but too often fail to do so. To support the importance of emphasizing the concept technology integration, for instance, Beaven et al (2010) surveyed 26 language teachers from different European countries to examine the factors that influence language teachers’ implementation of technology. They claim that, regardless of the growing use of digital technologies by teachers, “pedagogical developments have not always kept pace with this” (p.6). Therefore, with support from the growing body of evidence that technology integration could positively affect students’ academic performance and achievement, professional development programs should emphasize content and pedagogy during technology integration workshops with language teachers.

Additional support for the integration of technology into teaching comes from the Apple Classrooms of Tomorrow (ACOT) that its results are applicable to second language classrooms. This project, which was conducted during the 1980s and 1990s, was one of the earliest studies of its kind that examined the role of technology in classrooms as an educational reform to traditional classroom settings. The project involved more than 100 K-12 schools in different settings. They were located in different urban, suburban and rural sites across the U.S. and reflected diverse populations and socio economical conditions. Data gathered for this project were guided by the question, “What happens when teachers and students have constant access to technology?” (Dwyer, Ringstaff, & Sandholtz, 1991, p. 1). The majority of the studies linked to this project were qualitative in nature; analysis of the collected data resulted in several evaluation reports (e.g. Apple Computers, Inc. 1995; Baker, Gearhart, & Herman, 1989; David, 1992; Dwyer, 1994). After a decade of research, the ACOT project revealed that technology may not only enhance students’ education, but it can also lead to change in teachers’ teaching and
students’ learning (Baker, Gearhart, & Herman, 2006). Research along these lines continues to show when, for whom, and for what language learning goals technology integration might be most effective.

Another empirical research study has explored the effectiveness of educational technology integration in specific contexts and also examined learners’ attitudes toward technology integration. For instance, Chiu, Liou, and Yeh (2007) conducted a pre- and post-test using the automatic speech recognition (ASR) technology, CandleTalk, with 45 undergraduate students in Taiwan to examine if it can engage EFL learners in increasing their pronunciation skills and participating in meaningful speech interactions. Findings showed a significant difference in a paired t-test comparison between the scores of the pretest and posttest. The research results showed the effectiveness of Automatic Speech Recognition, CandleTalk, in the teaching of the speech acts “greeting, parting, requesting, complaining, apologizing, and complimenting” that led to a better oral competence (p. 213).

Furthermore, many studies in the area of education technology have reported positive effects of technology integration on students’ academic achievement and skills. Sung, Chang, and Liu (2016), for instance, conducted a meta-analysis that included, 110 experimental and quasi-experimental studies exploring the use of mobile devices as tools in educational interventions. The tools included variety of mobile devices such as cell phone, iPod, MP3 player, digital pen, classroom response system and laptops; the studies involved college, secondary and elementary students. Results showed a larger effect size for using the mobile devices outside the classroom confines and in informal settings. Findings showed that the integration of mobile devices into instruction could be significantly more effective than teaching with computer desktops only. On the other side, Bebell and O'Dwyer (2010) studied four different empirical
studies of 1:1 laptop programs in schools. Such studies that involve 1:1 computing are limited. Therefore, the authors explored the four studies’ “similarities and differences that exist across existing 1:1 environments” (p. 6). Each environment has its own uniqueness such as the funding mechanisms, professional development, and program support. They revealed that, unlike schools that did not participate in one-to-one laptop programs, schools using laptops showed a significant growth in students’ levels of engagement and in grade tests. This result stemmed in part from teachers’ alteration of their teaching styles when they had the opportunity to use laptops.

Although many educators currently use technology in their classrooms, many do not, including many language teachers. As previously stated, some research points to the effectiveness of technology integration. Therefore, teachers’ use of technology warrants further research, particularly for the integration of technology into language learning. The adoption and effective use of technology by language teachers remains one of the biggest gaps in the existing scholarship and therefore warrants closer scrutiny.

Barriers to Technology Integration

According to the literature, even though many teachers are aware that technology can be integrated effectively into their teaching practices, various barriers can block their actual implementation of it. Ertmer (1999) differentiated between two kinds of barriers, the external (first order) barrier and the internal (second order) barrier. Ertmer defined first order barriers as external barriers to the teacher that can be seen in the lack of resources (e.g., hardware), in training, inadequate professional training, and in time, ineffective time management. He defined a second order barrier as an internal barrier that is evident in the teachers’ perceptions, belief, and attitude toward technology which can contribute to their resistance to integrate technology into their teaching practices. These two forms of barriers differ in important ways. First order
barriers make it even more difficult, if not impossible, to integrate technology. In contexts where first order barriers do not exist, second order barriers can be addressed. In other words, if the technology and support exist, programs then need to address teacher professional development in order to facilitate their technology integration.

Hew and Brush (2007) found the same types of barriers and several additional ones, In their analysis of findings from 48 empirical studies that examined K-12 teachers’ use of computers for instructional purposes from 1995 to 2006. In fact, these researchers expanded on previous research by identifying six forms of barriers to technology integration. These barriers are “(a) resources, (b) knowledge and skills, (c) institution, (d) attitudes and beliefs, (e) assessment, and (f) subject culture” (p.226). They considered four external barriers such as resources, institution, culture, and assessment, while the other two barriers were internal barriers such as teachers’ attitudes and beliefs, and knowledge and skills. These barriers often provide insight into the reasons why teachers use – or do not – technology. For example, Hsu (2016) conducted a mixed-methods study to examine K-6 teachers’ barriers to technology integration. She surveyed 152 teachers and interviewed and observed eight teachers. Hsu identified “students’ lack of computer skills, teachers’ lack of training in technology, teachers’ lack of time to implement technology-integrated lessons, and teachers’ lack of technical support” as the common barriers among all of the K-6 teachers (p. 30).

Additionally, teachers’ uncertainty about the appropriate use of technology and its actual value in teaching and learning is another main obstacle that faces them during technology integration, a concern that could be considered a second order barrier. Teachers are more likely to integrate technology into their teaching practices if their uncertainties and concerns are addressed (Fullan, 2007; Hall, & Hord, 1987; Howard, 2013). Therefore, in order for teachers to
integrate technology into their classroom practices, first order barriers must be overcome and other resources must be available and support must exist. In contexts where first order barriers have been eliminated, second order barriers such as the lack of effective teacher professional development should be the focus of both instruction and research.

**The elimination of first order barriers.** In the U.S., first order barriers have largely been eliminated. Starting two decades ago, both teachers’ and students’ access to the Internet and technological tools has increased progressively. Wells and Lewis (2006), for instance, in a report sponsored by the National Center for Education Statistics (NCES), state that Internet access in U.S. schools increased from 35% in 1994 to almost 100% in 2005. Nowadays, most teachers have access to at least one Internet connected computer in the classroom (Gray, Thomas, & Lewis, 2010). This percentage indicates the reduction of at least one external barrier to technology integration, Internet-connected computers (Means, Toyama, Murphy, Bakia, & Jones, 2009). Thus, researchers note that more attention should be paid to the internal (second order) barriers (e.g., Birch as cited in Drexler, Baralt, Dawson, 2008; Ertmer, Anne, Olgun, Emine, & Polat, 2012; Hsu, 2016). Ertmer, Anne, Olgun, Emine, and Polat (2012) directly claim a need for teachers’ pedagogical and developmental programs to address internal barriers to technology integration. Therefore, because first order barriers do not really exist for many teachers in the U.S., research and education can focus on the second order barriers, including teachers’ beliefs and attitudes toward technology integration.

**Teachers’ beliefs and attitudes toward technology integration.** A main internal barrier to technology integration arises from teacher beliefs and attitudes toward technology integration. These barriers can be explored in order to understand teachers’ decisions about integrating technology. In other words, initiating and implementing educational technology varies according
to teachers’ attitudes. For example, Buabeng-Andoh (2012) suggests that if teachers consider technology as “neither fulfilling their needs nor their students’ needs, it is likely that they will not integrate the technology into their teaching and learning” (p.138); in other words, teachers with positive attitudes toward technology are more likely to integrate it into their teaching practices (Buabeng-Andoh, 2012; Hew, & Brush, 2007; Keengwe, & Onchwari, 2008).

Many researchers such as Kagan, 1992, Kim, Kim, Lee, Spector, and DeMeester, 2013 argue that teachers would not alter their beliefs simply by being introduced to new beliefs. They might, however, change if professional development experiences provide them with the opportunity to conceptually understand their beliefs and observe and examine alternative beliefs. For instance, some scholars recommend challenging teachers’ existing beliefs by focusing on student learning needs (e.g., Kagan, 1992; Kim, Kim, Lee, Spector, & DeMeester, 2013, p. 82). However, others believe that changing teachers’ change of beliefs regarding effective technology integration might be achieved through finding different techniques of considering and doing things (Ertmer, 2005).

Helping teachers to change their beliefs by program administrators and professional development with technology facilitators could support teachers’ effective use of technology (e.g., Ertmer, & Ottenbreit-Leftwich, 2010). Many strategies have been recommended to stimulate change. For instance, Kim, Kim, Lee, Spector, and DeMeester (2013) conducted a mixed-methods study to explore the relationship between K-8 teachers’ beliefs and technology integration. The research sample included twenty-two teachers who participated in a professional development program sponsored by the U.S. Department of Education. The funded research aimed at improving the use of technology in K-8 schools in rural areas in the southeast of United States. Findings unveiled some of the important strategies that could alter teachers’
beliefs: observation, practice, reflection, and social cultural support. The researchers declare that such strategies can take place through face-to-face collaboration (e.g., in the institution) and networking collaboration (e.g., virtually). Either form could positively impact the institution’s environment and thereby the support offered by the institution for technology integration (Chen, 2008). In other words, the chance that teachers’ beliefs can be altered is higher when they and their colleagues engage in examining, discussing, and sharing knowledge, experiences, and the difficulties they encounter in reality (Kim, Kim, Lee, Spector, & DeMeester, 2013). For instance, if some teachers discuss examples of excellent outcomes of student-centered learning or technology integration, other teachers, who are more resistant to change, might try a parallel tactic in their teaching practice. Further, a comfortable and collaborative environment can afford teachers with the opportunities to know, share, observe, and evaluate the results of whatever tool is introduced. With proper support, teachers’ beliefs can change, and thus that would enhance their level of integrating technology (Kim, Kim, Lee, Spector, & DeMeester, 2013, p. 84).

Similarly, De Liddo and Buckingham Shum (2010) acknowledge the role of a technological environment where teacher discussion and debate are facilitated and, thus, may lead to a change of past beliefs and the formulation of newly cooperative beliefs.

In addition, in a largely qualitative study about engaging teachers (and students) with media streaming technology that explores the perceived benefits of using BoB (BoB, 2016) as a support for teaching and learning with the staff of four faculties at the University of Surrey, Holmes, Clark, Burt, and Rienties (2013) mention that providing teachers with insufficient professional technology training and pedagogical practices opportunities with technology is not the only reason that deters teachers from integrating technology. An institutional culture is one of many other reasons that needs to be considered. For example, institutional decisions that restrict
posting, sharing, or uploading content to instructors might disengage and demotivate the students and thus the students’ disengagement might also disengage the instructors and their incorporation of technology. Also, the unlimited options and affordances of software and hardware might overwhelm and discourage teachers’ willingness to use technology.

Teachers’ beliefs are not easy to change, but it could happen if they are encouraged to consider their learners’ needs and participate in strategies that support interaction with colleagues around observation, discussion, practice, reflection, knowledge exchange, collaboration, and institutional cultural support (Kim, Kim, Lee, Spector, & DeMeester, 2013; Holmes, Clark, Burt, & Rienties, 2013; Lee, & Lee, 2014; Rienties, Brouwer, & Lygo-Baker, 2013). This leads to a consideration of professional development.

**Language Teachers’ Professional Development**

In order to develop a good understanding of language teachers’ development with technology, research around language teachers’ development with technology is reviewed in this section.

Egbert (2006) emphasizes the importance of language teachers’ professional development in technology integration. In an article about situating language teacher learning in CALL, Egbert emphasizes the important role of teacher education programs in preparing teachers to successfully tackle the classroom realities that teachers may face in teaching languages, the needs of the 21st century, and the challenges of incorporating technology in teaching practices. As she explains, exposing teachers to limited professional development during coursework results in “confusion and stress that teachers can feel once they assume an instructional role and have to apply technology-enhanced content learning” (p. 167). Egbert
argues that providing the teachers with the opportunity to learn in authentic contexts where they can apply their knowledge may help them to reduce confusion and stress. Therefore, an emphasis on both knowledge acquisition and practice with the technology should be considered by professional development providers to promote language teachers’ productivity and development with technology integration.

Providing language teachers with the opportunity to experience authentic technology integration practice while in their pre-service teacher programs, and/or incorporating examples of context-based technology integration throughout teachers’ development workshops has been found to be beneficial for teachers’ technical and pedagogical knowledge development and for their perceptions of technology integration. For example, in a mixed method study about the impact of blended learning on language teachers, Comas-Quinn (2011) surveyed and interviewed 20 language teachers. In her study, she highlighted that most technology education programs focus on information and skills and disregard the teachers’ professional transformation. Additionally, Comas-Quinn (2011) recommends a gradual introduction, adequate support, and a content and pedagogical incorporation with technology for teachers to effectively and efficiently use technology tools with their students. The adequate support and gradual introduction of technology would help language teachers to avoid feelings of being overwhelmed and feel more confident integrating technology into their teaching practices (Comas-Quinn, 2011; Kirkwood, Price, 2005).

Although many ESL/EFT institutions (e.g., TESOL) require experience in CALL and educational technology, technology integration, still, is not integrated into professional development in ways that help teachers to see it as important to their teaching contexts (Kessler, 2006). Hegelheimer (2006) blames teacher education programs for neglecting technology
courses that focus on authentic integration. If programs do teach them, they often hold little
connection to language teaching or occur at the end of the program so teachers miss considering
technology integration as an essential of their teaching. Hegelheimer therefore recommends
necessary curricular development that requires language teachers to have a technology course
early in teachers’ preparation programs. To fulfill the needs of language teacher preparation for
technology integration, continuous professional development of educational technology for
language teachers affords an important factor for motivating teachers to teach with technology
(Kessler, 2006; Peters, 2006). For example, in a study using survey, interviews, and focus groups
for collecting data from 240 graduates in TESOL masters’ programs, findings showed that the
participants’ dissatisfaction with the lack of CALL education (Kessler, 2006). According to this
recommendation, language departments and teacher education programs need to consider two
things. First, language teachers can acquire some skills and knowledge related to technology
integration as a pivotal part of their teacher education. Second, an emphasis on technology
should include its actual use in their classroom contexts. In combination, these features can
more effective/I support teachers’ integration of technology.

