International School Leadership and the Diffusion of Distance Education in East Asian International Schools

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International School Leadership and the Diffusion of Distance Education in East Asian International Schools

by

Jeffrey R. Dungan

An Applied Dissertation Submitted to the Abraham S. Fischler College of Education in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

Nova Southeastern University 2017
Approval Page

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I have read the Code of Student Conduct and Academic Responsibility as described in the Student Handbook of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

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June 26, 2017
Date
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Abstract

International School Leadership and the Diffusion of Distance Education in East Asian International Schools. Jeffrey R. Dungan, 2017: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: international schools, international school leadership, distance education, instructional technology, K-12 education, diffusion of innovations

Change is critical in most organizations. International schools attempting to redefine 21st century education for their students are innovating pedagogies and schools’ structures. However, the leader of an organization or school may be the most influential advocate for or barrier to change. International schools’ leaders continue to play a role in the diffusion of distance education. This study identified the knowledge and experience of international school leaders and identified themes that are related to the likelihood distance education would or would not be adopted by the schools they lead.

This applied dissertation describes international school leaders’ knowledge and use of innovation diffusion theory in adopting distance education into kindergarten-Grade 12 East Asia Regional Council of Schools (EARCOS). International schools are a unique niche in the global educational environment. Due to the global nature of international schools, the high cost of tuition, an abundance of instructional resources, and the demands of educating children for matriculation to university, instructional technology has become an important aspect in international education. Many schools have adopted 1:1 laptop programs and learning management systems to manage instructional resources for classes and to deliver web-enhanced and blended learning. Triangulating data from EARCOS school leaders collected through individual innovativeness surveys and coding open-ended interview transcripts provided insight to school leaders’ knowledge and use of innovation diffusion theory when applied to adopting or rejecting the use of distance education within their schools.

Data collected in this study indicated that EARCOS school leaders’ use of formalized planning when diffusing innovations, including distance education, within their schools varied depending on the scale of the innovation and the stakeholders involved. EARCOS school leaders rated themselves higher on average in individual innovativeness when compared to other innovativeness survey normative groups. Several other key themes emerged from the data including the following:

- Opinion leadership and change agents play a vital role in diffusing innovations in EARCOS schools. School leaders need to be adaptable and recognize opinion leadership within their schools to diffuse innovations efficiently.
- EARCOS school leaders rated themselves as highly innovative but were reluctant to explore innovative ways of delivering instruction, including distance education.
- Distance education was not seen as relevant in EARCOS schools, even though school leaders recognized their students would be exposed to online learning upon matriculation.
- Barriers to the diffusion of distance education exist in EARCOS schools including cost to develop distance education programs and courses, existing school structures, and the perceived absence of need.
Table of Contents

Chapter 1: Introduction ..................................................................................................................1
  Background and Significance of Problem .................................................................................2
  Deficiencies in the Evidence ........................................................................................................4
  Audience ........................................................................................................................................5
  Definition of Terms ......................................................................................................................5
  Purpose of the Study ....................................................................................................................7
  Summary .......................................................................................................................................8

Chapter 2: Literature Review ........................................................................................................10
  Purpose Statement ........................................................................................................................10
  Theoretical Framework-Diffusion of Innovations (DOIs) ..........................................................11
  Innovation Diffusion Theory in Education ................................................................................28
  Criticism of Diffusion of Innovation (DOI) Theory .................................................................30
  Barriers to Adopting Innovations ...............................................................................................32
  Innovation Diffusion Theory (IDT) in Instructional Technology Kindergarten-Grade 12 (K-12) ..................................................................................................................33
  Distance Education (DE) .............................................................................................................35
  Kindergarten-Grade 12 (K-12) Distance Education ..................................................................38
  Benefits of Distance Education (DE) in Kindergarten-Grade 12 (K-12) Education ..................41
  Barriers of Distance Education (DE) in Kindergarten-Grade 12 (K-12) Education ..................45
  Innovation Diffusion Theory (IDT) in Distance Education (DE) .............................................48
  Opinion Leadership .....................................................................................................................51
  Opinion Leadership in Kindergarten-Grade 12 (K-12) .............................................................54
  International Schools ..................................................................................................................62
  Instructional Technology in Kindergarten-Grade 12 (K-12) Education .....................................65
  Globalization of Education ..........................................................................................................69
  Research Questions .....................................................................................................................70
  Limitations ....................................................................................................................................72

Chapter 3: Methodology ..................................................................................................................74
  Aim of Study ...............................................................................................................................74
  Qualitative Research ..................................................................................................................74
  Rationale for Grounded Theory Study .......................................................................................76
  Participants ....................................................................................................................................79
  Data Collection Tools ................................................................................................................81
  Procedures .....................................................................................................................................83
  Data Analysis .............................................................................................................................84
  Structure Semistructured Interviews .........................................................................................86
  Ethical Considerations .................................................................................................................87
  Trustworthiness ..........................................................................................................................88
  Advantages and Disadvantages .................................................................................................90
  Potential Research Bias ..............................................................................................................92
Tables
1 Innovation Characteristics ................................................................. 20
2 Study Participants Broken Down by Age Category .............................. 105
3 Study Participant Gender Classifications .......................................... 105
4 School Leader Participants Ethnicity ............................................... 106
5 School Leaders Level of Educational Attainment .............................. 106
6 Key Leadership Professional Status Description .............................. 107
7 Individual Innovativeness Scale Scores ........................................... 110

Figure
Distribution of EARCOS School Leaders’ Individual Innovativeness Scale
Scores ........................................................................................................ 109
Chapter 1: Introduction

Schools are being forced to change; the 21st century world demands it. Kindergarten-Grade 12 (K-12) education continues to lag far behind every other sector in the modern world when it comes to innovating practice or shifting dominant paradigms. Innovation is rarely a word that comes to mind when one thinks of K-12 education. Often, innovations are introduced to schools, only to be abandoned before becoming institutionalized. The topic of how innovations enter into schools and the factors that are necessary for innovations to become common practice is pertinent in the face of a rapidly changing world where information is ubiquitous. Instructional technologies and distance education (DE) are innovations that continue to disrupt traditional educational paradigms within K-12 schools. Introducing and leading educational innovation within a K-12 school is a difficult and often protracted endeavor. School leadership is certainly one conduit for innovations to enter into a school, but the diffusion of any innovation within an organization is a complex schema that is far more nebulous than the top-down traditional leadership hierarchies that typify K-12 schools.

Variability in instructional technology is significant between K-12 international schools. Two schools that can coexist in the same city, with nearly the same budget, governance, quality of staff, and technological infrastructures, might be worlds apart when it comes to innovative uses of instructional technology. How is it, then, that in a similar scenario in Shanghai, China, there is so much variance between the uses of instructional technologies between schools? One school with a 1:1 laptop/iPad program has online courses developed by teachers and technology facilitators on staff so that high school students on either of their two cross-town campuses can attend courses. Another school, just minutes away, barely has a technology infrastructure that will support a
fledgling 1:1 bring your own device (BYOD) program. In the latter school, there has been no thought towards integrated distance or blended learning. The purpose of this qualitative study was to identify the knowledge and experience of East Asia Regional Council of Schools (EARCOS) school leaders and identify the themes that are related to the likelihood that DE would or would not be adopted by the schools they lead.

**Background and Significance of Problem**

The international school population has seen explosive growth over the last 10 years with the number of international schools doubling and exponential growth projected for the next 10 years (International School Consultancy Research [ISC], 2013). In 2011 alone, 345 new schools were added to the global network of schools; 248 of these were added in Asia as the Chinese boom economy has driven the need for more schools to educate expatriate children (Nagrath, 2011). The United Arab Emirates alone contain over 390 schools and 54% of all international schools exist in Asia (ICEF Monitor, 2013). These figures along with increasing enrollments in many parts of the world contradict recent economic trends that have dominated the headlines in the United States and Europe. The roughly 2.8 million students enrolled in private international schools represent an industry currently estimated at $27 billion (ISC Monitor, 2013) that is projected to reach $60 billion by 2022 (ICEF Monitor, 2013). The statistics paint an overall favorable picture for the future of international education. For many international schools, DE has become an initiative that many schools are pursuing.

If the statistics of DE are any indication where international schools may be headed, studies of the diffusion of DE within the domain of online education become more salient. Allen and Seaman (2013) noted, “Ninety percent of academic leaders believe that it is likely or very likely that a majority of all higher education students will
be taking at least one online course in five years' time” (p. 5). The National Education Association (n.d.) estimated that as far back as 2001, 30,000 students had enrolled in online courses and that by 2006, the vast majority of high school students in the United States would have completed at least one online course. More recently, an August 2010 survey of K-12 DE by Picciano and Seaman (2009) proposed there were roughly 1,030,000 K-12 students enrolled in online classes. This figure represents nearly 2% of the United States domestic K-12 population. Roughly 70% of these students enrolled in online classes were high school students. Online student numbers are projected to reach 160 million by 2025 and education is positioned to become the largest industry in the world (Agarwal & Legon, 2006). Christensen, Horn, and Johnson (2008) predicted that by 2019, over 50% of all high school classes will be online.

Delivering education via instructional technologies has become a significant trend over the last 2 decades; a trend further supported by advances in learning management systems and instructional design practices (Alavi & Leidner, 2001; Eastman & Swift, 2001; Santos & Wright, 2001). K-12 online education is one of the most rapidly growing sectors in education (Wicks, 2010). iNacol estimated that between 2009 and 2010, over 1.5 million students participated in some form of online education. Most studies acknowledged the fact that K-12 online education is being outpaced by online education initiatives in higher education (Wicks, 2010). A 2011 report by the Sloan Consortium estimated at that time there were already over 1 million students in the United States who were engaged in some sort of online or blended learning courses (Allen & Seaman, 2011).

Innovation diffusion theory (IDT) studies have enormous potential to benefit international schools by streamlining the diffusion of DE initiatives. The aim of diffusion
scholarship and practices is to maximize innovation diffusion efficiency. Innovations must be lofty in their objectives while being low in financial and human resources to be considered worthwhile (Dearing, 2009). Simonson (2000) identified three main constructs that play an important role in the diffusion of DE: (a) personal innovativeness, (b) perceived organizational innovativeness, and (c) computer anxiety. Identifying EARCOS school leaders who are able to expedite the diffusion of educational technology initiatives while examining the extent IDT plays in the process of accepting or rejecting educational technology could serve as a first step for international schools considering moving instruction online.

**Deficiencies in the Evidence**

IDT is one of the most well researched theoretical frameworks for studies involving topics including communications, sociology, medical and educational research, and fashion fads (Dearing, 2009). The amount of inquiry devoted to studying diffusion of innovations (DOIs) has increased steadily over the last 70 years (Rogers, 2003). However, Blandford and Shaw (2001) stated there is a paucity of literature relating to leadership in international schools. International school leadership was a facet of the dissertation topic; however, it is a broad category encompassing many topics, such as longevity, governance, finance, or international curricula not directly related to this study. Few studies examined the heuristics involved with school leadership’s perceived computer competence in relation to leadership style (Afshari, Bakar, Luan, Samah, & Fooi, 2009). Research that aimed at identifying school leaders and the factors that play into the acceptance or rejection of educational innovations within the international school niche were scarce and often lacking of a unifying framework (Hazen, Wu, Sankar, & Jones-Farmer, 2012). Additional research involving the promulgation of instructional
technology innovations throughout the continuum of education is warranted.

DE poses significant growth potential at all educational levels. Hazen et al. (2012) observed a sharp increase in DE research after 1998 corresponding with the year of the initial release of the Blackboard learning management system (LMS). However, few studies specifically focused on DE leadership (Beaudoin, 2002). DE leadership is also a relatively new area of research in higher education (Irlbeck & Pucel, 2000). The majority of earlier studies focused on LMSs within the construct of mediating distance learning. A scarcity of studies focusing on leadership continues today.

Audience

International school leaders and their integration of IDT in the acceptance or rejection of educational technology innovations represent an opportunity for educational research. This study would be well suited to any international or domestic school leader, scholar, or individuals working in educational technology, instructional technology, or DE positions who are interested in successfully diffusing educational innovations within K-12 schools.

Definition of Terms

For the purpose of this applied dissertation, the following definitions will be used.

**Adopter categories.** Rogers (2003) defined this as “the classifications of members of a system on the basis of their innovativeness” (p. 50). These categories include early adopters and innovators, early and late majority, and laggards.

**Communication network.** Rogers (2003) defined this as follows: “Consists of interconnected individuals who are linked by patterned flows of information” (p. 351).

**Diffusion.** This term refers to “the process in which an innovation is communicated through certain channels over time among the members of a social
Diffusion gap. This term refers to the gap between early adopters (innovators) who quickly adopt a new technology or process and pragmatic early majority (Rogers, 2003). Diffusion gaps may impede or curtail the diffusion of an innovation if not bridged.

Distance education (DE). Often, the terms virtual, online, and distance learning are used interchangeably in describing learning that is delivered synchronously or asynchronously via the Internet where instructor and student are separated by geographical distance. Within this study, DE was used and is defined by Simonson (2003) as, “Institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors” (p. 7).

Educational technology. The Association for Educational Communications and Technology (as cited in Richey, 2008) defined this term as the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources.

Grounded theory study. This term refers to a methodology, type of design in qualitative research used when studying a process . . . systematic, qualitative procedures that researchers use to generate a theory that explains at a broad conceptual level, a process, action or interaction about a substantive topic. (Creswell, 2011, p. 432)

Hurt-Joseph-Cook Innovativeness Scale (IS). A 20-point standardized measure that utilizes a 7-point Likert scale to determine an individual’s willingness to change (Hurt, Joseph, & Cook, 1977).

Innovation. Rogers (2003) defined this term as follows: “An innovation is an
idea, practice or object that is perceived as new by an individual or another unit of adoption” (p. 42).

**International school.** For the purposes of this study, the researcher defines an international school as a private K-12 accredited school offering an international curriculum, different from that of the host country, to an international student population taught by a multinational English-speaking faculty (Skirrow, 2009).

**International school leadership.** For the purpose of this study, international school leader refers to individuals within international schools who are divisional principals, deputy superintendents, directors of curriculum and or professional development, and superintendents.

**Opinion leadership.** Rogers (2003) defined this term as “the degree to which an individual is able informally to influence other individuals’ attitudes or overt behavior in a desired way with relative frequency” (p. 54).

**Semistructured interviews.** This term refers to one of two core methods of in-depth qualitative interviews. In semistructured interviews, the researcher identifies a topic of study and prepares a small number of questions to ask as lead questions with the intent of following these predetermined questions with follow-up questions (Rubin & Rubin, 2012).

**Purpose of the Study**

The purpose of this qualitative study was to identify the knowledge and experience of EARCOS school leaders and identify the themes related to the likelihood that DE would or would not be adopted by the schools they lead. The primary purpose of this qualitative study was to examine the decision-making process and the likelihood of international school leaders in the EARCOS school region adopting DE initiatives within
the schools they represented. Data were triangulated using a demographic survey, the individual Innovativeness Scale (Hurt et al., 1977) and semistructured interviews with 10 EAI school leaders. At the time of the study, the EARCOS school leaders were leading schools in five different countries. The data were used to assess EARCOS school leadership’s personal innovativeness, their use of opinion leadership when diffusing innovations within their schools, and the likelihood that DE was being considered as an innovative instructional methodology.

**Summary**

Distance learning has shown a high rate of growth in the K-12 educational market (Agarwal & Legon, 2006; Allen & Seaman, 2013; Picciano & Seaman, 2009; Wicks, 2010). However, studies involving the diffusion of DE in K-12 international schools were nearly nonexistent (Blandford & Shaw, 2001; Hazen et al., 2012). Likewise, international schools represent a significant area of growth and revenue in the educational marketplace that continues to outpace other sectors of private education in the United States (ICEF Monitor, 2013; Nagrath, 2011).

Rogers’ (2003) IDT theory provided the theoretical framework for the study. Interviews were conducted with upper school administrators using grounded theory and Rubin and Rubin’s (2012) responsive interviewing to identify how components of IDT theory contributed to school leaders’ adoption or rejection of educational technology innovations. All school leaders who participated were, at the time of the study, leading schools with established 1:1 laptop programs and an operational LMS for delivering web-enhanced, blended, or fully online instruction.

When school leaders are confronted with an educational technology innovation, leaders with knowledge of IDT, whether explicit or inferred, are more likely to see
success in the diffusion and institutionalization of the innovation than school leaders who have less knowledge of IDT. Successful school leaders who demonstrate knowledge of an innovation validate the perceived use and perceived ease of use (Agarwal & Karahanna, 2000; Agarwal & Prasad, 1999) to staff. School leaders who utilize opinion leaders embedded in various divisions and teams within a school witness more efficient diffusions of an innovation. This study aimed to discover how the role opinion leadership plays in the DOI within EARCOS schools and the likelihood that EARCOS school leaders would consider diffusing DE as an educational innovation.
Chapter 2: Literature Review

The following literature review is a purposeful presentation and overview of past research relevant to K-12 international school leadership’s perception in adopting and diffusing instructional technology innovations in EAR COS. This literature review explored the history of DOI theory, instructional technology diffusions in K-12 education, DE in international K-12 education, barriers of DE in K-12 education, and the influence of school leaders and opinion leaders within EAR COS exerted on the diffusion of instructional technologies, specifically, DE.

Purpose Statement

A qualitative approach utilizing Rubin and Rubin’s (2012) methodology to qualitative interviewing was employed to conduct this grounded theory study. This study aimed to gain insights from interviewing and surveying K-12 international school administrators regarding their own perceptions of individual innovativeness and the extent to which Rogers’ DOI theory determines how instructional technology innovations are diffused within their schools. International schools mark one of the most rapidly expanding segments of K-12 education globally (Brummitt, 2007; ISC, 2013; Nagrath, 2011), yet research dealing with international schools was limited both in its breadth and its scope. To date, most international school research has dealt with cultural implications of school cultures and values within the context of varying cultural norms and values of host countries, third culture kids, teacher retention, and perceptions of international school stakeholders. The research on the use, implications, and diffusion of instructional technology within the constructs of international schools was significantly more limited (Blandford & Shaw, 2001).

The central phenomenon in this study was the influence school administrators
have on the diffusion of instructional technology innovations within international schools in the EARCOS. Out of 142 EARCOS member schools, 60 schools satisfied the study’s criteria. Schools included in the study all had established 1:1 laptop programs and an LMS that was utilized for teachers to deliver content or resources to students. Emails sent from the research to superintendents and administrators of these 60 schools were sent asking for volunteer participation in the study. Ten replies from the initial email invitation were received. Replies represented schools in China (five), Thailand (two), Vietnam (two), and the Philippines (one). All administrator respondents fulfilled the requirements by leading schools with existing 1:1 laptop programs and a LMS in operation.

**Theoretical Framework-Diffusion of Innovations (DOIs)**

Rogers (1995) IDT theory provides a popular theoretical framework for research dealing with the diffusions of innovations within organizations. According to Haider and Kreps (2004), “Diffusion is the process through which an innovation, defined as an idea perceived as new, spreads via certain communication channels over time among the members of a particular social system” (p. 3). IDT studies seek to explain communication between individuals within populations that lead to the adoption and diffusion of an innovation. IDT studies emphasize mass media and interpersonal communication networks more than any other type of communication research (Rogers, Singhal, & Quinlan, 1996). The distinction of IDT studies compared to other communication studies is that diffusion research deals with communications that are viewed as being completely new to individual receivers (Rogers, 2003). Educational research is only one area where IDT has been used to explain the methods and intricacies of how educational innovations spread over time between individuals and organizations.
**History of diffusion research.** DOIs theory predates World War II and the study of communication theories in universities (Rogers, 2003). Diffusion studies can be traced back to Gabriel Tarde’s groundbreaking book titled *The Laws of Imitation* published in 1903. Tarde was a French sociologist that theorized innovations are characterized by a significant lag time before it becomes widely adopted or reaches “critical mass” (Karmeshu & Nedungadi, 2012; Markus, 1987). Tarde, well before his time and in advance of the wave of diffusion research that would come after Ryan and Gross (1943), originated the key concept of the S-shape curve of the DOIs (Rogers, 2003).