Kessler (2006) recommends another point to consider in teachers’ professional
development: their comfort level with the use of technology. He emphasizes that language
teachers tend to use technology ineffectively when they do not feel comfortable using it.
Similarly, other educators reported language teachers’ discomfort using tasks that required them
to use computers (Egbert, Paulus, & Nakamichi, 2002). From a similar view, others showed that
teachers would use technology creatively if they felt confident while using it (Hegelheimer, 2006).

Another key factor providing language teacher professional development around
technology lays in the importance of considering each of the language teacher’s individual differences and characteristics (Arnold, & Ducate, 2015; Borg, 2003). Teachers develop differently and are influenced by their prior knowledge, experience, attitude, pedagogical knowledge and teaching context. For example, in a study conducted by Chao (2006) about how K-12 in-service teachers related their CALL training courses and their implementation of CALL in teaching, findings showed that EFL teachers rarely used technology as expected by the professional development provider and faced many challenges. As noted previously, one of these challenges stemmed from the teachers’ beliefs and existing assumptions about language teaching and technology integration. Teachers who lacked motivation at the start of a development educational program or who did not receive the opportunity to practice what they learned during the developmental training, showed less likelihood to integrate technology into their classroom teaching practices.

Further, in order for technology to be effectively integrated, a professional development facilitator must address teachers’ need to understand why a technological innovation might be helpful to them. The position of House espoused (1974) decades ago still holds relevance:

Innovations are acts of faith. They require that one believe that they will ultimately bear fruit and be worth the personal investment, often without the hope of immediate return. Costs are also high. The amount of energy and time required to learn new skills or roles associated with the new innovation is a useful index to the magnitude of resistance (p. 73).

Several salient ideas emerge from the review of literature about the importance of teacher professional development. First, effective integration of technology in education cannot be achieved without preparing pre-service and in-service teachers to connect content with the selected technology tool and the pedagogy used (Mishra, & Koehler, 2006). More specifically, Koehler and Mishra (2009), who first presented the concept of Technological Pedagogical
Content Knowledge (TPACK), state that learning is most successful when teachers have a proper and sufficient awareness of the multifaceted interaction between pedagogical, technological and content knowledge. Kessler (2006) adds that technology should be introduced to language teachers on a gradual basis (Kessler, 2006). Third providing teachers with the opportunity to practice technology in authentic contexts where they can examine class realities and apply what they have learnt in coursework or professional development programs is highly recommended (Egbert, 2006). Finally, teachers’ prior experiences, learning differences, support, level of comfort, and the institutional context and its encouraging or discouraging role in integrating technology represent all-important factors for a gradual sustained growth toward integrating educational technology.

Although the literature review exposed many of the barriers that hinder language teachers from incorporating technology into their educational process and outlined many necessary professional development recommendations set forth by pioneers in the language and educational technology fields (see Figure 1), little research addresses actual technological integration for language educators. Several still need attention such as what the technology integration process should and does look like, other factors that might impact a teacher’s decision to adopt a new technology, why teachers integrate technology in some contexts and not in others, and how exactly language teachers make the decision to integrate technology.
The Diffusion of Innovations Theory

Diffusion of Innovations Theory (Rogers, 1995) may help uncover answers to the questions posed above incorporated in one broad question, while serving as a basis to understand the willingness of language teachers to consider integrating technology into their classrooms. In addition, this theory can help determine what knowledge and experiences influence the attitudes of teachers towards technological integration, which characteristics are associated with teachers who adopt/reject technology, and what perceptions teachers have towards the various attributes behind technological integration.

Diffusion of Innovations Theory (DIT) focuses on the adoption of innovations. This theory initially developed out of research in sociology and agriculture (Ryan, & Gross, 1943), before Rogers (1995) further developed and researched it. Other researchers (e.g., Dooley) used
it in other disciplines such as education, communication, anthropology, medicine, and marketing. In education, DIT research has been conducted to examine teaching and learning innovations such as a classroom management system, Blackboard, and other instructional technologies (Rogers, 2003).

Diffusion of Innovations theory seeks to explain how various populations adopt an innovation. Rogers (2002) defines an innovation as “an idea, practice, or object perceived as new by an individual or other relevant unit of adoption” (P.990); while he defines diffusion as “the process through which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system” (p. 990). Of importance to note that the word “new” refers to whether the potential adopter considers it to be new (Van de Ven, 1986). Rogers (2003) defines communication channels as “the means by which a message gets from one individual to another” (p. 18). Communication channels include mass media such as TV, newspapers, and interpersonal channels such as face-to-face communication. These tools are used as mediums to impact the beliefs of individuals to adopt an innovation (Rogers, 2003). When combined, four crucial factors need to interact for an innovation to be diffused and adopted by members of a particular social system: the innovation decision process, innovativeness, rate of adoption, and perceived attributes of innovation. Reflecting on that, Surry (1997) notes that Diffusion of Innovations Theory is not a well-unified theory, but a combination of a wide range of various sub-theories holding a different focus from the other; however, by integrating these sub-theories, a more complete picture can emerge than if any were used by itself.

In other words, Rogers’ theory can help draw an overall picture for the adoption and the diffusion of innovations. The theory can do so by considering both the characteristics of the
innovation and innovativeness of the individuals in the innovation-decision process. In the next section, a description of the four central DIT concepts will be detailed.

**Innovativeness.** Individuals and their tendency to adopt new innovations vary from one to another (Rogers, 1995, 2003). Rogers (1995) defines innovativeness as “the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system” (p.22). Thus, many diffusion scholars (Rogers, 1995, 2003; Robinson, 2013) believe that members of a social system can be categorized into five different groups according to the characteristics that influence the adoption of an innovation. Figure 2 shows the bell-shaped curve distribution of Rogers’ (2005) characteristics of innovativeness. According to Rogers, Individuals fall into one of the five innovativeness categories: innovators, early adopters, early majority, later majority, and laggards.

![Figure 2. The bell-shaped curve distribution of Rogers’ characteristics of innovativeness (2005, P. 281).](image)

**Innovators.** Within this segment that constitutes 2.5% of the bell-shaped curve, the adoption process usually starts with small group of visionaries, venturesome, and imaginative innovators. They are risk takers and willing to adopt an innovation. Such individuals usually spend much of their time and energy creating new ideas and appliances. Robinson (2013)
advised to track and follow them and to invite them as partners in designing projects.

**Early adopters.** They constitute 13.5% of the bell-shaped curve. These individuals quickly make a connection between smart innovations and their needs. They are the ones who seek superiority over their peers, are driven by social prestige, are financially able to invest, and, above all, y are role models to their colleagues. Change agents usually look for them since their opinion about an innovation establishes its diffusion. They are the opinion leaders. The more they acknowledge the product, the idea or the behavior, the more it will be perceived confidently by the majority of the social system members or the potential adopters (Robinson, 2013).

**Early majority.** This group constitutes 34% of the bell-shaped curve. They are pragmatists and would adopt new ideas only if “solid proof of benefits” is available (Robinson, 2013, p. 5). This kind of adopter seeks an easier, better, and confirmed means of doing things. The early majority generally accepts new ideas before the average member of a social system. Yet, they may consider an innovation for some time before finally adopting it. Robinson (2013) recommended key ideas that might work with early majority: (1) offering “competition to stimulate buzz” (2) using “mainstream advertising and media stories featuring endorsements from credible, respected, similar folks” (3) lowering the entry cost and guaranteeing performance, (4) redesigning for more simplicity and ease to use, and (5) providing a good “customer service and support” (p.5). Those who fall into this category tend to follow with eagerness to adopt innovation, but they occasionally lead.

**Late majority.** The late majority constitutes 34% of the bell-shaped curve. According to Rogers (2003), they are skeptical and cautious about new ideas. Rogers describes them as conservative pragmatics and “risk haters” ((Robinson, 2013, p.5) driven by following
mainstream fashion. Peer pressure motivates the late majority to adoption. New innovation could work with them if the focus is on accrediting “social norms rather than just product benefits,” being free of risk and answering the laggards’ critiques (Robinson, 2013, p.5). They adopt innovation just after the average members in a social system.

**Laggards.** This final group constitutes 16% of the bell-shaped curve. They are very traditional and very skeptical of innovations. They “see risk in adopting a particular product or behavior” (Robinson, 2013, p.5). Their criticism should be addressed in case of working with late majority as they share some of the fears. However, their point of views can be ignored when working with early adopters. Nevertheless, if they are given “high levels of control over when, where, how and whether they do the new behavior,” and maximize their familiarity with it, other laggards may successfully adopt the innovation (Robinson, 2013, p.5). The innovation-decision process for those who fall in the laggards’ category is often long, and all of their uncertainties need to be addressed before they make their decision to adopt an innovation. They need guarantees that the new idea will succeed before they adopt it (Rogers, 2003).

Rogers (2003) says that an individual’s innovativeness is the most commonly used sub-theory in the diffusion studies. In education, many studies were conducted to understand the attributes and categories of potential adopters. For example, Berryhill (2007) conducted a quantitative study that examined faculty’s perception of themselves a adopters or non-adopters of the instructional technology and whether a relationship existed among their adoption decision, demographics, and training source. A survey was used to gather the data from six hundred and fifteen faculty members. Findings showed that no relationship existed between faculty’s adoption and non-adoption decision and their demographic information; however, a relationship did exist between their adoption and non-adoption decision and the training they had. Further, results
showed that 90% of the faculty members considered themselves adopters of the instructional technology provided in the Technology Classrooms. This data indicated that individual innovativeness might be a valuable source for understanding potential adopters’ decision about adopting an innovation.

Generally, innovativeness was used as an independent sub-theory in many diffusion studies. It served as an indicator of potential adopters’ behavioral change. Because every potential adopter in a social system does not adopt an innovation at same time, members of a social system are classified into adopter categories based on their innovativeness. Thus, each adopter category involves individuals who share a similar degree of innovativeness (Rogers, 2003).

**Perceived attributes of an innovation.** The adoption of an innovation is mainly based on the adopters’ perception of five attributes of the innovation: relative advantage, compatibility, complexity, trialability and observability (Rogers, 1995). Briefly stated, perceived attributes theorize that an innovation can be diffused if adopters perceive that the innovation (1) presents a better idea than a superseded one, (2) is compatible with the values and norms of social system, (3) is simpler to understand, (4) is trialable before installment, (5) is easy for the adopters to see its results, or it is observable.

Due to Rogers’ (2003) assumption that every individual of a social system perceives the attributes of the innovation differently, many scholars investigated individuals’ perception of the attributes of innovations. For instance, Brahier (2006), in a mixed methods study, investigated the adoption of a digital annotation software package called *RepliGo TM*. Data were collected from 60 teachers using both innovativeness and perceived characteristics surveys. Perceived
attributes of the innovation were determined and findings revealed that relative advantage, compatibility, and trialability primarily directed teachers’ adoption of RepliGo. In a similar study, Rosetti (2012) conducted an experimental study to investigate fifty-six pre-kindergarten teachers’ use of interactive whiteboards before and after ready-made lessons as an intervention. Data were gathered using an online survey. Results of the research showed that the participants perceived the attributes of interactive whiteboards positively and they tended to use the innovation very often after the intervention. Further, as Rogers posited, complexity and trialability attributes were important predictors of the adopters’ decision category. Likewise, Keesee (2010) conducted a quantitative study and investigated the individual innovativeness of thirty-seven faculty members and their perception of the attributes of course management systems. The findings showed that participants who fell into different adopter categories perceived attributes differently from other participants. For instance, the attributes of compatibility and complexity were predictors for innovators; relative advantage, complexity, and observability were predictors for early adopters; for early majority adopters, the predictor was complexity; all the attributes except complexity were predictors for late majority; relative advantage, compatibility, complexity and organizational support were predictors for laggards. According to Rogers, perceived attributes of innovation plays an important role in adopting an innovation by members of a social system. Using the survey from Compeau and Meister’s (2003) Perceived Characteristics of Innovating Scale (PCIs) survey that Brahier and others have employed appears to be a valid way to collect data about this concept.

**The innovation decision process.** According to Rogers (1995), the innovation decision process “is the process through which an individual (or other decision-making unit) passes from first knowledge of innovation, to the formation of an attitude toward the innovation, to a decision
to adopt or reject, to implementation and use of the new idea, and to the confirmation of this decision” (p. 20). This innovation decision process consists of five stages: knowledge, persuasion, decision, implementation, and confirmation. If an innovation makes it through these stages, an expected social change occurs in the targeted social system (Rogers, 2003). See Figure 3 for an illustration of this process.

Figure 3. A model of five stages in the innovation-decision process (Rogers, 2003, P. 170)

The knowledge stage. This happens when teachers are aware about the innovation, but do not actually use it. In terms of the used innovation for this study, educational technology, both teachers and students might use the innovation, but they mostly use it for purposes other than educational ones.

The persuasion stage. This happens when teachers create an overall favorable or unfavorable attitude toward the innovation, weighing its advantages over its disadvantages and the ideas that supersede. In this stage, the teachers begin their interpersonal communications with
their colleagues, seek further information, and examine its impact on their teaching practices if they have already adopted it or if they are in the process to.

*The decision stage.* This happens when the teachers decide to accept or reject the innovation. This happens when they actually get engaged in activities related to their teaching areas, which lead to their decision to adopt or reject the innovation. If they have accepted it, the adoption process will literally start. Adoption here means innovation integration with the curriculum. Further, two types of rejection exist: active and passive. Active rejection occurs when an individual decides to adopt the innovation, and then rejects it. Passive rejection occurs when an individual does not even think about considering the innovation (Rogers, 2003).

*The implementation stage.* This happens when teachers set the innovation into use, as it sounds significant in enhancing their teaching practices. Teachers will start new teaching strategies integrating the innovation with the curriculum in a way that assists them to evaluate their performance and to assess its outcomes on their students.

*The confirmation stage.* This begins when teachers start evaluating the results of an already accepted innovation on their students’ engagement, critical thinking, collaboration, imagination and overall learning performance.

Moody (2009) states that “teachers not only begin to invent new ways to use technology, but they also collaborate with other teachers to create a unified vision of using technology across the curriculum” (p.20). Accordingly, adoption can occur when adopters gain knowledge about the existence of an innovation, create a favorable or unfavorable attitude toward the innovation, engage in activity to decide to adopt or reject the innovation, use the innovation, and confirm by either accepting or rejecting the innovation. To sum up, an individual could be in any of the five
stages of the decision-making process according to their perception of their innovativeness and their perception of the attributes of the innovation. Rogers’s theory helps in understanding the innovation-decision process in which members of a social system are involved. Briefly, Rogers (2003) states that the adoption categories of the individuals and their perceptions of the attributes of an innovation play a significant role in explaining the adoption and the diffusion of an innovation.