The landmark diffusion study by Ryan and Gross (1943) served as a benchmark study for diffusions of innovations and is still a work widely cited in DOI studies. Ryan and Gross studied the rate of adoption of hybrid corn seeds and revealed the central role social networks and opinion leadership play in the DOIs. Furthermore, this study set the stage for diffusion studies to expand beyond agricultural sociologists into many other fields including general sociology, medical sociology, education, communication, and public health (Rogers, 2003; Rogers et al., 1996). Ryan and Gross defined much of the research that would come after it, using the individual as the center or innovation decisions and adoption and communication channels as the key dependent variables.

Coleman, Katz, and Menzel’s (1966) study of adoption rates for tetracycline, a new medical drug at the time, supported the findings of Ryan and Gross (1943) while also revealing characteristics of early adopters of the new drug. Their study was a landmark study in IDT research as they identified specific attributes of innovativeness and opinion leadership. Innovators and early adopters were found to be more cosmopolite and highly participative in mass media and interpersonal communications. These attributes assisted opinion leaders in diffusing innovations more efficiently through a
population and helped shorten the gestational period between an adoption of an innovation and the acceptance of it.

Innovation diffusion theory (IDT). A single unifying theory of DOIs was lacking. Everett Rogers’ four theories of diffusion presented were the most widely cited of all diffusion theories (Surry & Farquhar, 1997). Rogers’ (2003) four theories included individual decision process, individual innovativeness, rate of adoption, and perceived attributes.

Innovation decision process. Rogers (2003) identified five steps in the innovation decision process: knowledge, persuasion, decision, implementation, and confirmation. The knowledge stage begins when an individual becomes aware of an innovation either passively or through information seeking. Individuals may practice selective exposure when seeking an innovation. The objective of the knowledge stage is to glean information in order to reduce uncertainty about the innovation’s potential to solve a perceived problem.

Through selective exposure, individuals seek information that is congruent to their needs, beliefs, and existing attitudes (Rogers, 2003). This idea infers individuals who are active information seekers do so based on a perceived need. Once an individual recognizes a need, he or she may exhibit selective perception where he or she filters information utilizing only that, which supports his or her needs. Rogers (2003) defined a need as desires and frustrations of an individual that outweigh his or her actualities. However, Rogers was careful to point out that needs do not always elicit information seeking and vice versa.

Rogers (2003) identified three types of knowledge: awareness knowledge, how-to knowledge, and principles knowledge. Awareness knowledge is often the knowledge that
serves as an impetus to begin further information seeking based on an individual’s need. Knowledge then progresses to how-to knowledge where an individual seeks information on how to use or implement the innovation correctly. The greater the complexity of an innovation, the more how-to knowledge an individual will likely seek. Principles knowledge is information that explains the underpinnings of why or how an innovation functions. Organizational change agents usually focus on awareness knowledge and are the individuals who bring innovations to organizations. Rogers (2003) suggested that change agents could potentially see greater results in innovation diffusion if they focused on how-to knowledge as this knowledge is essential to pass on to other individuals within an organization and can be responsible for expediting the acceptance of new innovations.

The persuasion stage is the stage at which an individual forms an opinion, favorable or unfavorable, towards an innovation. Rogers (2003) defined this stage as attitude formation within an individual. Rogers (2003) was careful to note that his definition differed from others in that persuasion is seen as an intrinsic process that comes from the knowledge stage rather than information that is communicated from an outside source with the intent to induce change in attitude on the part of the receiver. Communication has the greatest effect on the persuasion to adopt when an innovation carries a high-perceived risk (Midgley & Dowling, 1978). Rogers (2003) noted that although an individual possesses a favorable attitude towards an innovation, this is not enough to induce action from the individual. Rogers (2003) referred to this as the KAP-gap (KAP refers to knowledge, attitudes, practice).

The decision stage is where the decision-making process takes place whether to actively pursue an innovation or reject it. Trialability plays a major role in the decision stage. Individuals will test an innovation to see if it is compatible with their need. During
the decision stage, the adopter may demonstrate an innovation to others in hopes of expediting the decision-making process for others. Rogers (2003) delineated rejection of an innovation into active and passive rejection. Active rejection is defined as the consideration and possible trial of the innovation with a final decision not to adopt. An individual who never considered adopting an innovation in the first place defines passive rejection. Rogers (2003) stated that seldom have these two forms of rejection been distinguished in past innovations studies and noted the need for future research in both forms of rejection. Finally, the decision stage can be influenced by environmental or peer pressures that may subversively lead an individual to adopt an innovation. This is especially the case in collective cultures where the collective’s goals and needs take precedent of those of the individual (Haider & Kreps, 2004).

The implementation is defined by the use of the innovation by an individual. Where the knowledge-persuasion-decision stages are characterized as largely mental, the implementation stages shift towards a change in behavior. The implementation stage may continue for a period of time, often dependent on the degree compatibility and complexity of the innovation until it becomes institutionalized. Occasionally, an innovation undergoes reinvention where the innovation is modified or changed by a user in the process of implementation. Rogers (2003) noted that in many DOI studies the process of reinvention took place as part of the original innovation was accepted or the innovation was modified by participants in the study within the knowledge-acceptance continuum. Reinvention, therefore, often leads to faster rates of diffusion and acceptance of innovation and greater innovation sustainability.

The confirmation stage is marked by affirmation seeking by the individual. Confirmation is an attempt at reducing innovation diffusion dissonance if it is present
among peers or within an organization (Rogers, 2003). Discontinuance occurs when an individual rejects an innovation completely. Discontinuance can either be a result of replacement where an innovation gets replaced in favor of one that is perceived as better meeting the needs of the innovator or through disenchantment, where an individual become disinterested in continuing with an innovation. Rogers (2003) noted that discontinuance is a behavior that is more likely found among late adopters rather than earlier adopters.

*Individual innovativeness.* Rogers (2003) and Rogers and Shoemaker (1971) offered an operational definition of innovativeness as individuals who are early to adopt an innovation. The rate and willingness to adopt innovations is directly proportional to an individual’s innovativeness. Personal innovativeness represents a central construct in diffusion research and has served as an important facet of diffusion research in general (Agarwal & Prasad, 1998; Rogers, 2003). Hurt et al. (1977) differed in their definition of innovativeness by defining it in terms of an individual’s willingness to change. Midgley and Dowling (1978) noted that personal innovativeness was not time dependent in terms of the time an individual takes to adopt an innovation. In contrast to Roger’s definition of individual as a construct of the time taken before adoption occurred, Midgley and Dowling noted that time to adopt is just one of a myriad of variables that can influence innovation adoption. They posited that time is just one of a myriad of variables that go into the decision-making process whether to adopt or reject an innovation. Midgley and Dowling noted innate innovation is seen as “the degree to which an individual makes innovation decisions independently of the communicated experience of others” (p. 239).

Others have broken innovativeness into global and domain specific innovativeness (Agarwal & Prasad, 1998). Domain specific innovativeness is seen as
behavior to adopt innovation within a specific context of activity. Agarwal and Prasad (1998) offered their own definition of innovativeness within the domain of information technology, making a measure of innovativeness directly related to an individual’s propensity to try out new information technology. Their definition differed from others in that they considered their definition a trait and was therefore less influenced by environmental and individual factors and more stable than personality attributes.

Rate of adoptions. Rogers (2003) defined adoption as “a decision to make full use of an innovation as the best course of action available” (p. 473). Rogers (2003) categorized adopters of innovation based on the amount of time it takes an individual to adopt an innovation. These adopter categories include innovators, early adopters, early majority, late majority, and the laggards. Innovators are the earliest to adopt. Innovators are defined as being highly cosmopolite, having substantial financial resources, and are able to understand the complexity that an innovation requires for use or integration into existing systems (Rogers et al., 1996; Coleman, Katz, & Menzel, 1966). Baumgarten (1975) found opinion leaders to be more affluent, outgoing, and gregarious and less adverse to risk taking than their later adopting peers. Innovators represent the outliers in a given population or organization.

Innovators can sometimes be viewed as renegades within organizations because their views tend in opposition to the norm. Innovations can occur from within organizations where change happens organically from individuals following uncommon practices that lead to better outcomes than others following less divergent methods. This concept of positive deviance (Zeitlin, Ghassemi, & Mansour, 1990) describes how individuals who may not demonstrate the characteristics of innovators can still be innovative within an organization (Sternin & Choo, 2000). However, Valente and Davis
(1999) found that inconsistent definition of communication channels and mass media influences led to confounding results that these play in the diffusion process of the innovator.

Early adopters tend to be less cosmopolite. The early adopters exhibit the highest degree of opinion leadership within a population. According to Valente and Davis (1999), “Opinion leaders can function as champions for the new practice and accelerate the diffusion process” (p. 57). Early adopters are on the fringe of the innovators cliques. They are more cautious in the acceptance of innovations and, as such, are seen as trusted, pragmatic leaders whose opinions are of importance to adopter categories that come later on the temporal continuum of diffusion. Opinion leaders are often perceived to be experts in their field and are respected for their objectivity towards innovations. Dearing (2009) stated that most opinion leaders will initially react negatively toward innovations, rather seeking to form additional judgments. In this way, opinion leaders most often fall into Rogers (2003) early adopter category rather than an innovator. This may seem counter intuitive; however, it is the process that legitimizes the opinion leader in his or her peer groups; the ability to exercise patience while gathering personal data that support or reject the adoption on an innovation.

The early majority adopts an innovation just before the mean of a population accepts an innovation. The early majority makes up nearly a third of any population. Early adopters interact with peers; they are not viewed as opinion leaders (Rogers, 2003). The position of early adopters between opinion leaders makes the early adopter an important link between the very early and late adopters. The late majority represents the skeptics within a population. This group makes up another third of any population. Late adopters are cautious and skeptical about innovations. Observability, perceived ease of
use, and perceived usefulness are of paramount importance to reducing uncertainties for the late majority to accept an innovation (Agarwal & Prasad, 1999).

Laggards are the final individuals to adopt an innovation. Laggards possess little or no opinion leadership. In stark contrast to the innovator, the laggard displays a small interpersonal network and conservative values. The decision not to adopt as early as others by laggards is often a function of their lower economic standing compared to innovators. Laggards, with less financial resources, need to be sure that an innovation is worth the investment of their very limited resources (Rogers, 2003).

**Perceived attributes.** IDT includes five characteristics of innovation: complexity, relative advantage, compatibility, trialability, and observability (Rogers, 2003). According to Rogers (2003), if an innovation is to be adopted successfully, it needs to be perceived as advantageous, is compatible with existing organizational and behavioral norms, and past experiences, has a low level of complexity, can be experimented with and tested by the end-user, and has easily observable results and there is likely an increased probability that the innovation will be adopted. Lee, Hsieh, and Hsu (2011) showed that compatibility, complexity, relative advantage, observability, and trialability all had significant effects on an individual’s intent to utilize e-learning. Tornatzky and Klein’s (1982) meta-analysis found that compatibility, relative advantage, and complexity had consistent correlations for innovation adoption across a wide spectrum of innovation adoption studies. Haider and Kreps (2004) found that identifying potential factors that could affect the perceived attributes of an innovation could help in expediting the implementation and acceptance of an innovation.

The five characteristics of an innovation according to Richardson (2011) AND Rogers (2003) are described in Table 1.
Table 1

*Innovation Characteristics*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
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<tbody>
<tr>
<td>Relative advantage</td>
<td>Degree to which an innovation is perceived as a better idea</td>
</tr>
<tr>
<td>Compatibility</td>
<td>Degree of consistency with one’s values, experiences, and needs</td>
</tr>
<tr>
<td>Complexity</td>
<td>Perceived degree of difficulty with using the innovation</td>
</tr>
<tr>
<td>Observability</td>
<td>Degree to which one can see results of using the innovation</td>
</tr>
<tr>
<td>Trialability</td>
<td>Degree to which the innovation can be experimented with or practiced</td>
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</table>

*Relative advantage.* Relative advantage is a measure of the benefit one innovation provides over an existing idea that it replaces. Compatibility is the degree to which an innovation fits within an organization’s existing systems and needs. Tornatzky and Klein (1982) suggested that compatibility and relative advantage had been reviewed generally and with such inconsistencies that the results from studies dealing with these two attributes were difficult from which to interpret or draw conclusions.

*Compatibility.* Compatibility is the degree to which an innovation is compatible with existing individual and organizational constructs of values, experiences, and needs. Cheng and Townsend (2000) noted four issues of instructional technology in schools in Asian schools. First, there appears to be inconsistency between the use of technological innovations in schools and the educational objectives they are meant to satisfy. Second,
training and professional development are often lacking from plans attempting to introduce technological innovations into schools (Cheng & Tam, 2007). Third, schools struggle to match the pace of technological innovations with that of curriculum design and development. Finally, the cultural norms of schools in the Asian region are at times in direct incompatibility with technical innovations being introduced or considered (Richardson, 2011).

**Complexity.** Complexity is how users of an innovation view the difficulty of understanding and using an innovation. Rogers and Shoemaker (1971) defined complexity as “the degree to which an innovation is perceived as relatively difficult to understand and use” (p. 154). Complexity parallels perceived ease of use quite closely (Haider & Kreps, 2004). Pelgrum (2001) identified 38 obstacles faced by primary and secondary international schools in adopting instructional technology innovations. Among the most frequently cited reasons for not adopting an innovation was complexity. Teachers and administrators were equally lacking in knowledge or rationale for instructional technology initiatives (innovations) and therefore limiting the integration of an innovation into instruction.

Davis (1989) found that perceived ease of use and perceived usefulness played an important role in the diffusion of an innovation. Perceived ease of use and perceived usefulness were both strong correlates of whether innovations diffused throughout organizations. However, perceived usefulness was shown to be a stronger correlate than perceived ease of use (Davis, 1989). This suggests that users in an organization will consider a diffusion if it is of immediate use to them, often overlooking complexities that may be associated with an innovation if it provides functionality in accomplishing a task. Perceived usefulness was shown to be a strong correlate in the DOIs and should not be
overlooked by individuals or organizations attempting to introduce innovations into existing systems.

**Observability.** Observability is the degree the results of an innovation are visible by others in an organization or community. Pelgrum (2001) observed that instructional technology adoption was directly influenced by the extent to which end-users could observe the benefits of an innovation within the context of their professional responsibilities and organizational expectations. Broken hardware, the lack of opportunities to observe and innovation in action, and a lack of exposure to technologies in education were cited as direct correlates to the failure of adopting an instructional technology innovation.

**Trialability.** Finally, trialability is the extent to which an innovation can be tested within an organization before adoption takes place. Law (2009) examined trialability in her research of the role of staff development and professional development in the implementation of any “educational change” (p. 23). Similarly, Hawkins (2002) found that a pivotal attribute in the success of educational initiatives in developing countries was the amount of professional development provided. In this sense, professional development serves end-users to test, experiment, and try new educational innovations before adopting or rejecting them. Rodrigo’s (2005) survey of primary and secondary schools in Manilla to examine challenges in adopting educational innovations found barriers that limited the exposure and practice of using an innovation directly impacted end-user adoption of an innovation. Among these were inadequate resources (computers or devices), limited software, and Internet connectivity issues. Therefore, trialability is a key component in whether or not an innovation of any kind is adopted.

**The innovation-decision process.** Rogers (2003) described five main steps in the
process to accept or reject an innovation: knowledge, persuasion, decision, implementation, and confirmation. Evidence in research suggested and supported that adoption of an innovation follows a decision-making process. However, Rogers (2003) noted that not all innovations adoptions follow the innovations decision process lock step. Variability in the order of the first 3 stages of knowledge, persuasion, and decision can be observed in the adoption or rejection of innovations and, as Rogers (2003) noted, may be a function of differing cultural norms collectivist cultures over individualistic cultures.

Knowledge. In the knowledge phase, an individual seeks knowledge in order to reduce uncertainty about an innovation and to learn how it functions and its capacity to solve existing problems. Rogers (2003) stated the diffusions process is the “process by which an innovation is communicated through certain channels over time among the members of a social system” (p. 11). This study also sought to identify K-12 international school administrator’s knowledge of Rogers’ diffusion process and the role it plays in their decision making as to what instructional technology innovations are introduced and diffused within the schools they lead.

Persuasion. The persuasion stage marks the point where an individual begins to form a positive or negative attitude toward the innovation. In contrast to the cognitive aspect of the knowledge stage, the persuasion stage involves emotion as an individual begins to shape his or her feelings toward an innovation. The persuasion stage is also a point where individuals continue to gather information to reinforce their decision to adopt an innovation. Most often information gathering is an attempt to lower anxiety around the observability of the innovation and how it will benefit the individual in a given context (Rogers, 2003). This information is collected more from peer groups than examining empirical research, which supports the need for emotional support of innovation.
adoption. That is, adopters want to know their peers have found an innovation beneficial (Rogers, 2003).

Decision. The decision stage is the critical tipping point for innovations that have been introduced to individuals or organizations. It is at this stage that a decision is made to adopt or reject an innovation (Rogers, 2003). It is in the decision stage that trialability and observability of the innovation are paramount if the innovation is to be adopted. Innovations that can be trialed and have a viable relative advantage over current practice are more likely to be adopted (Rogers, 2003). Complexity and trialability were identified as most significant innovation attributes that interfered with adopting an innovation (Richardson, 2011). Furthermore, Richardson’s (2011) study of instructional technology adoption in Cambodia found that lack of observability or perceived usefulness was also a barrier to adopting instructional technology innovations. This echoed Tiene’s (2004) findings that instructional technology innovations in international educational settings that tend to be overly ambitious and optimistic about what a technological innovation can accomplish often fail.

The role of the change agent becomes important as he or she can expedite the diffusion process by demonstrating how the diffusion works and why it is favorable. If an innovation fails to gain traction among individuals, it can be rejected. However, rejection can also occur after an innovation has been adopted, known as discontinuance (Rogers, 2003). Discontinuance can be active or passive. Active rejection takes place after an innovation has been trialed but fails to be adopted by a majority of individuals. Passive rejection occurs when an innovation is never fully considered (Rogers, 2003).

Implementation. Implementation occurs when an individual or group of individuals, outside of a decisions-making unit responsible for introducing an innovation,
puts an innovation to use. Implementation involves a behavior change. In this way, the implementation stage differs from other stages in the innovation-decision process that are cognitive. The implementation stage is often where problems arise with the innovation and during the beginning of the implementation stage there is often uncertainty that persists in individuals adopting the innovation. Problems are often compounded if an innovation is an organization rather than an individual. Simply stated, the more people involved with implementing an innovation, the more likely issues will arise between those responsible for initiating the innovation and those responsible for implementing it. Therefore, the implementation stage is also a period of active information gathering by individuals as they seek best practice in implementing the innovation. Ultimately, an innovation that is implemented becomes institutionalized. At institutionalization, the innovation loses its quality as being new or different and becomes considered common practice.