**Rate of adoption.** Rogers (2003) explains the rate of adoption as “the relative speed with which an innovation is adopted by members of a social system” (p. 221). It is measured by counting the time period required for adopting an innovation by a certain percentage of social system members, which could be a year or a month. Rogers added “the rate of adoption is measured for an innovation in a system, rather than for an individual as the unit of analysis” (p. 23). For example, Feeney (2001) studied the rate of adoption of a course management system, Blackboard, at Temple University. He used digital cumulative recording in his research design as a web-based measurement strategy that provides a real-time automation of data at the point of adoption. The same recording of Blackboard course adoption facilitated comparisons with the university’s other management systems. Potential adopters perceived Blackboard as new. The study began in late 1999 when Blackboard was first installed. Results showed that the Business School faculties were the first and most pervasive adopters of Blackboard. The Blackboard rates of adoption serve as an important benchmark of the innovativeness of a higher education institution. This study explained that the rate of adoption is built around the change in the number of adopter. In other words, the study measured adoption by measuring the numbers of Blackboard adopters.

Further, Rogers explains that at the beginning of he adoption rate distribution on an S-shaped
curve is slow due to a few innovators and then the diffusion curve increases as adoption rate increases through time. Surry (1997) also theorizes that after the rapid growth of an innovation, its adoption would gradually decline as Figure 4 shows. Of additional importance, the rate of adoption of an innovation can be influenced by potential adopters’ perception of the attributes of innovation.

Figure 4. Variables determining the rate of adoption of innovations (Rogers, 2003, p. 222)

No previous studies have proposed a way to measure the decision-making process other than asking potential adopters to report their decision regarding adopting or rejecting an innovation.

Model for professional development (PD)

The PD model used for the technology workshops was based on recommendations from
the literature of best practices in professional development for teachers as listed in Figure 1. A two-stage model, as in Figure 5, illustrates guidelines for effective PD. The first stage involves a facilitator or technology coach assessing teacher current knowledge, skills, and abilities and then persuading them to learn about educational technology and providing them opportunities to gain knowledge and to integrate it into their teaching practices. More specifically, this stage includes three phases that address why teachers need to know about education technology, what they need to know, and how they can integrate it into their classrooms. The second stage involves creating an enabling environment to sustain teachers’ development with the use of technology. This stage includes three components, (1) administrative support, (2) opportunities for informal collaboration around education technology, and (3) an accessible platform for sharing links, ideas, and experiences. The model is based on Rogers’ DIT and the other literatures reviewed for this study.

Figure 5. Model for professional development.
**Stage one.** Unlike Rogers’ decision-making process sub-theory that consists of five phases, stage one of the PD model is based on three phases only. Rogers’ Innovation Decision Process sub-theory assumes that to adopt an innovation, a potential adopter first needs knowledge about that innovation. However, for some reasons that will be mentioned in the following paragraph, the diffusion process should not start with knowledge about the innovation, the “what,” but rather, it should start with the persuasion, the “why” phase first by building on the potential adopters’ prior knowledge of that innovation. For instance, based on previous research studies in marketing, Herr, Kardes and Kim (1999) stated that word of mouth communications has greater effects on persuasion than printed information. In order for potential adopters to be persuaded to adopt an innovation, they need first to know the answer to the “why.” A potential adopter might ask, Why do we need to spend that much time, effort, energy and maybe money to learn about it and to adopt that innovation? After the “why,” the change agent or the facilitator can provide the potential adopters with whatever information about “what” the innovation is (knowledge about the innovation) and help them to develop “how” to use it. So only when the “why,” “what,” and “how,” intersect can a change agent or a facilitator effectively persuade potential adopters to adopt the innovation.

**Why (Persuasion).** To convince the participants to integrate technology into teaching “the why”, the PD facilitator has to see herself as a change agent. Rogers (2003) described a change agent as an individual “who influences clients’ innovation decisions in a direction deemed desirable by a change agency” (p. 366). This means that the primary purpose of the professional developer’s role as a change agent is to promote the adoption of innovations by teachers through the means of inspiration, support, persuasion, and communication (Rogers, 2003). Further, most of the teacher education literature that addresses technology use puts
emphasis on students’ needs for teachers to consider and integrate technology, ignoring other important factors that are related to teachers themselves that might directly or indirectly impact their decisions and encourage them to integrate technology into their teaching practices. Therefore, during “the why” (persuasion) phase, as a change agent, the PD facilitator can emphasize three important factors: self-efficacy, marketing, and students.

1. **Self-efficacy:** Studies have indicated that self-efficacy is a strong predictor of an individual behavior (Bandura, 1977; Maddux, Norton, & Stoltenberg, 1986). Teachers who tend to persist, set high goals, and try all possible strategies and approaches to teaching would have a higher sense of self-efficacy than those who do not (Shaughnessy, 2004). In fact, successful teachers believe that they can make a difference in their students’ lives and would adopt a variety of teaching methods to demonstrate their beliefs. Therefore, learning about the use of educational technology might increase their technology self-efficacy through learning about educational technology and how to use it in classroom.

2. **Marketing:** A report published by the British Council in 2006 claimed that the global English language market is growing and changing. First, “more people than ever want to learn English” (Graddol, 2006). People all over the world tend to learn English for different purposes including education, business, and leisure. Second, it is changing because the businesses' usual power brokers have changed. For or instance, the role of native English-speaking countries that used to lead the industry has diminished (British Council, 2006) China, the country with the highest ESL students, learning English as a second language has started preparing its non-native English teachers. The “number of non-native speakers and teachers of English is now thought to outnumber native speakers
and teachers” (British Council, 2006, p. 1). Last but not least, “of the job postings on TESOL career center…that targeted master’s prepared ESOL teachers, nine (60%) listed training or experience with CALL, online delivery, or educational technology as a required or desirable attribute” (Kessler, 2006, p. 23). The competitive marketing of teaching English as a second language makes it reasonable for teachers to consider learning about technology and integrating it into their teaching practices because teachers who use technology will replace those who do not (Bosch, 1993).

3. **Students:** All teachers should ask themselves this question: Who are we without our students? Considering 21st century needs, debates concerning student education with technology has been raised. There is a rapidly growing gap between today’s students and the teachers who teach them (Duderstadt, 2000; Oh, & Reeves, 2014). For instance, in a mixed method study that investigated students’ use of technology inside and outside of classrooms and their middle school science teachers, the research findings related the gap or disconnect between the students and their teachers to the teachers’ lack of professional development with technology (Wang, Campbell, Coster, & Longhurst, 2014). Before that study, Oblinger (2005) went further and made a futuristic statement, claiming that “if the current generation of learners differs from faculty and administrators in attitude, aptitude, and knowledge, the odds are that the differences with the next generation of learners will be even more striking” (p. 69). Research shows that technology integration enhances the teaching and learning processes and improves the students’ outcomes (Egbert, Herman, & Lee, 2015; Stanley, 2012). Therefore, teachers’ development with technology is needed to satisfactorily address today’s and future student’s needs (Millis, 1994).
These three factors show “why” the participants might consider integrating technology in the English language context. English language teaching is a profession like all other professions and needs continuous and constant professional development to be competitive in the English language market. To do so, teachers need to be open to learning about new ways of teaching to boost their sense of self-efficacy, be competitors in the English teaching market, and show compassion toward their students by learning different approaches to teaching to meet each of their students’ wants and needs. This is why teachers who start using technology and those who start learning how to integrate technology into teaching will have a higher sense of technology self-efficacy, be competitive in the English language market, and be able to meet today’s students’ needs. The professional developer can include these ideas into professional development around technology adoption.

**What (Knowledge).** “The what” phase of professional development can then focus on helping participants define educational technology and understand CALL and task engagement principles (Bull, & McKenna, 2004; Egbert, 2003). The aim is to show language teachers’ ways for using computers and other educational technologies for the purpose of teaching and learning the language. These ways are supposed to emphasize the task engagement principles including authenticity, social interaction, creativity, connection and communication. Many types of tasks can accomplish this goal. A facilitator could, for example: (a) share with participants a video and have them make connections between their classrooms and the outside world, (b) involve the participants in a brainstorming activity to elicit concepts or vocabulary, or; (c) ask them before the workshop to read a work on the topic that has meaning and value to them and prepare to discuss it.

**How (Practice).** After participants understand the “why” and “what”, the how” (practice)
phase provides short, yet continuous professional development, which may be in the form of workshops or other forums. In each one, language teachers can be guided to how to consider the right technology tool based on the content objectives. This also needs to be supported with authentic activities and examples. The goal, from “the how”, is not only for teachers to understand and be able to use technology in meaningful ways, but also to know how to create student- collaborative and centered learning experiences. Therefore, it is important to consider an ample number of tool choices but also just enough tools in each professional development session for teachers not to feel overwhelmed. The tools chosen should address the language and other skills that meet the teachers’ interests and needs.

Further, instead of arranging PD sessions in one or more long days, sessions can be split into separate formal professional meetings and continuous informal meetings that meet the following goals:

- As noted previously, the gradual introduction of the technological tools (Kessler, 2006), so teachers would not feel overwhelmed.
- The exposure to classroom realities. During or after each professional development session, teachers should have enough time to practice what they learned in their own classroom contexts (Egbert, 2006).
- The continuity of teacher professional development during the academic term or year (Comas-Quinn, 2011).

The teacher education literature with technology suggests that, because teacher learning is not straightforward, in a time frame of 120 minutes and a focus on three or fewer tools for each PD session, the facilitator should be able to provide each individual teacher with the kind of support s/he needs (El Shaban, 2016; Arnold, & Ducate, 2015).
Stage two. This stage involves creating an enabling environment. This stage is important when teachers start to show a willingness to adopt technology into their teaching practices and they are in the phase of gradual integration of educational technology. Through an enabling environment, teachers can be encouraged to share experiences in using technology, including difficulties and successes, so that any uncertainty with their development can be perceived as achievable, comfortable, and even rewarding. To accomplish this, the enabling environment can consist of two factors:

Administrative support. Other than support for effective daily tasks, administrative support is required for the continuity of teachers’ development with the use of technology and to ensure that this progress will not come to a halt. Few, yet effective services that administrators can do to maintain the progress of faculty members include: (1) provide access to necessary resources (e.g., paid software, articles, Internet, computers, iPads, technicians.); (2) hire a professional technology development coach or other expert to update teachers with new educational technology software who can teach them how to use these tools to improve student academic achievement; and (3) secure funds to pay for teachers’ release time.

Opportunities for collaboration. This idea might sustain teachers’ professional development with the use of technology through the means of regular face-to-face communication and a digital platform for collaboration. With this informal communication, teachers receive the opportunity to feel part of a learning community. The face-to-face communication can provide teachers with the opportunity to interact and support one another and learn from each other’s experiences in implementing different approaches and strategies to teaching with technology. In addition, a digital platform, which can be used in ways similar to the face-to-face communication, can be set up in cyberspace so teachers can learn virtually
anywhere and anytime. It can reside on a learning management platform or other accessible technology to help teachers in their professional development.

**Summary**

Many research studies have used Diffusion of Innovations Theory to explore the spread of innovations within the educational field. However, in a review of the relevant literature, several gaps emerged. First, none of these studies investigated the adoption and diffusion of educational technology integration by in-service ELL teachers. Second, none of the previous studies incorporated the recommendations from the literature that addressed the teachers’ concerns with the use of technology during their professional development periods. Third, most of the DIT studies did not use educational technologies as innovations. Last but not least, Rogers Singhal, and Quinlan (2003) raise a concern about the prevalence of quantitative design in DIT research studies and especially the pervasiveness of surveys. As they state, the dominant style of diffusion investigations is… the quantitative analysis of data gathered by survey interview methods from large samples” (p.14). The frequent use of the same quantitative method in collecting diffusion data has been criticized by other researchers using Diffusion of Innovations Theory (e.g., Braheir, 2006; Meyer, 2004; Rogers, 2003). Meyer (2004) discusses the limitation of this frequently-used method, stating:

In sum, then, a great deal is known about the characteristics or attributes of innovations, about the characteristics of adopters, and whether or not and when adoption occurred. Importantly, however, much less is known about “why” or “how” adoption occurs or fails to occur” (pp.62-63).

To address this issue, Meyer (2004) suggests that a qualitative approach could provide researchers with credible findings that would generate additional directions. A qualitative design allows for as the posing of hypotheses and research questions previously overlooked and important. Thus, to address these gaps, the current study uses Diffusion of Innovations Theory
as a framework to qualitatively explore in-service ELL teachers’ decision-making around educational technology adoption, based in a context in which recommendations from the literature for teacher professional development are applied.
CHAPTER THREE

METHODOLOGY

The purpose of this study was to understand how Diffusion of Innovations Theory might inform the process of teacher development in education technology use. Shedding light on this issue may support facilitators in providing language teachers with context-appropriate professional development in education technology use. The study uses a qualitative methodology to answer the following research question:

To what extent does the Diffusion of Innovations Theory explain the adoption decisions of in-service teachers?

The current study adopted Meyer’s suggestion, noted previously, by using a qualitative study design backed by statistical procedure, integrating descriptive statistical data. This study will add several pieces of understanding the process behind in-service ELL teachers’ adoption of education technology as an innovation. Specifically, it will identify these teachers’ individual innovativeness and explore their perception of the attributes of educational technology use. It will also explore their decision-making process. This approach will ultimately achieve an in-depth understanding of the diffusion process among in-service ELL teachers. This study took place over Summer and Fall semester 2015. It focused on an intensive English program at a university in the Midwest U.S. The overall data collection process lasted for four months. The following comments describe the participants, context, data collection procedures, and data analysis for this study.
Research Participants

Access to the research participants was provided by the Director of the intensive English program. The Director stated that he was very willing to introduce his teachers to educational technology. In Summer 2015, an email that included a description of the study, proposed workshops, and consent information was sent to the program director. Eight participants (2 males and 6 females), the total number of faculty members in the intensive English program, agreed to participate in this study, except one female participant. Therefore, she will be excluded from the research participants. Six of the participants were over 40 years old and the other two were between 20 and 30 years old. All of the participants except one had MA degrees. The participants had varied experience in teaching English as a second language that ranged from 2 to more than ten years. Table 1 shows the background information of each of the participants based on pseudonyms provided for the study.

Table 1

*Participants’ Background Information*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Gender</th>
<th>Age</th>
<th>Educational experience</th>
<th>Teaching TESOL Experience</th>
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<td>Over 40</td>
<td>MA degree</td>
<td>&gt;10</td>
</tr>
<tr>
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<td>Male</td>
<td>Over 40</td>
<td>MA degree</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Kayla</td>
<td>Female</td>
<td>Between 20-25</td>
<td>BA degree</td>
<td>0-2</td>
</tr>
<tr>
<td>Jace</td>
<td>Female</td>
<td>Over 40</td>
<td>MA degree</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Sarah</td>
<td>Female</td>
<td>Over 40</td>
<td>MA degree</td>
<td>7-10</td>
</tr>
<tr>
<td>Kate</td>
<td>Female</td>
<td>Over 25</td>
<td>MA degree</td>
<td>3-6</td>
</tr>
<tr>
<td>Helen</td>
<td>Female</td>
<td>Over 40</td>
<td>MA degree</td>
<td>&gt;10</td>
</tr>
<tr>
<td>Denisha</td>
<td>Female</td>
<td>Over 40</td>
<td>MA degree</td>
<td>0-2</td>
</tr>
</tbody>
</table>

The researcher was a research participant as well. She trained the in-service language teachers on how to use educational technology. To do so, she led three professional development
workshops. In addition, she was a co-worker and taught English as a second language during the Fall semester.