One important aspect of the implementation stage is the process of reinvention of an innovation as it is being implemented. Reinvention is “the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation” (Rogers, 2003, p. 180). Charters and Pellegrin (1972) were among the first scholars to recognize and study reinvention. In their study, they examined differentiated staffing in four schools. Charters and Pellegrin noted that innovations in staffing took place within the schools and the process for this innovation was different in each of the four schools studied. Similarly, Emrick, Peterson, and Agarwala-Rogers (1977) studied educational innovation diffusion at the national level in the United States. Their study found that about half of the adopters adopted aspects of an innovation but did not adopt the innovations as they had been introduced. Innovations that are designed to
account for reinvention to fit a wider range of adopters’ needs are often adopted more quickly (Rogers, 2003). Innovations with a higher degree of complexity are more likely to undergo reinventions. Therefore, innovations that are often reinvented or modified to best meet the needs of individuals and organizations are often more sustainable than innovations that may be implemented without flexibility to reinvent (Rogers, 2003).

**Confirmation.** During the confirmation stage, the individual or organizations seek to confirm that the decision to adopt an innovation was in their best interest. During the confirmation stage, the decision to adopt an innovation may be reversed if there are conflicting evaluations of the innovation (Rogers, 2003). The confirmation stage is where individuals will also seek to reduce dissonance; the feeling of uncertainty that comes with adopting an innovation. Even if an innovation is adopted individuals will continue to reduce dissonance by questioning the validity of the innovation and examining the fidelity of the original innovations versus subsequent iterations due to reinvention (Rogers, 2003).

**Considerations influencing diffusion.** Rogers (2003) identified four major considerations that can influence the diffusion process in education. These included (a) the innovation itself and the five characteristics of an innovation including its relative advantage over existing systems and technologies; its compatibility with systems; processes, or technologies that have been institutionalized; its perceived complexity; the degree to which the effect of an innovation can be observed; and if the innovation can be tested and experimented with during the diffusion process; (b) the channels that information concerning the innovation is communicated through and the degree to which school administrators leverage opinion leadership to diffuse an innovation; (c) the amount of time from introduction of an innovation to acceptance and widespread use of
the innovation; and (d) the nature of the social systems and interorganizational
components that affect the diffusion of the organization (Rogers, 2003).

Organizational and personal innovativeness also impact the rate of DOIIs within
organizations, including schools (Rogers, 2003). Whereas Rogers (2003) identified larger
organizations as being more innovative, schools can sometimes be hindered by their size
in diffusing innovations and institutionalizing new practices or technologies. Larger K-12
international schools, however, do have the advantage of larger school enrollments,
which equates to larger operational budgets. In turn, these larger budgets can be used to
introduce more professional development and technologies to enhance existing
instructional systems and practice. Kozma (1985) reinforced the need of increased
resources when considering and for the adoption of considered innovations. Although
resources alone do not infer any innovation can be adopted and institutionalized, Kozma
(1985) noted that lack of resources was most often cited as a reason for not considering
an innovation. Other reasons of nonadoption lie in how an innovation correlates with past
experiences, techniques, and technologies used in past instruction by teaching and
administrative staff in a school. In this sense, “best practice” becomes a filter upon which
school staff views innovations. If the considered innovation is incongruent with past
practice, or was not an evolution of an already established technique, the innovation
failed. Kozma (1985) stated, “It was not that the innovation was considered and rejected,
but rather that it did not evolve from the previous experiences of a colleague” (pp. 308-
309). Rogers (2003) identified that innovation decisions made within organizations
usually fall into one of three categories:

“1. Optional innovation-decisions”: choices to adopt or reject an innovation that
are made by an individual independent of the decision by other members of a
system;

“2. Collective innovation-decisions”: choices to adopt or reject an innovation that are made by consensus among the members of a system.

“3. Authority innovation decisions”: choices to adopt or reject an innovation that are made by a relatively few individuals in a system who possess power, high social status, or technical expertise. (p. 39)

One of the goals of this study was to determine if international K-12 school administrator’s decision to introduce and innovation to their staff was perceived as optional, collective, or authoritative.

In addition to organizational innovativeness Rogers (2003) also found that individual or personal innovativeness characteristics were also a determinant in the rate of diffusion of an innovation. Hurt et al. (1977) defined innovativeness as a willingness to change. Individual innovators, or change agents (Rogers, 2003), facilitate the flow of innovation information from the organization to other individuals in the organization that an innovation is targeted. Rogers (2003) emphasized individual innovators “provide a communication link between a resource system with some kind of expertise and a client system” (p. 318). Rogers (2003) noted individual innovators would not be necessary if social and technical chasms were not present between those in an organization desiring innovation and others in the organization considering an innovation. Individual innovativeness is a function of an individual’s high degree of knowledge and expertise of an innovation that is attempting to be diffused and their positive attitude toward change (Rogers, 2003).

**Innovation Diffusion Theory in Education**

Rogers’ (2003) DOI theory, specifically the five characteristics impacting
individual’s decision on whether to accept or reject an innovation, is a framework to organize past research in the area of K-12 education and instructional technology innovations (Richardson, 2011). Research dealing with the successes and failures of adopting instructional technology innovations into educational contexts was extensive. However, this body of research rarely examined these characteristics through the lens of Roger’s DOI theory and in so doing often overlooked the perspective of the end-user of the innovation. Therefore, the research focused on lessons learned while neglecting the perspective of past IDTs. In turn, educational research failed to contribute to an understanding of DOI theory with specific contexts such as K-12 instructional innovation adoption (Richardson, 2011).

Rogers (2003) noted education has been a less important contributor to the theoretical understanding of DOI theory. Unlike other professions, teachers and school administrators are often involved in collective and/or authoritative innovation-based decisions. Whereas most innovation-diffusion studies focused on optional innovation decisions, education provides a platform from which to explore innovation diffusion decisions less commonly studied (Rogers, 2003). The fact that education diffusion studies increased from 23 studies in 1961 to 359 in 1994 illustrates the potential educational diffusion research to add to the already robust literature foundations of DOI theory. Confounding, then, is Roger’s (2003) observation that since 1995, educational diffusion studies have decreased dramatically.

Mort (1953) was an early pioneer of DOI studies at Columbia University in New York. His studies on the effect of locally controlled school financial decisions as a predictor of school innovativeness confirmed long-held stereotypes that wealthier, suburban districts were more innovative than urban counterparts. Furthermore, Mort’s
studies identified a substantial time lag for educational innovations to be adopted. Mort noted there was nearly a 25-year time lag between American schools adoption of innovations considered best practice. Carlson (as cited in Rogers, 2003) refuted the 25-year time lag in American school innovation noting that modern math only took 5 years to be adopted in the late 1950s and early 1960s. Carlson’s study was important for its focus on interpersonal networks and their role in diffusing innovations (Rogers, 2003).

Kozma (1985) asserted that innovation in education are prone to outside influences and therefore may precede differently than diffusion of innovations in other environments or organizations. Among these factors may be funding; state or political initiatives in education reform; or the ability of schools to offer adequate, long-term support and development for innovations they wish to see adopted. Kozma (1985) also noted individual attempts at innovating that do not correspond directly to students’ or schools’ curriculum or missions, that are unsupported by schools or fail to diffuse to larger portions of a school or district, will ultimately fail. Therefore, instructional improvement lies in the balance between individual autonomy in the organization to introduce innovations and “organizational considerations when promoting instructional improvement” (Kozma, 1985, p. 317).

**Criticism of Diffusion of Innovation (DOI) Theory**

DOI studies are not without their limits. Haider and Kreps (2004) noted, “DOI makes certain simplifying assumptions about the complex reality it studies” (p. 7). Kozma (1985) noted the DOI framework failed to address motivations that influence innovation adoptions. Rather, Kozma (1985) asserted that interpersonal communications and stakeholder buy-in of the innovation was paramount in innovation adoption, sustainability, and institutionalization. Richardson (2011) reiterated this in his study of
instructional technology innovations in Cambodia. Most notably, these limitations were highlighted by the use of a qualitative methodology when compared to a past study employing measurable, quantifiable findings. Richardson’s (2009) earlier study quantitatively measured innovator characteristics’ impact on innovation adoptions. In contrast, Richardson (2011), using a qualitative approach to isolate innovation characteristics and innovation attributes, found that DOI factors were “rarely discussed in isolation” (p. 27). Innovations characteristics were found to overlap and were described as factors that blended, at times making them indistinguishable from one another. Rogers (1995, 2003) recognized four main criticisms of his DOI theory: (a) a proinnovation bias, (b) the individual blame bias, (c) recall problems, and (d) the issue of inequality.

**The proinnovation bias.** The proinnovation bias assumes innovations should be diffused and adopted to all individuals in an organization or social network. The proinnovation bias also assumes diffusion should happen quickly without modification or reinvention. This bias can lead to researchers ignoring important aspects of innovations that lead to rejection, modification (Rogers, 2003). Haider and Kreps (2004) stressed that proinnovation bias can also lead researchers to overlook antidiffusion constructs within organizations that have the potential to prevent diffusion of ineffective, poorly designed, or misaligned organizational innovations.

**Individual-blame bias.** Individual-blame bias holds individuals rather than organizations or social networks responsible for problems diffusing or adopting innovations. Research that sides with change agencies rather than individuals promoting innovations is a source of this bias (Rogers, 2003). This bias promotes the notion that success or failure of the diffusion of given innovations is dependent on the individual, rather than examining the broader context of an individual’s environment. Therefore, the
individual-blame bias is a micro, rather than a macro, approach to diffusion research resulting in presumptions and over emphasis about the individual’s role in diffusing innovations (Rogers, 2003).

**The recall problem.** Diffusion research differs from a majority of social sciences research in that it involves time and retroactively examining events and decisions made along the innovation diffusion continuum (Rogers, 2003). The recall bias is introduced whenever a respondent in DOI research is asked to examine retrospectively events and decisions. Individual’s ability to recall decisions, social network characteristics, outside influences, and individual and organizational actions that influenced acceptance or rejection of an innovation accurately and subjectively may be hindered or altered depending on the amount of time between the research and the diffusion of an innovation (Rogers, 2003).