**Research Context**

The demographics of the intensive English program (IEP) program included 8 teachers and the Director, who was also an ELL teacher, and 40 international students. As stated above, one of the female teachers who was leaving the university declined to participate in the follow up interview, so she was excluded from the study.

The program’s classrooms were equipped with a TV, computer, document camera, and projector. iPads were available upon request. Also, a computer lab at the university was assigned to the program for use during this study. The program coordinator, the participant Jace, and director, the participant Dan, with support from the university's Provost, covered all funding related to the study, including incentives for the teachers for their participation (pay for the hours they attended workshops) and for the cost of registration for one of the technologies, *English Central* (2017), at a cost of $15 per month for a one year subscription.

**Technology Workshops**

During the semester, the intensive English program teachers participated in four technology workshops. The purpose of the workshops was to introduce tools, provide examples of integration, and provide support for practice as a basis for their decision-making about educational technology. All participants except one, Helen, participated in all of the workshops; she experienced time constraint that caused her to miss parts of the second and the third professional development sessions. The next section describes the workshop procedure that was based on the model for professional development. This information helps ground some of the data presented in the next chapter.
Implementing the professional development model. The implementation of the model for the professional development began during the fall semester with three formal workshops to meet stage one requirements and a fourth workshop to give an example of stage two requirements. Each workshop lasted for about two hours. In each workshop, the researcher introduced three software packages. Rogers’ decision-making process was considered while introducing the idea of educational technology. In order to engage teachers in tool exploration, brainstorming, and reflection, participants had hands-on training for each tool. The next section provides more details about the workshop map.

The first workshop. The first workshop took place in week 1 of the fall semester and it was lasted for 2 hours. This workshop was conducted as follows:

- The workshop commenced with a Jeopardylab (n.d.) game as an icebreaker to build on teachers' prior experiences of technology and give them an overall idea of what educational technology in a classroom could look like.

- Second, because the researcher viewed herself more as a change agent rather than simply a facilitator, in the introduction to this workshopshe highlighted three reasons for why it is necessary for teachers to consider integrating technology into their teaching practice. She presented these ideas using Popplet software (2016). The reasons, as stated previously, included self-efficacy, marketing and students. The intention was to convince the participants to integrate technology into teaching - "the why" (persuasion). After addressing why teachers should learn to use technology (persuasion), an explanation of educational technology and task engagement that served as “the what” (knowledge) was presented. In addition, an educational technology tool, JeopardyLabs (n.d.), was presented as an example. A set of diverse questions was first set. It included language,
history, and art questions. During the workshop, the participants were divided into two
teams with instructions on how to participate. A small incentive was given to the winning
team. Because chocolate was the incentive, the other team was invited to enjoy theirs as
well. Further, the presentation was delivered using the software Popplet (2013) as well.
This tool was used to show the participants how it can be used as an instructional tool.
Also, a preliminary map of the upcoming technology workshops was presented.

- For this workshop, the “how” (practice) section was the longest as it involved hands on
  approach used for the rest of the first workshop and the other workshops.
- Third, hard copies and online supporting materials with the necessary technology tools
  were shared to the participants.
- Fourth, the researcher demonstrated how to use Jeopardylab (2013), Popplet (2016), and
- After each tool, the participants were given ample time to try the tools themselves. Then,
  following a lesson plan template, they were asked to create a lesson using any tool that
  interested them the most, focusing on the objectives of any of the language contents that
  they were teaching.
- Finally, Socrative software (2017) was used to wrap up the workshop. In order to give the
  participants, the opportunity to experience the tools themselves, the researcher provided a
  class code. This will also enable them to experience the tool themselves, examine their
  understanding of some of the CALL principles and collect their feedback about the
  workshop.
• Additionally, the participants agreed to use Facebook (Facebook, 2017) as a digital form of communication in the same workshop. The digital form of communication is part of stage two (the enabling environment) of the teachers’ professional development model.

**The second workshop.** The second workshop took place in week 3 and it was lasted for two hours. This workshop was conducted as follows:

• Teachers were engaged in an informative argument about their experiences when they integrated the tools they have learned in the previous workshop.

• The researcher continued with "the how" (practice) and presented *English Central* (2017), as an interactive tool for English language learning and the specific language skills that could be enhanced using this tool. Then, the participants were given ample time to try on its different levels on their own and reflect on how they felt about using it.

• A co-worker (Kate), volunteered to present *Breaking News English software* (2004-2017), and the participants were given the time to try the tool and to reflect on it as well.

• There was a quick navigation of *Google* (Google, 2014) and exchange of ideas about *Google image*, search, and *YouTube*. Then, the researcher paid special attention to how to use Google document to engage students in collaborative projects and writing. All the participants were invited to the Google document and given the opportunity to experience how it feels to be on the same page at the same time.

**The third workshop.** The third workshop took place in week 2 of the second term of the Fall semester and it was lasted for two hours. This workshop was conducted as follows:

• It started with an introduction of the three tools that will be presented and how each tool can be integrated into teaching English as a second language. These tools included *VoiceThread* (2017), *TEDxESL* (Jones, 2014), and Story jumper (2017).
• VoiceThread (2017) was the first tool presented and the participants were advised to create their accounts in advance. The researcher shared an email with all the participants containing instructions on how to create their accounts two days prior to the workshop.

• The researcher demonstrated how to use the tool and navigated it with the participants. Then, she asked them to access a link that she shared with them five minutes before the workshop started. She posted an illusion photo as a media and asked the participants to comment using either microphone, telephone, or writing to express what they thought about the photo. The participants were given time to read and listen to the comments of each participant and also reflect on them, either on the software or in the lab.

• Then, the researcher introduced TEDxESL (Jones, 2014) and shared one of the tool’s already existing lesson plans. After watching one of the clips, the researcher facilitated a meaningful discussion, considering the content of that clip and their overall evaluation of it.

• Last but not least, StoryJumper (2017) was introduced. The researcher asked the participants to create their accounts and explained how teachers can create their classes and invite their students to work under their guidance. The participants observed that this software is one of the very engaging ones. After the workshop, some of them decided to stay in the computer lab to finish creating their stories.

The fourth workshop. The fourth workshop took place in week 5 of the second Fall semester. This informal workshop was conducted as follows:

• A fourth informal workshop led by the participants was conducted as an example to sustain teachers’ professional development in using technology. The goal was to provide them with the opportunity to collaborate and share their experiences.
• During the same workshop, some participants shared other educational technology tools that are similar to the ones they had learned about in the previous workshops such as *Kahoot* (2017) and *Factile* (n.d.).

• The goal of this workshop was for teachers to brainstorm and share their experiences on recent research in the field of ESL and technology. This informal meeting is scheduled to take place twice or once a month. Also, as mentioned earlier, the participants agreed to use Facebook as an online platform for communication starting after the first workshop.

**Data Collection**

Data used in this study were collected from three online surveys, two sets of interviews, and informal anecdotal sources such as emails, observations, and brief hallway talks as the researcher made herself approachable and available to respond to the participants questions and reevaluations on their use of educational technology. These data sources are explained in detail below.

**Surveys.** Qualtrics, an online survey software tool, was used to collect data for the three surveys used in this study. The surveys were as follows:

**Background survey.** This survey was used to collect demographic data about the 8 participants. They responded to the survey in Summer 2015. It included age, gender, education level, teaching experience and the types of technology used before the study was conducted. The reason for collecting this background information about the participants was to determine if any of the characteristics have had a bearing on the participants’ individual innovativeness and their perceptions of the attributes of the innovation. See Appendix A for the survey.
**Individual innovativeness scales (II).** Individual innovativeness data were gathered using the Hurt, Joseph, and Cook Individual Innovativeness scales (1977), based on the DIT. It was used to know “the degree to which an individual … is relatively earlier in adopting new ideas than the other members of a system” (Rogers, 2003, p. 475). The IS has a total of twenty questions such as “I feel that I am an influential member of my peer group,” “I rarely trust new ideas until I can see whether the vast majority of people around me accept them,” and “I enjoy trying new ideas.” The items were set up on a five-point Likert-type scale. According to Hurt, Joseph, & Cook (1977), their innovativeness survey “has the potential to predict willingness to adopt innovations across populations” (p. 63) and has a reliability coefficient that ranges from 0.86 to 0.90; this makes it a significant predictor of the innovation.

All 8 participants responded to the survey in Summer 2015. Survey findings were used to categorize technology users into one of the categories from Rogers’ (2003) innovativeness scale: (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards. For the survey and the measurement, see Appendix B.

**Perceived characteristics of innovating scale (PCIs).** This survey was used to collect the participants’ perceptions of the attributes of educational technology. In this study, Compeau and Meister’s (2003) Perceived Characteristics of Innovation survey was used because it had the highest reliability of any of the scales that exceeded (0.70); however, the survey was altered to meet the requirements of this study. First, the survey underwent a change in the number of items. The survey originally consisted of 45 questions It was shortened to 18 to maximize the response rate (Nielsen, 2004). Therefore, a Rasch Model, based on Item Response Theory (IRT), was run to determine the psychometric properties of the survey. Survey questions were deleted using fit statistics that included the in-fit and the outfit to indicate how predictably the data fit the model,
i.e., considering two standard deviations for each score from the curve to see if they were a good fit or misfit. Further, an item-person map was used to eliminate conceptually redundant questions. After this procedure, the survey was narrowed to the 18 questions used in this study.

Specifically, as a result of the Rasch Model, the *measurability* construct was excluded and none of its items were included because it did not fit and also because it was not part of Rogers’ attributes concept. The *complexity* construct was reduced to 2 items, while the *image* construct was reduced to 4 items. The *compatibility* construct was reduced to 6 items. The trialability construct was reduced to 1 item and the *observability* to one item as well. The *relative advantage* construct was reduced to two items. The reduction in the number of items was to reduce sameness. The *voluntariness* construct was excluded because the teachers volunteered to learn about educational technology after it had been highly recommended by the program director and the university vice-chancellor. The exclusion of these items resulted in the reduction of the number of items from 45 to 18.

Third, some phrases were reworded to suit the innovation of the study, e.g., the term “educational technology” replaced “Microsoft Excel” for the innovation as used in the original scale. The 18 remaining questions were set up on a seven-point Likert scale that ranged from “strongly disagree” to “strongly agree.” In the final version, then, six constructs were included: relative advantage, image, compatibility (compatible with value, prior experience, preferred work style and fit current work practices), complexity, trialability, and observability. For the survey and the detailed analysis procedure, see Appendix C.

**Interviews**

In order to understand more about the participants' decisions to adopt or reject technology and to reach an in-depth understanding of the adoption of education technology, all of the
participants took part in semi-structured interviews. Each participant was interviewed individually. Two interviews, an initial and a follow-up, were conducted. The initial interviews were conducted before the first workshop and the follow up ones were conducted after the last workshop. The questions addressed in the first interview were determined by considering the participants’ responses on the innovativeness scale (IS). For example, one of the questions asked about how they saw themselves in the eyes of their colleagues. Other questions addressed in the follow-up interview were determined by considering the participants’ responses on the Perceived Characteristics of Innovating Scale (PCIS) and their decisions to adopt. For example, one of the questions asked the participants about their decision about whether to adopt or not to adopt educational technology in your teaching practices.

The interview questions also addressed the participants’ ways of teaching and types of technology they used, if any; this interview gathered data to understand the level of the teachers’ familiarity and use of educational technology while teaching English as a second language and to create an overall picture of their teaching style. Only one participant missed the first interview as she traveled to Russia for ten days’ vacation and joined the study for the first workshop. Both of the semi-structured interviews were audiotaped and transcribed.

**Informal/Anecdotal Data**

The period of four months that the researcher spent at the intensive language program as a research participant, facilitator, and co-worker provided her with the opportunity to interact with the teachers on a daily basis and understand the program’s culture. The participants and the researcher engaged in various casual conversations. The participants noted that the researcher made herself available and approachable to encourage them to come to her at any time, sharing their concerns with her and asking any questions. Three of the participants asked frequent
questions outside of class whenever they wanted to use technology in their lessons. This type of unstructured data was noted and integrated with the other data where appropriate in order to address the research question more deeply.

**Data Analysis**

**Surveys.** As mentioned in the data collection section, three online surveys were used to gather the research data.

*Background survey.* Participants’ background information was examined to see if there is any relationship between each participants’ background information, their innovativeness, and perceptions of the attributes of the innovation or not. For instance, the researcher checked whether there were any patterns in the data based on participants’ age, teaching experience, and gender.

*Individual innovativeness scale.* This inventory predicted “the degree to which an individual … is relatively earlier in adopting new ideas than the other members of a system” (Rogers, p. 475). The calculation of the participants’ total responses followed three steps based on the authors’ instructions and then checked against their scoring categories. Using the established criteria led to the following designations: (1) participants with scores above 80 were classified as Innovators; (2) participants with scores between 69 and 80 were classified as Early Adopters; (3) participants with scores between 57 and 68 were classified as Early Majority; (4) participants with scores between 46 and 56 were classified as Late Majority; and (5) participants with scores below 46 were classified as Laggards/Traditionalists. In general, people who score above 68 are considered highly innovative, and people who score below 64 are considered low in innovativeness. In other words, the analysis of the responses showed which among the five categories each participant fell into.
**Perceived characteristics of innovating scale.** Descriptive statistical analysis was used to analyze participants' responses to this survey. The calculation of the minimum, maximum, means and standard deviations of each item indicated the participants’ perceptions of the attributes of educational technology.

**Interviews.** Each of the two semi-structured interviews lasted between fifteen to thirty minutes. Creswell’s (2009) steps for qualitative data analysis were adopted to analyze the interview data: Transcribed data were organized and coded based both on ideas from the literature such as challenges, decision categories, and so on and codes that emerged from the data in order “to develop a sense of categorical, thematic, conceptual, and or theoretical organization” of the collected data (Saldana, 2009, p. 149). Then, codes were grouped into themes that were integrated and interpreted with regard to the research questions. The interview provided detailed information about which of Roger's decision-making stages applied to the participants.