**Equality issues.** Socioeconomic variables play a large role in how and why innovations are introduced and how they proceed through the innovation adoption continuum. Research neglecting to analyze the socioeconomic variables at play within organizations or social networks is neglecting a fundamental variable that affects not only which innovations are introduced but also a significant factor in determining diffusion and adoption rates. Haider and Kreps (2004) noted, “the diffusion of innovations widens the socioeconomic gap between the higher and the lower status segments of a system, especially, but not limited to, resource-poor settings” (p. 8).

**Barriers to Adopting Innovations**

Complexibility and trialability were identified as most significant innovation attributes that interfered with adopting an innovation (Richardson, 2011). Furthermore, Richardson’s (2011) study of instructional technology adoption in Cambodia found that
lack of observability or perceived usefulness was also a barrier to adopting instructional technology innovations. This echoed Tiene’s (2004) findings that instructional technology innovations in international educational settings that tend to be overly ambitious and optimistic about what a technological innovation can accomplish often fail.

Kozma (1985) reinforced the need of increased resources when considering and for the adoption of considered innovations. Although resources alone do not infer any innovation can be adopted and institutionalized, Kozma (1985) noted that lack of resources was most often cited as a reason for not considering an innovation. Other reasons of non-adoption lie in how an innovation correlates with past experiences, techniques, and technologies used in past instruction by teaching and administrative staff in a school. In this sense, “best practice” becomes a filter upon which school staff views innovations. If the considered innovation is incongruent with past practice, or was not an evolution of an already established technique, the innovation failed.

**Innovation Diffusion Theory (IDT) in Instructional Technology Kindergarten-Grade 12 (K-12)**

IDT in the domain of instructional technology and DE have a robust literature base. However, many of these studies have taken place in the context of higher education or within private-sector organizations (Hazen et al., 2012; Schnitman, 2008; Smith, 2012). Christo-Baker (2004) studied the advantages and barriers of adopting DE in higher education. DE was found to offer education to a wider audience without the costs of additional buildings. DE benefited institutions in reaching segments of a population that might typically not be able to attend classes on an organization’s physical campus. DE was found to promote lifelong learning initiatives within organizations. Valentine (2002) found that quality of instruction, cost-effectiveness, technology infrastructure issues,
insufficient professional development, and negative student and staff attitudes toward DE can all negatively impact the diffusion of DE within educational organizations. Hanson’s (2009) study of centralized versus decentralized organizational structure in organization found that DE led to staff feelings of isolation from their peers. Decentralization can lead to a decrease in diffusion of DE ideas and innovations between colleagues and contradicts the notion of top-down organizational models being less innovative.

**Innovation diffusion in K-12 education.** Baruch, Mioduser, and Nachmias (2006) studied ICT diffusions in 10 Israeli K-12 schools and focused on two different innovation diffusion patterns. They compared internal diffusion patterns and school-wide diffusion patterns. Internal diffusion was initiated within the school by individuals other than school leaders and tended to be small in scale (<15% of staff/student populations) where system-wide diffusions were initiated by educational administrators and represented a top-down approach to diffusion (>50% of staff/student populations).

Baruch et al. found that although internal innovations usually change the teacher-student dynamic, the innovations were difficult to scale to larger populations. School-wide innovations were dependent on principal vision and motivation, teacher professional development, and school policy. School-wide innovations were found to be scalable to larger populations and as a result were viewed as being more sustainable than the smaller internally initiated innovations. Surry, Porter, Jackson, and Hall (2004) examined conditions necessary for successful DOIs within K-12 schools. Their finding supported those of Baruch et al. They identified nine conditions necessary for successful DOIs in K-12 schools, including dissatisfaction with status quo, adequate time, resources, skills and knowledge, rewards, incentives, participation, commitment, and leadership. However, they noted these conditions rarely are all stable concurrently within a school and that the
importance of each condition can change based on several organizational factors.

**Distance Education (DE)**

**History.** *DE* is defined as an “institution-based, formal education where the learning is separated and where interactive telecommunications systems are used to connect learners, resources, and instructors” (Simonson, 2003, p. 7). Others offer a more general definition of *DE* that does not distinguish between formal and informal learning. Martyn (2003) and Rovai and Jordan (2004) noted that *DE* is a blend of instructional online tools in support of pedagogy, andragogy, and student learning.

Keegan (1980) concluded that *DE* is composed of six elements: (a) geographical separation of teacher and student; (b) influence of an educational organization that guides the curriculum of instruction and accredits learning programs, (c) the use of technologies and various media in instruction, (d) possibility of synchronous face-to-face seminars and instruction, (e) two-way communication between an instructors and learners, and (f) “Participation in the most industrial form of education (Keegan as cited in Moore, 2007, p. 6). Keegan’s definition remained the most widely accepted definition of *DE* (Moore & Kearsley, 2011) until Simonson’s (2003) definition became the accepted definition. Other theorists have added to aspects of the definitions of *DE* including Simonson, Schlosser, and Hanson’s (1999) equivalency theory, Saba’s (2003) systems theory, and Moore’s (1997) theory of transactional distance.

*DE* is hardly a new endeavor. The field, which spans over the last 150-160 years, includes innovations made in delivering content to learners separated by space. *DE* is widely used throughout the world today. The history of *DE* can be broken down into five main periods defined by emergent technologies that provided breakthroughs in transmitting learning materials and information to large and geographically separated
populations. These periods included the period predating correspondence education. In fact, the roots of disseminating educational information in this period had its roots in the ancient Greeks such as Socrates and the Sophists (Saettler, 2004). Second was correspondence education that relied heavily on mail and postal delivery systems for the delivery of print media aimed at specific instructional goals and outcomes (Saettler, 2004). Third was one-way communications such as radio and television where the learner was a passive participant. One-way communications often included print media to accompany broadcasted messages and guide learners through preprogrammed sequences of instructions (Saettler, 2004). Fourth, two-way audio and visual communications emerged and dominated the delivery of instruction for the next 2 decades, allowing learners to be separated geographically while allowing for synchronous interactions in real time. The fifth period is the current period of DE that leverages satellite and Internet technologies that have been facilitated by computers and the advent of the affordable personal computer.

Current DE is an amalgamation of all four periods of DE involving many modalities of media and delivery systems in organizing and delivering instructional content. The most widely used is the Internet, which allows for two-way synchronous and asynchronous communication and the transmission of video, audio, and print materials by the instructor and learner. In this way, the transactional distance between learner, instructor, and content (Moore, 1997; Moore & Kearsley, 2011) continues to diminish as learners are able to interact with the content, other learners, and instructors in new and novel ways that were previously impossible.

**Theoretical history of DE.** Theory related to DE did not emerge until the late 1960s and 1970s. Prior to this, few studies were undertaken that explored early forms of
correspondence that were systematic in design and that explored the instructional value and components of correspondence. Starting in the late 1940s and early 1950s, scholars began to examine critically the educational instructional elements and design of correspondence learning (Holmberg, 1995). In Europe, Holmberg and Peters were conducting pioneering studies in correspondence education. Holmberg (1995) was the first to draw attention to pedagogy in correspondence instruction. Peter’s study of DE in over 30 countries at the time formed his theory of industrialized education (Moore, 2007).

In the United States, two early pioneering studies emerged examining educational television and Wedemeyer’s Articulated Instructional Media Project at the University of Wisconsin-Madison. Wedemeyer (as cited in Moore, 2007) was the first to deconstruct instruction into specialties and employing specialists to develop each of these areas of instruction. This was the beginning of other theories, including Wedemeyer’s system method and linked communications theory with adult education (andragogy; Moore, 2007).

Wedemeyer’s system view was a radical departure for the single originator as the source of instructional material. Rather, Wedemeyer found that if instructional tasks could be broken down into their smaller components, these components could be designed by individuals with the most experience (specialists) and could employ a variety of media. Instruction designed this way was more efficient to design and increased the quality of instruction greatly (Wedemeyer & Najem, 1969). Black (2007) noted this study was the early forerunner of instructional design and was “of monumental importance in the history of distance education” (p. 5).

Wedemeyer’s system view brought greater attention to the instructional benefits
of correspondence study resulting in the redefinition of it as “independent study” (Black, 2007, p. 6). Wedemeyer’s redefinition also included redefining the learner as a having the potential to control directing their learning and being independent geographically. Moore and Kearsley (2011) built on Wedemeyer’s work and developed the landmark theory in DE known as transactional distance (Moore & Kearsley, 2011). Moore and Kearsley defined the perceived distance a learner felt between other learners, the instructional material, and the instructor.

Nearly 30 years later, Russell (1999) examined over 300 research findings to determine the effectiveness of face-to-face instruction compared to DE. Russell concluded that student’s DE learning outcomes were no different than the student outcomes from students receiving face-to-face instructions. Russell’s finding became better known as the no significant difference phenomenon and is still a widely cited study in supporting the efficacy of DE (Saba, 2003). Contemporary studies are beginning to focus on within group learner differences, media attributes, and the benefits the individual technology and media can bring to DE pedagogy. These technologies and media need to be evaluated on their perceived benefits to “access, flexibility, costs, and their potential to support quality teaching and learning” (Black, 2007, p. 5).

**Kindergarten-Grade 12 (K-12) Distance Education**

DE in K-12 education is often referred to as a virtual school. Clark (2001) defined *virtual school* as “an educational organization that offers K-12 courses through Internet- or Web-based methods” (p. 1). In the K-12 setting, virtual school is a term that is used to describe learning at a distance where the learner and instructor are separated by geography and time. Growth in virtual schools is an outgrowth of independent study high schools dating back as early as 1920. Likewise, two-way video and audio-based
education also has a long history. Dating back to 1933, Iowa hosted the first educational television programming (Moore, 2007). More recently, the two-way video network in Iowa, the Iowa Communications Network, served over 750 different sites (Moore, 2007).

K-12 DE programs utilize a variety of technologies to facilitate instruction including the Internet, asynchronous web-based learning, two-way synchronous video, prerecorded video, audio recordings, and print materials (Setzer & Lewis, 2005).