The research procedure is presented in Figure 6 below.
Validity and Reliability

Qualitative research studies can provide more accurate, convincing, and comprehensive results when researchers employ different instruments in collecting and analyzing their data (Yin, 2009). This study increased the research’s credibility and validity by providing evidence from different data sources such as surveys, interviews, and informal data to configure a
“coherent justification for themes” (Creswell, 2003, p. 196). Using multiple sources of evidence can help to avoid bias while providing a deep understanding of the data. The comparison of the collected data through triangulation enhanced the research’s validity and interpretation and helped to understand the relationship among the different subsets of the theory.

Limitations

A number of limitations might influence the study findings. These are explained below.

1. Time limit: The time available for investigating the decision-making in this research study might be a problem. According to the Diffusion of Innovations Theory, adopting a new idea might happen over time before it can be spread among members of a social system (Rogers, 2010). However, how much time an innovation needs is unclear. The four months of this study allowed the innovation to be introduced gradually, and the participation of the researcher in every aspect of the English program allowed the researcher to pace the workshops appropriately for the participants.

2. The number of participants: Although the study had only 8 participants, this number could be determined as appropriate when performing deep data analysis and bringing in-depth insights to the research question. Further, this number comprised the "system" of the IEP (all of the teachers) that Rogers explains is central to innovation diffusion.

3. Focus on a limited number of technologies: This research considers the idea of educational technology integration in general as an innovation, but it exposed in-service language teachers to a specific set of technology tools which may not be relevant for them and may therefore affect the participants' adoption decisions. However, the
researcher took into consideration the participants’ stated teaching and technology interests and included a variety of tools among which to choose.

Summary

As noted previously, most Diffusion of Innovations studies have focused on quantitative analysis of data. This study tapped a qualitative research design to support an in-depth understanding of the diffusion of innovations process among in-service ELL teachers. Also, unlike other diffusion studies, this research collected data from a small sample and provided in-depth analysis of the technology adoption. Also, to my knowledge, this is the only study that has used DIT to explore the adoption of educational technology with in-service ELL teachers using educational technology as an innovation. Information about the participants’ backgrounds, the research setting, and the data collection and analysis procedures were included in this chapter. Descriptive and rich narrative analyses of the data collected are presented in the next chapter.
CHAPTER FOUR

RESULTS AND DISCUSSION

The purpose of this study was to understand how Diffusion of Innovations Theory can inform teachers' decisions about education technology use. Shedding light on this issue may support facilitators in providing language teachers with context-appropriate professional development. Based on the theory, the study explored participants’ self-reported innovativeness and their perceptions of the characteristics of educational technology as an innovation.

Results of the data analysis are presented below for each participant in order to show the relationships between the different subsets of the theory and each participant’s overall adoption decision for using educational technology. The discussion presents how useful the theory might be to represent each participant's decision and the overall fit of the theory for all participants.

Dan

Individual innovativeness. Table 2 presents the innovativeness data for the participant Dan.

Table 2

<table>
<thead>
<tr>
<th>Dan’s Innovativeness Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness Score</td>
</tr>
<tr>
<td>70</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The analysis of the innovativeness scale that participants completed before the study
period showed that Dan, who was the IEP director and an ESL instructor, fits into the early adopter category as classified by Rogers (2005). This means that, in general (not necessarily for education technology), Dan perceived that he was fairly inventive and accepted new ideas easily. This also suggests that he would be expected to consider the use of innovations such as technology. His mean score of 70 was above the mean for the group (66.5). His leadership competence, represented in his management of the intensive English program, would support Rogers’ classification of early adopters’ characteristics. For example, anecdotal data shows that he managed to secure funds for the technology professional development workshops, reserved a computer lab for the program for teachers to apply what they had learned from the workshops, and provided teachers with access to some of what they needed to grow in using technology. In response to an interview question about his choice of “strongly agree” for being influential on his peers, he stated:

As a teacher, most of my peers know me as a cooperative [sic] and team leader. I always like to learn new ways and share them with my colleagues. I used to also develop new class materials or exercises and if they worked well in my classes I would certainly encourage my peers to try them in their class as well.

Both the innovativeness survey and the interview data gathered from Dan support his placement into the early adopter category.

**Perceived characteristics of the innovation.** Table 3 presents Dan’s perceived characteristics of educational technology.

Table 3

<table>
<thead>
<tr>
<th>Characteristic of the Innovation</th>
<th>Dan’s item mean</th>
<th>Group item mean</th>
</tr>
</thead>
</table>


Because Dan falls into the early adopters’ category, according to the theory, he is expected to perceive the attributes of educational technology positively and this should affect his decision to adopt technology. Examining his perceptions of the attributes of educational technology can shed light on whether and how this expectation was met. The table data, collected from the Perceived Characteristics of Innovation survey given after the workshops, show that Dan: strongly agreed that the use of educational technology has a relative advantage; viewed the use of educational technology as compatible; moderately disagreed that the use of educational technology is incompatible; perceived the use of educational technology as easy to use; responded that the use of educational technology enhances his image in his organization; moderately agreed that he can share the results of his use of the innovation with others; and slightly agreed that he used educational technology on a trial basis long enough to see what it could do.

The analysis of this data shows that relative advantage, ease of use, and image are the most important attributes of technology that Dan considers in his decision to adopt. Dan’s mean score of 7 in relative advantage, image, and ease of use was above the mean for the group means.
of 5, 5.13, and 6; he had one of the highest scores on the scale. In addition to the survey data, interview data showed that Dan thinks that ease of use or complexity has the most impact on his decision to adopt technology. He stated that the most important factor that he is looking for when it comes to the use of technologies is “how user friendly they are, meaning they are not very complicated and not taking too much time from the class period.”

Describing his perceptions related to the ease of use attribute, Dan said in his follow-up interview that another important challenge is using technology without a backup plan in case technology disruption occurs. For instance, Dan shared his experience in this regard saying:

One of the challenges I faced couple of times was to plan my class on watching a movie that was available online, however when I went to class the movie was removed from Youtube due to copyright issues. Thus, I spent much time trying to find it searching many websites. That, in my view was not a good planning and I had to change the whole class and I did see that the students weren’t as happy as usual. From that time, I always did my best to have plan B ready to go in case my primary class lesson doesn’t work.

According to the DIT, Dan’s innovativeness as represented in his perception of himself as an early adopter and his positive perception of the attributes of educational technology are important in shaping his decision to adopt technology.

**Decision-making process.** Based on the data gathered from the first question of the final interview about participants’ decisions on whether to adopt or reject educational technology, Dan placed in the confirmation stage, the last stage of Rogers’ decision-making process. In support of this placement, when Dan was asked about whether he would adopt or reject the use of educational technology in general, he answered, from the instructor viewpoint, “I will definitely keep integrating educational technology into my teaching practices,” and from the administrator viewpoint, he stated the following:

As an administrator, it’s pivotal to embrace technology tools these days because most of the students are always growing up using technological gadgets. So, I would like to
invest in providing workshops and sending faculty to learn more about those technology-related educational methods. The teachers should feel more comfortable and engaged with the new educational technologies so they can employ them in their classes. As a director, to have faculty members who are using new technology-based techniques in teaching is a great endeavor that strengthens the program’s reputation and success in recruiting more students as well.

**Summary.** The integration of the survey and interview data gathered from Dan showed that DIT explained the decision-making process for this participant fairly well. According to Rogers’ DIT, Dan’s perception of himself as an early adopter predicts that he is most likely will adopt educational technology IF he perceived its attributes positively, and the data showed this to be the case. Further, Dan is in the confirmation stage of Rogers’ decision-making process. According to the DIT, this result is not mere coincidence, but indicates how the theory works. To explain, if a potential adopter falls into the early adopter category, it is most likely he or she will decide to adopt that particular innovation earlier than his peers who fall in late categories. This was true in Dan’s case. Ae started developing a favorable attitude toward the use of educational technology even before the workshops started and encouraged the other participants to integrate technology after the first workshop. Nevertheless, according to the theory, each potential adopter’s perception of the attributes of the innovation is what shapes his or her decision to adopt the innovation. According to Rogers, 49-87% of the variance in the rate of adoption of innovations is explained by their perception of attributes of an innovation. If a potential adopter perceived the innovation positively, the likelihood for adoption of the innovation increases and vice versa. Additionally, the innovation-decision type, communication channels, social system, and change agents may increase the predictability of the participants’ decisions to adopt the innovation. Dan falls into the early adopter category, perceived the attributes of educational technology positively, chose to use technology when he stated his decision clearly that he will adopt educational technology during the follow up interview. The
interconnectivity between these three concepts was consistent in explaining how Dan made his decision to adopt technology.

**Jace**

**Individual innovativeness.** Table 4 presents the innovativeness data for Jace.

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>73</td>
<td>Early Adopter</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Like Dan, the analysis of the innovativeness scale that the participants completed before the study period showed that Jace fits into the early adopter category as classified by Rogers (2005). Her score of 73, in general, means that Jace perceived that she was fairly inventive and accepted new ideas easily. This also means that she would be expected to consider the use of innovations such as technology. As Table 4 shows, her score was above the mean for the group (66.5) and showed that she was with the highest scorers on the scale.

Some of the early adopter characteristics can be seen in Jace’s leadership role. She is the program coordinator of the IEP. Observation data showed that her decisions do matter to the other members of the social system and teachers tend to seek her advice and follow her recommendations whenever needed. For instance, she is the one who assigns teachers to the different levels to teach and decides which books to consider for different language proficiency levels. This means that the change agent or the facilitator expects that an individual with such...
characteristics will adopt the educational technology and that she will act as a role model for the later adopters to be encouraged to follow her footsteps and adopt the innovation. However, anecdotal data also showed that at the first professional workshop, Jace and another participant, Helen, resisted learning about technology. For instance, during the first workshop Jace kept saying, “I am not a tech person. I am not a tech person. I am not gonna [sic] use technology,” and she was the last participant to respond to any instructions. Before this workshop and during the first interview, Jace made the comment that “inside the class I feel I only have them for a certain amount of time and so much information I feel when we are in class I feel that I shy away from technology because they use it too much … I know I would like to have more interaction with each other with the teacher mm as a native speaker and experienced teacher… that time with me should be spent.” Regardless of the resistance evident in this response, Jace responded to the question, “What if someone introduced you to technology?” saying, “If it fits into what I teach I mean if I see it. If it fits what I wanted to teach, then, yes. It depends. If I could fit it, I would change and adopt it how I teach [sic].”

In the second workshop, Jace showed enthusiasm that exceeded all of the others. She requested to learn more about technologies to use for writing which she started immediately integrating into her teaching practice. This response coincides with her early adopter score. Because she teaches writing, she was attracted by Google Docs (2017) and StoryJumper (2017) and started immediately using them after the workshops. After the second workshop, Jace and two other participants were among the first participants to encourage their students to use Google Docs. Also, Jace and Denisha worked together to examine the impact of using Google Doc on their students’ writing. They also submitted a proposal with the same idea to an international conference.
Even though observation showed that Jace’s perceptions as related to the innovativeness scale conflicted somewhat with her actions and opinions during the first workshop, her perceptions differed completely after the second workshop when she was introduced to a technology that fit her teaching interests. Similar to Dan, the survey data showed that Jace enjoyed taking part in the leadership responsibilities of the group she belongs to and she perceived herself as an influential member of her peer group. Also, Jace strongly disagreed in the belief that "the old way of doing things is the best." These responses match well with early adopter personalities and traits.

**Perceived characteristics of innovation.** Table 5 presents Jace’s perceived characteristics of educational technology.

Table 5

*Jace’s Perceptions of the Characteristics of Educational Technology*

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Jace's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>6.5</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>6.25</td>
<td>5.41</td>
</tr>
<tr>
<td>Incompatibility</td>
<td>2.25</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>4.5</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>6.5</td>
<td>5</td>
</tr>
<tr>
<td>Observability</td>
<td>6</td>
<td>5.63</td>
</tr>
<tr>
<td>Triability</td>
<td>6</td>
<td>5.75</td>
</tr>
</tbody>
</table>

Because Jace falls into the early adopters’ category, she is expected to perceive the attributes of educational technology positively and this should affect her decision to adopt
technology. The Perceived Characteristics of Innovation Survey given after the workshops shows that Jace agreed that the use of educational technology has a relative advantage, viewed the use of educational technology as compatible, moderately disagreed that the use of educational technology is incompatible, slightly agreed that the use of educational technology is easy to use, responded that the use of educational technology enhances her image in her organization, moderately agreed that she can share the results of her use of the innovation with others, and moderately agreed that she used educational technology on a trial basis long enough to see what it could do. Jace’s mean scores of 6.5 in relative advantage and image and mean score of 6.25 in compatibility were above the mean for the group means of 5, 5.41 and 6 and showed that she had one of the highest scores on the scale. The analysis of this data shows that relative advantage, image, and compatibility are the most important attributes of technology that Jace considers in her decision to adopt.

Further, interview data showed that Jace thinks that relative advantage as represented in the enhancement of teaching style and students’ outcomes has the most impact on her decision to adopt technology. For instance, she commented, “I don’t think technology changed my teaching style but rather enhanced it. I always like to bring new and interesting things into the classroom because I do not want my students to get bored.” She also added, “I think it has made the group assignments more successful. It is definitely easier for them to work on a group project.”

According to the DIT, Jace’s success, which is linked to her positive perception of the attributes of educational technology, is important in shaping her decision to adopt technology. However, it is important to note that unlike Dan, Jace perceived the use of educational technology as complex (mean=4.5), which is lower than the group mean at 5.13. Also, data showed that she thinks that she lacks experience when it comes to using educational technology. That may
explain why she chose to work with her co-worker, Denisha, to use technology in her writing class.

**Decision-Making Process.** Considering her categorization as an early adopter and by her positive perception of the attributes of educational technology, it is interesting to note how Jace changed her attitude toward technology use from appearing highly resistant (e.g., “not a technology person”) to seeming resilience. She commented, “I wouldn’t have tried some of the things I am doing right now if the workshops had not been made available so easily.” At the end of the four months of the study, Jace is in the confirmation stage of the decision-making process. She fits this category because, for example, when she was asked about whether she would adopt or reject the use of educational technology in general, Jace responded, “Decided to use technology such as Facebook and Google Docs for group work so that students could work more easily outside of the classroom.” She also added, “I found Google Docs, Facebook and Voice Thread to be the most useful. Google Docs is probably the one I am most likely to use since I teach mainly writing.”

**Summary.** The analysis of the survey and the interview data gathered from Jace showed that DIT explained the decision-making process for this participant well. She perceived herself as an early adopter in general although she was initially reluctant to use the specific innovation of educational technology. This is in keeping with DIT because the innovativeness scale only applies to innovation in general. According to Rogers’ DIT, Jace’s perception of herself as an early adopter links to her positive perception of the attributes of educational technology and her falling into the confirmation stage of Rogers’ decision-making process. According to the DIT, Jace’s positive perception of the attributes of educational technology has also shaped her decision to adopt technology. For instance, the analysis of the in-depth interview showed that
relative advantages as represented in enhancement of teaching style and students’ success had
the greatest impact on Jace’s decision to adopt technology. Similarly, the analysis of the
Perceived Characteristics of Innovation survey revealed that relative advantage, compatibility,
and image as the most important attributes that shaped her decision to adopt technology. Similar
to Dan, the interconnectivity between these three sub-theories was consistent in explaining how
Jace made her decision to adopt technology.

Kate

Individual innovativeness. Table 6 presents the innovativeness data for the participant
Kate.

Kate’s Innovativeness Data

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70</td>
<td>Early Adopter</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Like Dan and Jace, the analysis of the innovativeness scale that the participants
completed before the study period showed that Kate fits into the early adopter category as
classified by Rogers (2005). This means that she would be expected to consider the use of
innovations such as technology. As Table 6 shows, her mean score of 70 was above the mean for
the group (66.5) and it showed that Kate had one of the highest scores on the scale out of the 8
participants. Other than her job as an ESL instructor, Kate was also the coach of a cheerleading
team at the university, a leadership characteristic that distinguishes members who fall into the
early adopters’ category. During the first interview, Kate stated that she viewed herself as an
excellent collaborator with her colleagues. She also showed enthusiasm to adopt the technology; for instance, informal observation showed that during the second workshop, she took the lead and demonstrated one of the technology tools to her colleagues.

Furthermore, the analysis of the innovativeness survey data also revealed that Kate enjoyed trying new ideas, was receptive to new ideas, and viewed herself as an influential member among her peer group. According to the DIT, those who belong to the early adopter category can easily influence the decisions of early majority to adopt the innovation, and they are the ones, according to the literature, whose decisions the change agent might focus on for this reason.

**Perceived characteristics of innovation.** Table 7 presents Kate’s perceived characteristics of educational technology.

Table 7

*Kate’s Perceptions of the Characteristics of Educational Technology*

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Item Mean</th>
<th>Group mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>4.5</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>6.75</td>
<td>5.41</td>
</tr>
<tr>
<td>Incompatibility</td>
<td>1.5</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>6.5</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>3.33</td>
<td>5</td>
</tr>
<tr>
<td>Observability</td>
<td>5</td>
<td>5.63</td>
</tr>
<tr>
<td>Triability</td>
<td>7</td>
<td>5.75</td>
</tr>
</tbody>
</table>
Kate falls into the early adopters’ category; according to the theory, she is expected to perceive the attributes of educational technology positively and this should affect her decision to adopt technology. The table data, collected from the Perceived Characteristics of Innovation survey, show that Kate slightly agreed that the use of educational technology has a relative advantage, viewed the use of educational technology as strongly compatible, strongly disagreed that the use of educational technology is incompatible, moderately agreed that the use of educational technology is easy, slightly disagreed that the use of educational technology improved her image in her organization, slightly agreed that she can share the results of her use of the innovation with others, and strongly agreed that she used educational technology on a trial basis long enough to see what it could do.

The analysis of this data shows that Kate slightly agreed that relative advantage is an important factor when considering using technology. Nonetheless, triability, compatibility, and ease of use are the most important attributes of technology that Kate considers in her decision to adopt. For instance, Kate’s mean score of 7 in triability, mean score of 6.75 in compatibility, and mean score of 6.5 in ease of use were above the mean for the group means of 5.75, 5.41 and 5.13. She had some of the highest scores. On the other hand, unlike Dan and Jace, Kate did not perceive image as an important attribute for using technology. She had a mean score of 3.33 for image, lower than the group mean score 5.

The analysis of the interview data showed that relative advantage as represented in the enhancement of teaching style and activities, students’ engagement, and cost, in addition to the ease of use, have the greatest impact on Kate’s decision to consider technology. For instance, similar to Jace, Kate believed that the use of technology enhanced her teaching practices. She stated, “I wouldn’t say that technology changed my teaching style, but it certainly enhanced my
activities and practices.” Overall, Kate had a positive perception of the attributes of educational technology. According to the DIT, Kate’s positive perception of the attributes of educational technology is important in shaping her decision to adopt technology and is compatible with her innovativeness as an early adopter.

**Decision-making process.** Based on the data from the final interview that set participants’ locations in Roger’s decision-making process, Kate is in the confirmation stage. As one example of her fit with this category, when she was asked about whether she would adopt or reject the use of educational technology in general, Kate chose not to give a straightforward answer. Instead, she stated, “I am always open to using technological practices in the classroom and curriculum.” However, she added that she would consider a few things before using technology such as “…the cost… how user friendly it is… whether or not it will contribute to the goals and objectives of the course content”.

**Summary.** The analysis of the survey and the interview data gathered from Kate showed that DIT explained the decision-making process for this participant well. According to Rogers’ DIT, Kate’s perception of herself as an early adopter links to her perception of the attributes of educational technology and her categorization in the confirmation stage of Rogers’ decision-making process. If a potential adopter falls into the early adopter category, it is most likely that he or she will decide to adopt that particular innovation earlier than his/her peers who fall in later categories. Kate falls into the early adopter category, perceived most of the attributes for educational technology positively, and thus it is easy to say where she is in the decision-making process. Similar to Dan and Jace, the interconnectivity between these three sub-theories was consistent in explaining how Kate made her decision to adopt technology.
Ken

Individual innovativeness. Table 8 presents the innovativeness data for the participant Ken.

Table 8
Ken’s Innovativeness Data

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>67</td>
<td>Early Majority</td>
<td></td>
<td>66.5</td>
</tr>
</tbody>
</table>

Unlike Dan, Jace and Kate, the analysis of the innovativeness scale that participants completed before the study period showed that Ken falls into the early majority category. Like early adopters, this means that he would be expected to consider the use innovations such as technology. His score of 67 was slightly above the mean for the group (66.5) and showed that he had an average score on the scale. For instance, his selection of neutral as a response to the following questions, “I enjoy taking part in the leadership responsibilities of the group I belong to,” “I follow the belief that "the old way of doing things is the best," “I tend to feel that the old way of living and doing things is the best way,” and “I am slow to change” show that he belongs to the early majority group. He exhibits his fit with this placement by his satisfaction with the level and type of traditional technology that he used and his lack of participation in leadership.

Ken’s categorization as early majority and his responses to the first interview seemed to indicate that he would adopt technology. For example, in the first interview before the workshops, Ken said that he used CDs to help his students read more quickly, and he also had
students use TedTalks and YouTube videos for content. In a response to give an example of his use of technology, Ken explained, “I would show them [the students] the Ted lecture on like seven or eight different kinds of real robots that people made and then finally, you know okay, now come together in your groups and see if you can make your own robot cell design.” In addition, in a response to one of the interview questions regarding whether he views himself as a role model to other teachers, Ken was a little hesitant, but answered “Occasionally, I just, ah, it's hard for me to think of myself that way, but I'm more than willing to help anybody if they need it, so yeah.” Although this type of hesitation is not completely characteristic of early majority, his statement that he was willing to help is a feature of early majority.

**Perceived characteristics of innovation.** Table 9 presents Ken’s perceived characteristics of educational technology.

Table 9

*Ken’s Perceptions of the Characteristics of Educational Technology*

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Ken's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>4.5</td>
<td>5.41</td>
</tr>
<tr>
<td>Incompatibility</td>
<td>2.75</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>4.5</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Observability</td>
<td>4</td>
<td>5.63</td>
</tr>
<tr>
<td>Triability</td>
<td>4</td>
<td>5.75</td>
</tr>
</tbody>
</table>

Because Ken falls into the early majority category he is expected to perceive the
attributes of educational technology positively and this should affect his decision to adopt technology. The data in Table 9 show that Ken feels neutral that the use of educational technology has a relative advantage, slightly agreed that the use of educational technology is compatible, slightly disagreed that the use of educational technology is incompatible, slightly agreed that the use of educational technology is easy, felt neutral that the use of educational technology would enhance his image in his organization, felt neutral that he can share the results of his use of the innovation with others, and felt neutral that he used educational technology on a trial basis long enough to see what it could do.

The analysis of this data shows that compatibility and ease of use are the most important attributes of technology that Ken considers in his decision to adopt. However, Ken’s mean scores of 4.5 in compatibility and ease of use were lower than the group means. In addition to the survey data, analysis of the interview data showed nostalgia for a traditional way of teaching (without technology). Data analysis showed that Ken is both comfortable with his current traditional teaching methods and satisfied with his technology use level.

According to the DIT, Ken’s neutral perception of the majority of the attributes of educational technology and his level of satisfaction with the technology he uses may be important in shaping his decision to adopt technology. This indicates that, although he is early majority, he may or may not adopt technology. This fits with Rogers’ idea that people tend to differ on their perception of the attributes of an innovation depending on the innovation itself, regardless of where they are on the innovativeness scale.

**Decision-making process.** Based on the data from the final interview about participants’ location in Rogers’ decision-making process, Ken is in the decision stage. This category fits his
response to a question regarding whether he would adopt or reject the use of educational technology in general. As he answered, “I am still considering it and haven’t really made any decisions.” He added, “I still use the same amount of technology [audio and video media for listening and speaking classes] as before but may incorporate more in the future.” Even though he was not sure that he would integrate new technologies, Ken was observed using one of the workshop technologies, Jeopardy, in some of his reading classes. He also started to use TEDESL, which he heard about in the workshops.

Like Rogers’ early majority, final interview data showed that Ken might seem hesitant at first in adopting technologies that differ from the ones he currently uses. However, he does have the willingness to try new ones, as indicated in the following statement:

I use audio and video media fairly extensively. I do want to say that I did appreciate everything that you showed us, and I may incorporate something in the future if I find it useful. I would definitely like to incorporate the Jeopardy site you showed us; I thought that was a really great idea.

In other words, although Ken uses some old and new technologies, he is still deciding whether he will adopt additional technologies. In a way, his responses contradict his actions, but according to the theory, just because he is early majority does not mean that he will adopt whatever he sees. In other words, DIT can still be said to be a good fit to explain Ken's adoption decisions.

**Summary.** The analysis of the survey and the interview data gathered from Ken showed that DIT explained the decision-making process for this participant fairly well in terms of his perception of the attributes of educational technology and his decision-making process. Nonetheless, his decision-making and his neutral perception of the attributes of educational technology slightly contradict his perception of his innovativeness as an early majority. This does not mean that the theory did not explain the decision-making process for this participant.
Well, but it has rather shown that members of a social system do not always line up as early adopters or early majorities in all zones of their decision-making processes. For instance, a member may adopt the use of educational technology into her/his teaching practices and yet he or she may not be receptive to using an online social network such as Twitter. Individuals may move back and forth across the scale based on their interests and needs.

Sarah

Individual innovativeness. Table 10 presents the innovativeness data for the participant Sarah.

Table 10
Sarah’s Innovativeness Data

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>66</td>
<td>Early Majority</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Like Ken, the analysis of the innovativeness scale showed that Sarah falls into the early majority category. This means that she would be expected to consider the use of innovations such as technology, but not with the initiative and leadership that characterizes early adopters. Her score of 66 was a little below the mean for the group (66.5). The analysis of the innovativeness survey showed that even though Sarah chose "strongly agree" as a response to the questions that she seeks out new ways to do things, and enjoys trying new ideas, her choice of neutral as a response to the question, “I rarely trust new ideas until I can see whether the vast majority of people around me accept them,” provides proof that Sarah is pragmatic and considers
a proof of the innovation’s effectiveness from early adopters before she would make her decision to adopt it. This trait distinguishes the early majority group to which Sarah belongs.

During the first interview, Sarah said she was willing to adopt technology and observations showed that she really did. For example, in the first interview before the workshop, she stated,

Yeah, I will be willing to use any of the technology. Let’s say we are about to introduce six new technologies, I will be very interested in using them, umm, but if I had a difficulty using them then I would have a tendency not to use them. So it would be something that I have to learn very quickly and use very easily in the classroom.

Overall, both the innovativeness survey and the interview data gathered from Sarah showed that she falls into the early majority category.

**Perceived characteristics of innovation.** Table 11 presents Sarah’s perceived characteristics of educational technology.

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Sarah's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5.5</td>
<td>5.41</td>
</tr>
<tr>
<td>Incompatibility</td>
<td>1</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>3</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>5.75</td>
<td>5</td>
</tr>
</tbody>
</table>
Because Sarah falls into the early majority category, she is expected to perceive the attributes of educational technology positively and this should affect her decision to adopt technology. The table data collected from the Perceived Characteristics of Innovation Survey given after the workshops show that Sarah moderately agreed that the use of educational technology has a relative advantage, slightly agreed that the use of educational technology is compatible, strongly disagreed that the use of educational technology is incompatible, slightly disagreed that the use of educational technology is easy, moderately agreed that the use of educational technology improved her image in her organization, strongly agreed that she can share the results of her use of the innovation with others, and strongly agreed that she used educational technology on a trial basis long enough to see what it could do.

The analysis of survey data shows that Sarah perceives that relative advantage is an important factor when considering using technology. For instance, Sarah’s relative advantage mean score of 6 is similar to the group mean score. Nonetheless, triability and observability attributes are the most important attributes of technology that Sarah considers in her decision to adopt. Sarah’s mean scores of 7 in triability and observability were above the mean for the group means of 5.75 and 5.63.

In addition to the survey data, the analysis of the first interview data before starting the technology workshop showed that Sarah’s perception of the use of educational technology as complex might deter her from adopting technology. For instance, she stated:
One of the things, my biggest barriers I just don't know the technology and I don't have time to research technology and to implement that…. Number 1 is just I don't know how to use to technology well and number two is I don't have time … I’m so busy doing lesson plans and doing preparation for the class so I don't have time doing the research and to study and to learn new technologies.

Sarah's characterization of technology as complex could be due to the lack of adequate professional development that she commented on in the initial interview. For instance, Sarah expressed her concern stating:

So if we had a technology person that could help us that could come to classroom and make suggestions that will be very helpful.

However, after the technology workshop, Sarah’s perception of the need for professional development and support was confirmed. In the follow up interview after the last workshop, she stated her belief that “technology engages the students more at times, it makes the class more interesting for both the student and the teacher, and the workshop showed us some interesting sites to use in the classroom.” Based on this response relative advantage as represented in students’ engagement impacted Sarah’s decision the most to adopt technology. Over all, even though Sarah fell into the early majority category, she had a very positive perception of the attributes of educational technology. According to the DIT, Sarah’s positive perception of the attributes of educational technology is important in shaping her decision to adopt technology and it is compatible with her innovativeness and perception of herself as an early majority.

**Decision-making process.** Based on the data gathered from the first question of the final interview about participants’ decisions on whether to adopt or reject educational technology, Sarah was in the confirmation stage, the last stage of Rogers’ decision-making process. As an example, when Sarah was asked about whether she would adopt or reject the use of educational
technology, she made her decision clear about integrating educational technology, saying, “I would definitely adopt educational technology into my teaching practices.” Interestingly, Sarah progressed from stating that she knew nothing about educational technology use to the implementation and confirmation of using it.