**Scope of K-12 DE.** As of 2014, students, regardless of the state in which they live, can enroll and take some form of online learning. Barbour and Kennedy (2014) acknowledged,

All 50 states and the District of Columbia offer K-12 students some form of online learning. Twenty-six of those states have a state-led online learning initiative or state virtual school. Thirty states in addition to the District of Columbia have a full-time online school option for their K-12 students. (p. 6)

As of 2013-2014, 30 states had online schools. Students in these states could attend these online schools regardless of where they lived in the state. The International Association for K-12 Online Learning estimated there are roughly over 300,000 students who attend some form of online education offered by states. This represented a roughly 6% increase from 2012-2013 (Watson, Pape, Murin, Gemin, & Vashaw, 2014). Appendix A illustrates the differences in state-offered, online learning programs as defined by Barbour and Kennedy (2014) and Watson, Winograd, and Kalmon (2004).

Independent district-level K-12 online learning programs seem to represent the fastest growing sector on K-12 online learning development (Barbour & Kennedy, 2014). Districts that were developing their own DE courses cited the ability to offer courses not otherwise available through brick-and-mortar schools, a more robust catalog of advanced
placement (AP) and college-level courses, limited space for increasing student enrollments, reduced scheduling conflicts for students, credit remediation for failed coursework, targeted needs of specific learners, and increased district educational revenues were the most common reasons given for in-district development of DE offerings (Clark, 2001; Moore, 2007; Setzer & Lewis, 2005).

Many states are now requiring students to take at least one online class before graduating. As of 2006, Michigan now requires all high school students to participate in at least one online course before matriculating (Watson et al., 2014). In 2009, New Mexico required all high school students to take at least one DE course in order to graduate (Watson et al., 2014). Florida, one of the states with the largest state-sponsored online schools required all districts to provide students from K-12 online learning opportunities either through the state run online programs or other state approved online programs (Barbour & Kennedy, 2014; Watson et al., 2014).

**International K-12 DE.** Although most prolific in North America, many countries are utilizing Internet technologies to deliver K-12 DE (Barbour & Kennedy, 2014). The United Kingdom has been using DE and instructional technologies to extend learning beyond the confines of brick-and-mortar schools and classrooms and provide access to curricular materials and instruction (Barbour & Kennedy, 2014; Harris, 2005). Singapore requires all of its nationally certified teachers to receive training to teach online. Singapore has also mandated that all secondary schools, junior colleges, and nearly 85% of primary schools institute course management systems (CMS). CMSs in Singapore allowed all K-12 students to be able to access learning purely online; blended learning with face-to-face and online instruction combined was still the most prevalent form of instruction (Patrick & Powell, 2009). This widespread use of CMSs throughout
Singapore also had the added effect of allowing instruction to continue during “pandemic events,” natural disasters, or other events that would prevent students from attending face-to-face instruction (Koh & Lee, 2008). Powell and Patrick (2008) noted that New South Wales in Australia provided K-12 DE to children in remote parts of the territory in order to provide students equal learning opportunities afforded to students in more populated areas.

China and India are examples of countries not only developing economically but also educationally in terms of DE offerings (Barbour & Kennedy, 2014). As of 2006, a mere 1% of the Chinese population had taken an online course; however, by 2016, China hoped to extend these numbers to 100 million more students (Barbour, 2010). India is also poised to extend its development of DE greatly. India’s desire to make education universal to all K-12 students would require new construction of nearly 200,000 schools. Development of DE is India would help to offset the economic burden that new construction would cause on local governments and economies in India (Barbour & Kennedy, 2014).

**Benefits of Distance Education (DE) in Kindergarten-Grade 12 (K-12) Education**

Distance education, being unique in that the teacher and learner are separated in time and space, has some unique advantages and benefits not afforded in traditional brick-and-mortar face-to-face education. Moore (2003); Simonson, Smaldino, Albright, and Zvacek (2012); and Smith (2012) noted that the separation DE is characterized by can serve to diffuse instructor and content knowledge more globally to a larger audience, fosters greater collaboration between students around class activities, and diminishes the logistical limitations posed by face-to-face education. Simonson et al. (2012) elaborated that DE can also “supplement existing curricula, promote course sharing among schools,
and reach students who cannot (for physical reasons or incarceration) or do not (by choice) attend school in person” (p. 138). Research identified six main benefits of DE including (a) providing higher levels of motivation, (b) expanding educational access, (c) providing high-quality learning opportunities, (d) improving student outcomes and skills, (e) allowing for educational choice, and (f) improving administrative efficiency (Barbour & Reeves, 2009; Berge & Clark, 2005; Cavanaugh, Barbour, & Clark, 2009; Kellogg & Politoski, 2002).

Expanding educational access. Many schools see DE as a way to expand the educational offerings of their school or their district. Cavanaugh (2001) and Cavanaugh, Gillan, Kromrey, Hess, and Blomeyer (2004) found that for rural schools or smaller sized schools, providing access to courses that would otherwise not be taught at their schools was the most important benefit of DE. Zucker (2005) also found that being able to offer AP and other college-level courses was viewed as a strong benefit of utilizing and developing DE in K-12 schools. The advantage of increased access to courses that might not otherwise be offered by some schools extends to minority students who can access specialized courses (Barbour & Reeves, 2009). Fulton (2002) stated that online learning was beneficial for students who could not attend brick-and-mortar schools for a variety of reasons including being hospitalized or homebound for medical reasons, students who had been removed from school because of disciplinary actions, students who traveled extensively because of participation in athletic events, or students who moved frequently due to their parents career responsibilities. Others have found that convenience, scheduling flexibility, credit recovery, and avoiding student-student conflict as reasons K-12 DE is gaining in popularity (Mills, 2003; Tunison & Noonan, 2001).

Providing high-quality learning opportunities. DE has the potential to diversify
learning opportunities offered to students when designed and delivered properly. A strength of DE was the facilitation of peer-to-peer learning that might not take place due to geographical separations of students in online courses (Elbaum & Tinker, 1997). Interactions of students from different geographical, cultural, and socioeconomic settings also serve to give DE students cultural perspectives that might otherwise not be available to them at a local brick-and-mortar school.

Appana (2008) found that DE provided students with increased student-teacher and student-student interactions. They also noted increased levels of collaboration between students and that certain asynchronous features of learning online such as threaded discussions and course message boards allowed students time to reflect on their learning. In addition, they found that DE was favorable for shy or reserved students who would normally not participate in face-to-face class discussions and allowed them to participate in conversations and discussions more easily. Butz (2004) surveyed 195 online K-12 learners and found that DE was favorable to traditional pedagogies in diversifying learning experiences and accommodating students with different learning styles.

**Improving student outcomes and skills.** DE, by its very nature, involves technology skills students may or may not acquire through traditional face-to-face education (Berge & Clark, 2005). Setzer, Lewis, and Greene (2005) noted that K-12 online learning was important for students to acquire online learning skills in a safe and supervised learning environment before moving to postsecondary education where DE is more prevalent. Zucker and Kozma (2003) examined the benefits of DE through the lens of globalization. They noted DE provided learners with the skills necessary to be competitive in a global economy including intercultural communication, collaboration,
and problem solving.

Barker and Wendel (2001) showed students in K-12 DE showed greater improvement in critical thinking, online researching, basic computer skills, independent learning, problem solving, and time management. Cavanaugh et al. (2004) stated, “As DE is currently practiced, educators and other stakeholders can reasonably expect learning in a well-designed DE environment to be equivalent to learning in a well-designed classroom environment” (p. 20). Tunison and Noonan’s (2001) survey of students found most students appreciated a sense of autonomy and freedom over their learning. In addition, they found students enjoyed problem solving, being able to work at their own pace, and learning new skills without having to wait for a teacher to directly supervise them or control the pace of their learning.

Other studies suggested that DE promotes student-centered learning, produces more in-depth and substantive discussions than face-to-face settings, and encourages wider participation from students (Appana, 2008; Smith & Hardaker, 2000). However, Davies and Graff (2005) asserted that increased online interaction did not lead to higher performance for students receiving passing courses, yet students who were receiving low or failing grades in their online courses interacted significantly less.

Allowing for educational choice. DE is a viable alternative for students who have struggled in a traditional educational setting (Berge & Clark, 2005). Students who have had behavioral problems in traditional schools have been shown to find success in online courses. In addition, students looking to supplement their high school transcripts before applying or attending college have turned to DE (Butz, 2004; Cavanaugh et al., 2004; Fulton, 2002). Due to No Child Left Behind (NCLB) policies, many schools have turned to DE alternatives in order to meet requirements of NCLB in guaranteeing access
to a wider array of courses than they would normally be able to offer.

**Administrative efficiency.** DE can increase the ability of schools to offer specialty courses, especially in rural settings. In addition, DE can attract more highly qualified teachers, mitigate issues with limited space and facilities, and decrease dropout rates. Keeler (2003) found that DE schools spent significantly less time on student discipline issues and saved time on administrative tasks related to registering students, attendance, and grading. K-12 DE courses made it easier for administrators to monitor course content, for parents and students to access real-time grade information, and increased instructor-parent communications.