**Summary.** The analysis of the survey and interview data gathered from Sarah showed that DIT explained the decision-making process for this participant fairly well. According to Rogers’ DIT, Sarah’s perception of herself as an early majority links to her positive perception of the attributes of educational technology, and this explains why she is in the confirmation stage of Rogers’ decision-making process. Similar to all the previous participants, the interconnectivity between these three sub-theories was consistent in explaining how Sarah made her decision to adopt technology.

**Denisha**

**Individual innovativeness.** Table 12 presents the innovativeness data for the participant Denisha.

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>Early Majority</td>
<td>66.5</td>
<td></td>
</tr>
</tbody>
</table>

Like Ken and Sarah, the analysis of the innovativeness scale that participants completed before the study period showed that Denisha falls into the early majority category. Her score of
66 was a little below the mean of the group (66.5); however, like Sarah, Denisha showed traits of early adopters in terms of her relatively positive perceptions of the attributes of educational technology. Her decision to adopt technology was higher than those of the early majority. Regardless of her short teaching experience, Denisha showed willingness to learn how to integrate educational technology in a way that is like the other participants who fall into the early adopters’ category. For instance, observation data showed that Denisha was among the first participants to really start using technology in her classroom. She is also the teacher that collaborated with Jace and used Google Docs to enhance the students’ writing collaboration skills, and she submitted a proposal with Jace in the international conference. Further, Denisha showed initiative and attended the researcher’s classes twice to see how she used technology tools such as Breaking News English on iPads and how the students in those classes used StoryJumper (2017) to write. After her class observation, she started immediately using the tools with her students. According to the DIT, early majority are pragmatists. They tend to see how early adopters use an innovation before they make their decision to adopt it. This fits exactly with Denisha's data.

**Perceived characteristics of innovation.** Table 13 presents Denisha’s perceived characteristics of educational technology.

Table 13

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Denisha's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>5.5</td>
<td>5.41</td>
</tr>
</tbody>
</table>
Because Denisha falls into the early majority category, she is expected to perceive the attributes of educational technology positively and this should affect her decision to adopt technology. Table 13 shows that Denisha strongly agreed that the use of educational technology has a relative advantage, moderately agreed that the use of educational technology is compatible, slightly disagreed that the use of educational technology is incompatible, slightly agreed that the use of educational technology is easy, strongly agreed that the use of educational technology enhances her image in her organization, strongly agreed that she can share the results of her use of the innovation with others, and strongly agreed that she used educational technology on a trial basis long enough to see what it could do.

The analysis of this data shows that relative advantage, image, observability, and triability are the most important attributes of technology that Denisha considers in her decision to adopt. Denisha’s mean score of 7 in relative advantage, image, observability and triability was above the mean for the group means of 5.5, 6.3, and 5.75.

In support of the survey data, the interview data also showed that relative advantage as represented in the enhancement of teaching style and students’ engagement has the most impact on Denisha's decision to adopt technology. For instance, Denisha believes that the use of

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Rating</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incompatibility</td>
<td>3.25</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>5</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Observability</td>
<td>7</td>
<td>5.63</td>
</tr>
<tr>
<td>Triability</td>
<td>7</td>
<td>5.75</td>
</tr>
</tbody>
</table>
educational technology did not only enhance her teaching style, but it changed it to the better. She reflected, “There is no doubt that my students’ level of engagement was higher with the use of technology.” According to the DIT, Denisha’s highly positive perception of the attributes of educational technology is important in shaping her decision to adopt technology and, similar to Sarah, her perception of the use of educational technology is higher than her innovativeness as an early majority would assume.

**Decision-making process.** Based on the data from the final interview about participants’ location in Roger’s decision-making process, Denisha is in the confirmation stage. In keeping with this category, when she was asked about whether she would adopt or reject the use of educational technology in general, Denisha responded, “I will definitely be implementing more technology into my teaching practices in the future.” Regarding what shaped her decision to adopt technology, Denisha commented:

> The workshops offered me the opportunity and time to become familiar with some new technology for the classroom. Once I implemented the new technology, I was happy with the outcome and the level of involvement of my student’s part. Being given the time and opportunity to learn about educational technology and the results influenced my decision to continue using technology in the classroom.

**Summary.** The analysis of the survey and the interview data gathered from Denisha showed that DIT explained the decision-making process for this participant, as with the previous participants, fairly well. According to Rogers’ DIT, Denisha’s perception of herself as an early majority links to her positive perception of the attributes of educational technology fairly well and together led her be in the confirmation stage of Rogers’ decision-making process. Similar to all the previous participants, the interconnectivity between these three sub-theories was consistent in explaining how Denisha made her decision to adopt technology. The reason about why Sarah and Denisha perceived themselves as early majorities, yet they showed the traits of
early adopters can be linked to their positive perception of the attributes of educational technology. Potential adopters might perceive themselves as early majority in general. However, that does not guarantee their adoption or rejection of that particular innovation. Their perceptions of the attributes of the innovation may have a greater influence on their decision and the rate of adoption in general. It is also worth to note that early majority rarely lead. Nonetheless, in the context of this study, both participants were amongst the first to integrate technology into their teaching practice.

Kayla

**Individual innovativeness.** Table 14 presents the innovativeness data for Kayla.

Table 14

<table>
<thead>
<tr>
<th>Kayla’s Innovativeness Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovativeness Scale</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>62</td>
</tr>
</tbody>
</table>

The analysis of the innovativeness survey showed that Kayla fits into the early majority category as classified by Rogers (2005); however, she had the second lowest mean score (62) on the innovativeness scale compared to the mean score for the group (66.5). Also, similar to Ken, her choice of the neutral response to questions like “I am generally cautious about accepting new ideas,” “I follow the belief that "the old way of doing things is the best,” “I am slow to change,” and “I am very inventive” gives the indication that she may need evidence of effectiveness from innovators and early adopters before she can make her decision to adopt the innovation.
According to Rogers’ innovativeness categories, this is part of the early majority characteristics.

The analysis of the interview data for Kayla supports Rogers’ claim regarding early majority traits. Some data showed that Kayla seemed reluctant to use technology and that she most leans toward the traditional pattern of teaching. For instance, she stated:

There have been effective teachers before technology was ever invented, and the greatest minds have come from ages where none such technology existed, and their lectures are still of invaluable importance to the greatest educators, scientists, and scholars today.

In addition to her belief in the effectiveness of teaching without technology, Kayla stressed “I find that my students engage in the classroom whether I use technology or not. The only difference I notice is when we play games and the students become very competitive, and it was fun.” The innovativeness survey and the interview data gathered from Kayla showed that even though she falls into the early majority category, her reluctance to use technology, like Ken, indicates that she is comfortable with the level of technology that she is using and she does not see the need for more. According to the DIT, even though she perceived herself as early majority in general. This does not mean that she is willing to adopt educational technology specifically.

**Perceived characteristics of innovation.** Table 15 presents Kayla’s perceived characteristics of educational technology.

*Kayla’s Perceptions of the Characteristics of Educational Technology*

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Kayla's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>4.5</td>
<td>6</td>
</tr>
</tbody>
</table>
Because Kayla falls into the early majority category, she is expected to perceive the attributes of educational technology positively and this should affect her decision to adopt technology. Examining her perceptions of the attributes educational technology can shed light on whether and how this expectation was met. The table data, collected from the Perceived Characteristics of Innovation survey given after the workshops, show that Kayla slightly agreed that the use of educational technology has a relative advantage, moderately agreed that the use of educational technology is compatible, strongly disagreed that the use of educational technology is incompatible, moderately agreed that the use of educational technology is easy, slightly agreed that the use of educational technology would enhance her image in her organization, slightly agreed that she can share the results of her use of the innovation with others, and strongly agreed that she used educational technology on a trial basis long enough to see what it could do.

The analysis of the data collected from the perceived characteristics of innovation survey given after the workshops showed that triability, compatibility, and ease of use tend to be the most important factors that impacted Kayla’s decision to use technology. For instance, Kayla’s mean scores of 7 in triability, 6.5 in compatibility, and 6 in ease of use were above the group mean score that ranged from 5.75 to 5.41 to 5.13, Refer to Table 15 for more details.
In addition to the survey data, the analysis of the interview data showed relative advantage as represented in enhancement of teaching style and students’ engagement as the attribute that impacted Kayla’s decision to consider using technology. For example, Kayla maintained that technology “does help my [her] teaching style. It can better aid communication in the classroom between students, and between teacher and students”. In addition to the Rogers’ attributes, another two important challenges that would impact Kayla’s perception of the attributes of educational technology emerged from the follow up interview: The first acknowledged a nostalgia for a traditional way of teaching and learning. For instance, Kayla is one of the late majority teachers and although she started gradually integrating technology, in her interview she tended to give more credits to teaching without technology. In one of her responses to why she chose strongly disagree that she would feel herself as a more valuable candidate in her institution if she used technology, Kayla responded,

Although I use technology in my classroom, I do not rely on technology. There have been effective teachers before technology was ever invented, and the greatest minds have come from ages where none such technology existed and their lectures are still of invaluable importance to the greatest educators, scientists, and scholars today. Therefore, I do not feel valuable because of technology, but because I care about my students and I am an effective educator with or without its usage.

Second, she referred to a shortage in access to technological resources (Internet, computers, iPads…etc). She was the only teacher who shared the lack of resources concern during the in-depth interview. She stated,

It is often difficult to have access to the computer labs. I cannot always rely on the hope that every student will bring their phones to the classroom if I want to use a game which requires that each student have a computer, and it is difficult to request the laptops in the classroom. Often, when we do have laptops, students do not know their IDs and passwords, therefore I have to take the time to go around and log them in. Often there will be a technological issue that will hinder our learning and cut out our time. Despite this and other issues that do not come to mind at the moment, I do acknowledge that
technology usage in the classroom can be fun and helpful. Therefore, I have only slightly disagreed with the statement.

Even though only two of the participants evidenced nostalgia to a traditional way of teaching and only one considered the lack of technological resources, still these issues need to be addressed as they could impact the participants’ decision to adopt educational technology.

According to the DIT, potential adopters’ perceptions of the attributes of the innovation are important in shaping their decision on whether to adopt or reject the innovation. This indicates that, although Kayla fits into the early majority category, she may adopt technology based on her perception of its specific triability, compatibility, ease to use or relative advantage attributes. This fits with Roger’s idea that people tend to differ on their perception of the attributes of any innovation depending on the innovation itself.

**Decision-making process.** Based on the data collected from the final interview about the participants’ stage in Roger’s decision-making process, Kayla did not easily allow an assignment to a category. However, Kayla seems to be more likely in the implementation stage. For example, when she was asked about whether she would adopt or reject the use of educational technology in general, she stated that her decision to adopt technology is not up to her, but to the 21st century needs. In a written follow up email, she noted:

> My decision to use technology is not up to me. I live in the twenty-first century where our daily lives are centered on technology. I am forced to use email, Facebook, and other such methods of present-day technological communication. Furthermore, my work has made it obligatory to attend technological workshops. Technology is an inescapable fact of everyday life that cannot be avoided.

Like an early majority, final interview data showed that Kayla might prefer teaching without technology. However, she chose to cope with the 21st century demands she perceived and incorporate some of the technology tools in her teaching. She only does so when she feels it
If I feel that my lesson is missing a component in the classroom, or if I want to implement a game, I will often look to technology to aid in my classroom teaching. It is not important to me whether technology is implemented in the classroom or not, but whether the students have the ability to learn from my teaching method, whatever that may be.

Although Kayla’s perception of her innovativeness fits her in the early majority category, interview data showed Kayla believes the decision to use technology is not up to her. This means that, regardless of her positive perception of the attributes of educational technology that are consistent with her innovativeness as an early majority, Kayla may actually be more of a laggard in using technology if it was up to her.

**Summary.** The analysis of the survey and interview data gathered from Kayla showed that DIT explained the decision-making process for this participant fairly well in terms of her perception of the attributes of educational technology and her innovativeness. Nonetheless, her designation as being in the implementation stage of decision-making somewhat contradicts her positive perception of the attributes of educational technology and her perception of her innovativeness as an early majority. This does not mean that the theory did not explain the decision-making process for this participant well, but, similar to Ken and others, it shows that members of a social system do not always line up as early adopters or early majorities in all zones of their decision-making processes. Further, her positive perception of the attributes of educational technology might have a positive impact on her decision to consider using it for its relative advantage feature as her interview data showed, for instance.

**Helen**

**Individual innovativeness.** Table 16 presents the innovativeness data for Helen.
Table 16

*Helen’s Innovativeness Data*

<table>
<thead>
<tr>
<th>Innovativeness Scale</th>
<th>Innovativeness Score</th>
<th>Innovativeness category</th>
<th>Group Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61</td>
<td>Early Majority</td>
<td>66.5</td>
</tr>
</tbody>
</table>

The innovativeness survey data showed that Helen fits into the early majority category as classified by Rogers (2005); however, she had the lowest mean score (61) on the innovativeness scale compared to the mean score for the group (66.5). She was on the borderline of late majority. She chose the neutral response to the innovativeness survey questions “I am aware that I am usually one of the last people in my group to accept something new,” “I am an inventive kind of person,” “I tend to feel that the old way of living and doing things is the best way,” “I am suspicious of new ways of thinking,” “I follow the belief that the old way of doing things is the best,” and “I am slow to change.” Similar to Ken and Kayla, this response indicates that she might need evidence of effectiveness from innovators and early adopters before she can make her decision to adopt the innovation. According to Rogers’ innovativeness categories, this is a characteristic of the early majority.

The analysis of the interview data supports Rogers’ claim regarding Helen's early majority traits. Data showed that Helen seemed to be the most reluctant teacher to try new ideas if she was compared to her colleagues. For example, interview data indicated that Helen associates her hesitation in using technology to the time factor; she claimed, “I am teaching the same way I have always taught…I do not have time to develop new material. I already work close to 80 hours/week and that is enough.” In part, this may have to do with Helen's life
situation which made her feel pressured to work constantly. Also, informal conversations with Helen showed that she is rather conservative and hesitant about integrating technology and she needs a guarantee of the innovation’s effectiveness before she would decide to adopt it. For example, she was part of a study group that was looking at Facebook as a teaching tool but needed detailed information about the technology and its effectiveness as a tool first; she was consistent in requesting such information about the tools presented in the workshops. This data does not mean that Helen is a mismatch for the early majority category but that she needs a model to follow before she would consider using technology. In fact, Helen was an excellent co-worker in the Facebook research project and she would not have been involved if she did not trust her other co-workers. This is mostly a trait of late majority that could explain why Helen’s innovativeness mean score is low. Even though she technically falls into the early majority category on the innovativeness survey, the interview data gathered from Helen showed that her reluctance to use technology would put her closer to late majority, which her score supports.

**Perceived characteristics of innovation.** Table 17 presents Helen’s perceived characteristics of educational technology.

Table 17

*Helen’s Perceptions of the Characteristics of Educational Technology*

<table>
<thead>
<tr>
<th>Perceived Characteristics of Innovation</th>
<th>Helen's item mean</th>
<th>Group item mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative Advantages</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Compatibility</td>
<td>3.5</td>
<td>5.41</td>
</tr>
<tr>
<td>Incompatibility</td>
<td>4</td>
<td>2.42</td>
</tr>
<tr>
<td>Easy to use</td>
<td>3.5</td>
<td>5.13</td>
</tr>
<tr>
<td>Image</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>
Because Helen falls into the early majority category, she is expected to perceive the attributes of educational technology rather positively and this should affect her decision to adopt technology. The data in Table 17 show that Helen: slightly agreed that the use of educational technology has a relative advantage, felt neutral that the use of educational technology is compatible but leaned more to slightly disagree that it is compatible, felt neutral that the use of educational technology is incompatible, felt neutral that the use of educational technology is easy but leaned more to slightly disagree, strongly disagreed that the use of educational technology would enhance her image in her organization, moderately agreed that she can share the results of her use of the innovation with others, and felt neutral that she used educational technology on a trial basis long enough to see what it could do.

The analysis of this data shows that observability and relative advantage are the most important attributes of technology that Helen considers in her decision to adopt. For instance, Helen’s mean scores of 6 in observability and 5 in relative advantage were near and lower than the group means of 5.63 and 6.

In addition to the survey data, the analysis of the interview data showed relative advantage as represented in the time factor to be the attribute that impacted Helen’s decision to consider using technology. For example, Helen specified that her use of technology is all about timing. If she had enough time, she would consider using technology. As she stated,
It all has to do with time. Even though I like using educational technology in the classroom, I do not have time to develop the material I need. I teach too many classes, and have too many papers to grade (often 400-500 papers/semester). If I taught one class (not in the English department) in the summer, I would be more inclined to use educational technology because I would have time to develop the material I need.

According to the DIT, potential adopters’ perceptions of the attributes of educational technology are important in shaping their decision on whether to adopt or reject the innovation. This indicates that, although Helen perceived herself as a (low) early majority category, she is reluctant to use technology because of the time constraints. However, anecdotal data about time showed that she may adopt technology based on her perception of its relative advantage. For instance, even though the survey showed that her positive perception of the attributes of educational technology is much lower than her colleagues, observation data suggests that her participation in the Facebook project to enhance the writing of her ESL students indicates that she can see a relative advantage in using technology. Therefore, it might be worthwhile to note that participants who had lower scores or scores that bordered a different category in the individual innovativeness survey might share some of that category traits. This means that Helen might have traits of late majority individuals as well, which might explain her low perception of the attributes of educational technology, excluding observability and relative advantage.

**Decision-Making Process.** Based on the data collected from the final interview about the participants’ location in Roger’s decision-making process, Helen is mostly in the implementation stage. She does not fit the definition of knowledge or persuasion stages, and her decision to see the impact of using Facebook on students’ writing implies that she has already decided to use at least one educational technology. It seemed like Helen was still in the implementation stage in part due to the fact that her teaching schedule was in conflict with the technology workshop schedules. However, interview data and observation showed that Helen
started developing a positive attitude toward integrating technology. She evidences this attitude in her research collaboration with Jace and the researcher. Therefore, it can be claimed that DIT explained the decision-making process for this participant fairly well.

**Summary.** The analysis of the survey and interview data gathered from Helen showed that DIT explained the decision-making process for this participant fairly well in terms of her perception of the attributes of educational technology and her innovativeness. Regardless of Helen's full-time commitment in teaching and grading for almost 80 hours a week, Helen's positive perception of the attributes of educational technology, observability and relative advantage, and her participation with Jace and the researcher in the Facebook research places her in the implementation stage. According to Rogers’ DIT, Helen’s perception of herself as an early majority, regardless of her low score, links to her positive perception of the attributes of educational technology and to her decision to adopt technology.

**Conclusion**

Overall, the analysis of the data indicated that five of the eight participants were in the confirmation stage of positively deciding to adopt educational technology. Two participants were in the implementation stage, while the other was in the decision stage, still considering the use of educational technology. As DIT suggests, participants' adoption decisions appeared to be based in large part on their perceptions of the attributes of educational technology as mainly exemplified by relative advantage, ease of use, compatibility, and triability. Participants also noted specific challenges that linked to attributes, such as time, lack of resources, nostalgia, and unreliability of technology. Many of the participants indicated that the educational technology workshops impacted their decisions to adopt technology, as they were first introduced to
educational technology through these workshops.

Further, no patterns based on participant demographics (e.g., age, education, teaching experience, or gender) were found. For instance, the youngest of them all, Kayla, was more reluctant to use technology than the other male and female participants. In addition, the data analysis showed no pattern among these participants that teaching experience was a factor to consider when they made their decisions to adopt or reject technology. To give an example, Denisha, who had only three years of teaching experience, decided to adopt educational technology and started integrating technology into her teaching practices immediately after the first workshop, perceiving its attributes positively. From the other side, data analysis showed that Ken, who has more than 10 years of teaching experience, was still in the decision stage, while Jackie, with the most teaching experience, was in the confirmation stage.

An important point to highlight is that in this study the participants’ innovativeness did not always serve as a perfect indicator of the participants’ decision to adopt or reject technology. For instance, analysis of the innovativeness scale showed that Ken and Kayla fell into the early majority category; however, the analysis of the interview data revealed that both participants were reluctant to use technology and they were still in the decision process. Nevertheless, by looking at the participants Denisha and Sahara, who made their decision clear to adopt technology, data from the innovativeness scale showed them accurately falling into the early majority category. Overall, the interconnectivity among the theory parts was consistent for the majority of participants in explaining how, in this context; they made their decisions to adopt technology.

The findings from this study revealed how DIT might be used to explore in-service
language teachers’ decisions to adopt technology into teaching. These findings were obtained by exploring each of the participants’ perceptions of their innovativeness and linking it to each one’s perception of the attributes of educational technology. The Diffusion of Innovations Theory provided a basis for this analysis. Also, the responses from these participants identified other factors and challenges that the in-service ELL teachers perceived related to their decisions to adopt technology.
CHAPTER FIVE

CONCLUSIONS

This research study sought to draw an overall picture of the decision to adopt educational technology among in-service English language teachers in an IEP who comprised what Rogers calls a "social system." The purpose was to understand how Diffusion of Innovations Theory reflects the decision-making process. The workshop model and the conclusions can help facilitators in providing language teachers with context-appropriate professional development in education technology use. This study accomplished this purpose by identifying the in-service language teachers' individual innovativeness according to Rogers’ five adoption categories and exploring the in-service language teachers’ perception of the attributes of educational technology after participating in workshops and other environmental enablers. In short, the study found that DIT explained the decision-making process of in service ELL teachers fairly well. Further, as the workshop model indicates, educational technology adoption is not as likely to occur without expert and administrative support. Implications of the findings for administrators, facilitators, and researchers follow.

Implications

The findings of this study suggest several recommendations for facilitators or administrators who provide language teachers with a context-appropriate professional development in educational technology. Their consideration of them might support their success in teachers’ adoption of educational technology.

1. Understand teacher innovativeness. The characteristics of teachers and specifically how they may react to a requirement to adopt educational technology matter. Because
facilitators, innovators, and early adopters can influence less enthusiastic adopters within the same social system, facilitators and administrators should know who might help with their goal of innovating.

2. **Address attributes of educational technology.** Teachers will make deliberate decisions whether to adopt educational technology. Facilitators need to address the educational technology attributes if they would like teachers to make their decision to adopt educational technology. Findings of this study revealed that relative advantage accounts for five of the teachers’ decisions to adopt educational technology; this suggests that effective professional development around innovations should show teachers how an innovation improves their students’ engagement, enhances their teaching practice, eases the communication, and makes learning fun. In other words, facilitators need to address relative advantage in various ways, supporting their claims with evidence. The same kind of attention can be paid to other attributes that professional development participants perceive as important.

3. **Consider using the workshop model.** Teachers in this study noted the effectiveness of the workshops in persuading them to integrate technology and showing them how to do so. In addition, the development of an enabling environment supported their ongoing development. Administrators and facilitators can adopt this model to work in their professional development contexts.

**Recommendations for Further Research Studies**

Recommendations for future research include further exploring teachers’ individual innovativeness, better understanding their perceptions of the attributes of educational technology, and evaluating the effectiveness of the workshop model in persuading teachers to integrate
technology. Further studies can also be conducted to:

- measure change in or stability of teachers' perceptions of innovations over time.
- collect data from a bigger population to uncover more challenges and give more credibility to the findings of this research.
- study DIT in a different context, such as with K-12 schools and teachers.
- examine students' perceptions of the attributes of educational technology and the impact of these perceptions on their academic achievement.
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APPENDIX

APPENDIX A: Participants’ Background Survey

Directions: To answer the following questions, you have the freedom to list or narrate.

1. Identify your gender.

2. In what year were you born?

3. What is your ethnicity?

4. What is the highest degree or level of school/education you have earned?

5. Have you received any type of information technology skill certificates?

6. How many hours a day do you usually use the World Wide Web (www)?

7. What is your area of study in the university?

8. Have you ever taught English as a second language? To whom? For how many years?

9. What kind of technology do you use most often in your daily life?

10. Why did you choose to participate in this workshop?
APPENDIX B: Individual Innovativeness Survey

Directions: People respond to their environment in different ways. The statements below refer to some of the ways people can respond. Please indicate the degree to which each statement applies to you by marking whether you: Strongly Disagree = 1; Disagree = 2; are Neutral = 3; Agree = 4; Strongly Disagree = 5 Please work quickly, there are no right or wrong answers, just record your first impression.

_______ 1. My peers often ask me for advice or information.

_______ 2. I enjoy trying new ideas.

_______ 3. I seek out new ways to do things.

_______ 4. I am generally cautious about accepting new ideas.

_______ 5. I frequently improvise methods for solving a problem when an answer is not apparent.

_______ 6. I am suspicious of new inventions and new ways of thinking.

_______ 7. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.

_______ 8. I feel that I am an influential member of my peer group.

_______ 9. I consider myself to be creative and original in my thinking and behavior.

_______ 10. I am aware that I am usually one of the last people in my group to accept something new.
11. I am an inventive kind of person.

12. I enjoy taking part in the leadership responsibilities of the group I belong to.

13. I am reluctant about adopting new ways of doing things until I see them working for people around me.

15. I tend to feel that the old way of living and doing things is the best way.

16. I am challenged by ambiguities and unsolved problems.

17. I must see other people using new innovations before I will consider them.

18. I am receptive to new ideas.

19. I am challenged by unanswered questions.

20. I often find myself skeptical of new ideas.

21. I am cautious about accepting new ideas.

22. I am suspicious of new ways of thinking.

23. I am very inventive.

24. I am Receptive to new ideas.

25. I follow the belief that "the old way of doing things is the best."

26. I am slow to change.

27. I rarely involve teachers (faculty) in the decision-making process.
Scoring:

Step 1: Add the scores for items 4, 6, 7, 10, 13, 15, 17, and 20.

Step 2: Add the scores for items 1, 2, 3, 5, 8, 9, 11, 12, 14, 16, 18, and 19.

Step 3: Complete the following formula: II = 42 + total score for Step 2 - total score for Step 1.

Scores above 80 are classified as Innovators.

Scores between 69 and 80 are classified as Early Adopters.

Scores between 57 and 68 are classified as Early Majority.

Scores between 46 and 56 are classified as Late Majority.

Scores below 46 are classified as Laggards/Traditionalists.

In general people who score above 68 and considered highly innovative, and people who score below 64 are considered low in innovativeness.

Source:

APPENDIX C: Perceived Characteristics of Innovating Scale (PCIs)

Directions: People respond to new technologies in different ways. The statements below refer to some of the ways people can respond. Please indicate the degree to which each statement applies to you by marking whether you: Strongly Disagree = 1; Moderately Disagree = 2; Slightly Disagree = 3; are Neutral = 4; are Undecided; Slightly Agree = 5; Moderately Agree = 6; Strongly Agree = 7.

_______ 1. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) will improve my teaching performance.

_______ 2. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) will make me more productive.

_______ 3. The use of educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) is completely compatible with my current way of working (teaching).

_______ 4. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) fits poorly with my current work practices.

_______ 5. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) fits with my preferred work style.

_______ 6. It will be hard to employ my preferred work style when using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.)

_______ 7. The use of educational technology (such as computer, blog, wiki, Vox Pop web,
social networking, mobile apps, digital cameras…etc.) is compatible with my past experience.

_______8. I lack experience when it comes to things like using educational technology ((such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.)

_______9. My values are in conflict with the use of educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.)).

_______10. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) is completely consistent with my values.

_______11. I believe that educational technology is cumbersome to use.

_______12. Overall, I believe that educational technology will be easy to use.

_______13. Using educational technology (such as computer, blog, wiki, Vox Pop web, social networking, mobile apps, digital cameras…etc.) improves my image within my organization.

_______14. In my organization people will gain prestige by using educational technology.

_______15. Having educational technology will be a status symbol in my organization.

_______16. Because of my use of educational technology, I see myself as a more valuable employee.

_______17. I would find it easy to tell others about the results of using educational technology.

_______18. I was permitted to use educational technology on a trial basis long enough to see what it could do.
19. Supervisors in my organization expect me to use educational technology.

20. My decision to use educational technology is entirely up to me.

21. The use of educational technology is mandatory in my school.

Source:

APPENDIX D: First Semi Structured Interview Questions

1. Would you describe your preferred teaching style?

2. Have you ever used educational technology when teaching? If the answer is “yes”,
   would give me an example of what is it and how you used it?

3. Why did you not use technology before? What would encourage you to use it in
   future?

4. How do you see yourself in the eyes of your colleagues? How do you see yourself in
   the eyes of students?

5. How do you like them to perceive you?

6. In the innovativeness survey, you chose (e.g., slightly agree- slightly disagree…) that
   you are …? (A couple of questions were based on the participants’ responses on the
   innovativeness survey and they varied according to each one’s response).
APPENDIX E: First Semi Structured Interview Questions

1. Let me know about your decision-making regarding the adoption or rejection of educational technology in your teaching practice.

2. What factors influenced your decision the most? Or what shaped your decision?

3. What was your goal in attending this workshop?

4. Did the use of educational technology change your teaching style? How?

5. Is there anything else you would like to share with me about the workshop?

6. Would you let me know how educational technology was used in your classroom?

7. Comparing your previous teaching style to your recent use of educational technology, have you noticed any change? In what way?