**Barriers of Distance Education (DE) in Kindergarten-Grade 12 (K-12) Education**

Barriers cited to not adopting DE in K-12 are numerous. However, several reasons emerged from past studies for why DE is not diffused and adopted in existing K-12 school settings on the district and individual school level. Cost was a factor most often cited as a reason for a school or district not expanding their traditional face-to-face offerings to include DE offerings (Setzer & Lewis, 2005). Setzer and Lewis (2005) identified nearly 68% of surveyed school districts in their study that had halted the consideration of adopting DE due to increased costs of course development, technology infrastructure upgrades, and supplemental salary adjustments for course development and online teaching as major factors preventing school districts from considering or expanding existing course offerings to include DE offerings. Simonson, Schlosser, and Orellana (2011) found the greatest barriers to implementing DE in South Dakota schools were (a) a greater need for training; (b) a basic lack of support; (c) adequate time to plan, develop, and implement distance learning courses; (d) innate fear and misunderstanding of the process; (e) scheduling conflicts; and (f) technical issues.
Berge and Muilenburg (2000) noted underlying and existing organizational constructs that contributed to the rejection of DE and served as barriers to adoption. Among these were existing school structures and restrictive administrative policies, inability for school leaders to institute organizational change, a lack of technical expertise, an fear and misunderstanding of DE and technology innovation in general, legal issues with expanding face-to-face offerings to include DE, and supported technological infrastructures to allow increased student and teacher access to school/district networks and resources. Setzer and Lewis (2005) documented similar barriers to the development of K-12 DE initiatives. However, they identified additional barriers not included by Muilenburg and Berge (2005) such as inadequate technological infrastructures to support online teaching and learning and concerns regarding the quality of online course offerings and online teaching pedagogies. However, Setzer and Lewis also noted that existing state or local laws and policies and funding discrepancies based on students attending courses online rather than at the brick-and-mortar school were also considerations cited as reasons to reject the development of DE offerings by schools.

Mathur and Oliver (2007) examined barriers to DE from the student perspective. Students’ self-efficacy with technology and their technological resources outside of school need to be considered as a factor inhibiting students from being able to access distance learning materials or communicating with teachers or peers online (Larsson, Boud, Dahlgren, Walters, & Sork, 2005; Moore & Kearsley, 2011). Ally (2004) recommended that substantial time and resources be dedicated to learning about potential student needs and special challenges students may face, especially when considering online or blended instruction in international contexts. Developing a cohesive and comprehensive plan on instructional strategies to meet the needs of learners is often a
strong determinant of success in international DE. Isolation is another component that appears to be critical to student success in online programs. Where instructors and instructional designers have failed in making DE courses interactive and collaborative, learners have reported a perceived disconnect from their classmates, the content, or the instructor (Dickey, 2004; Ibrahim, Rwegasira, & Taher, 2007).

Larsson et al. (2005) expanded this to include the considerations of cultural and political diversity within organizations and student populations when considering online programming of instruction in international schools. A lack of cultural and or political sensitivity to international issues was found to be a barrier to implementing DE. This was shown to impede the progress of program development and negatively affected the ability of the learner to persist and thrive academically. However, Ally (2004) found that often times this is overlooked at the organizational level where the focus is shifted to funding, technological infrastructure, and teacher training when considering a shift to DE.

Mathur and Oliver (2007) noted that many educators lack the skills that are necessary to teach effectively in a blended or fully DE setting. They noted that DE is more time-consuming and energy intensive than traditional face-to-face programming. They recommended additional teacher preparation and preplanning are paramount in ensuring a consistent flow of instruction during a course delivered online. This includes the advance structuring of all course materials including course assignments, readings, and lectures or associated course media. Mathur and Oliver noted that this becomes even more important in international settings where additional consideration and affordances must be made of students’ understanding of technology and access to reliable technologies and Internet connections may be limited. Larsson et al. (2005) stated that an awareness of student’s technological resources, bandwidth limitations, and faculty
limitations due to inexperience with required technologies for course delivery also need significant consideration if quality distance-learning opportunities are to come to fruition.

**Innovation Diffusion Theory (IDT) in Distance Education (DE)**

Diffusion research is a widely used framework from which to study innovation diffusion in many facets of society. However, when it comes to education, few studies focused on defining the role faculty participation plays in the diffusion of DE technologies (Tabata & Johnsrud, 2008). Davis (1989) showed that perceived usefulness and perceived ease of use are determinants that still play a large role in the acceptance of new technologies, including DE. Ndubisi (2004) subsequently supported these findings. He found that in Malaysian schools that had built a favorable attitude toward DE had emphasized perceived usefulness and perceived ease of use of DE technologies. This supported Rogers (2003) who stressed innovations with low complexity and high levels of compatibility when compared to existing technologies. In addition, Ndubisi found that enhancing computer self-efficacy, increasing access to technology resources, increasing support for staff and students, and reducing computer anxiety all facilitated the diffusion of DE acceptance.

DE fundamentally differs from face-to-face traditional education and therefore requires a different type of support and training for staff. Li and Lindner (2007) found an increase of DE technologies within an organization does not necessarily determine or increase diffusion or adoption rates of DE. Reluctance to adopt DE innovations was well documented in the research. The factors contributing to a reluctance to adopt DE included increased time and effort to bring courses online, doubts about the overall effectiveness of DE, and the failure of many schools and universities to recognize DE as equal to face-to-face teaching in regards to tenure and promotion systems (Bennett & Bennett, 2003;
Bennett and Bennett (2003) found that these barriers could be mitigated by illustrating the relative advantages, demonstrating compatibility to existing teaching and learning practices, and allowing staff to trial or “test drive” DE technologies significantly reduced many obstacles hindering the adoption of DE innovations. These findings supported Rogers’ (2003) findings that relative advantage, trialability, and compatibility with existing technologies or practices will expedite the DOIs within an organization. In addition, individuals in social science disciplines were more active in adopting DE than were staff in hard sciences or engineering departments. Li and Lindner (2007) found that neither gender, age, nor academic rank were predictors of DE adoption. This further supported DOI theory in that age is not a determinant of where individuals fall on the adopter category continuum. However, Li and Lindner found the level of education did have a negative impact on the adoption of DE technologies. This contradicted Rogers’ (2003) findings that formal education had a positive impact on adopter behaviors.

Tabata and Johnsrud (2008) examined the diffusion of DE through Rogers’ (2003) DOI theory. They further supported the notion that complexity, relative advantage, observability, and trialability are all critical elements that can hinder or expedite the diffusion of DE innovations. Tabata and Johnsrud found that for staff members who found DE compatible with their current work, a 10% likelihood existed they would participate in exploring DE initiatives. Interestingly, and somewhat confounding, was their results on complexity. Tabata and Johnsrud found that even when DE was viewed as complex, there remained a 6% increase in the likelihood of participating in DE. This finding suggests that in spite of complexity, faculties will still explore DE if relative advantages are seen as compatible and favorable to existing
instructional pedagogies. In regards to observability and trialability, Tabata and Johnsrud, found that observability was associated with a higher likelihood of faculty exploring DE innovations. Being able to see the results of DE innovations led to a 13% increase in the likelihood of participation where being able to tryout DE before fully integrating it into course delivery resulted in a 9% increase in the likelihood of adopting DE into a faculty member’s teaching.

Dooley and Murphrey (2000) noted similar findings to Li and Lindner (2007). Dooley and Murphrey found respondents in their study felt that DE offered relative advantages over traditional educational delivery methods. The benefits noted were reaching new populations of learners, enhancing pedagogy, and enabling increased communication and collaboration between instructors and students. However, attributes of compatibility, trialability, observability, and complexity all seemed to be contributing to a perception of DE as difficult to implement. Dooley and Murphrey found respondents felt that incentives to move classes online were limited and, therefore, not compatible with their existing teaching responsibilities. In addition, respondents perceived the technologies involved in offering DE courses to be overly complex and not observable or “trialable” unless another department had already developed online courses.

Few studies examined the role administration and support staff plays in diffusing DE within schools and universities. Administrative support appears to be a crucial factor in diffusing and implementing DE into existing educational systems and paradigms (Nworie, 2012). Administrators surveyed by Dooley and Murphrey (2000) noted that having early adopters on staff and having access to technology was a major factor in the rate of DE diffusions. Dooley and Murphrey found that administrators were often unaware of the role their support and encouragement had on staff members initiating the
use of DE. Understanding the role played by administrators in supporting innovation diffusion within educational contexts can help facilitate and expedite diffusion and adoption of DE innovations.

If a school or university identifies a goal of increased participation in DE, then the development of system-wide planning integrated across grade levels, departments, and disciplines are necessary. Long-range planning that develops organizational understanding as to the benefits of DE over traditional teaching should be documented and articulated to staff. Expectations for employing DE should be incorporated into pedagogical visioning and should provision for increased access and funding for technology requirements, the development of on-site comprehensive technological support that is housed close to staff and faculty, adequate compensation for moving courses and content to DE platforms, and scaffolds that assist staff and faculty in course design (Tabata & Johnsrud, 2008).

**Opinion Leadership**

Opinion leaders are instrumental in diffusing innovations within organizations. Rogers (2003) noted that opinion leaders serve as direct conduits for innovations to enter organizations, help change organizational norms, and can accelerate changes in behaviors or systems within organizations. Opinion leaders accelerate organizational shifts by removing barriers that might otherwise impede the progress of diffusing an innovations change (Valente & Davis, 1999). Rogers (2003) observed that opinion leaders were critical in organically diffusing innovations within organizations and were more successful in doing so than mandates for change offered by superiors. Katz (1957) noted three qualities that functioned in his study of opinion leadership. These were (a) the opinion leaders values and traits, (b) the individual opinion leader’s perceived
competence or expertise, and (c) the opinion leaders social position and network within an organization.

However, opinion leaders are not always the earliest adopters of innovations. The paradox of opinion leaders’ position within organizations means that although they may still adopt an innovation before the late majority does, they do not become the earliest proponents of an innovation because it could jeopardize their standing as an opinion leader. Rather, opinion leaders will more often monitor organizational feelings toward an innovation, exerting their influence once the relative advantage and observability of an innovation are clear (Rogers, 2003; Valente & Pumpuang, 2007). Valente and Pumpuang (2007) found that opinion leaders influence their communities in at least four different modalities: (a) persuading others, (b) establishing or reinforcing organizational norms or best practices, (c) leveraging existing organizational resources in aiding in the diffusion of an innovation, and (d) raising awareness of an innovation. Haider and Kreps (2004) identified seven different roles an opinion leader can take during the diffusion process:

1. to develop a need for change;
2. to establish an information-exchange relationship;
3. to diagnose problems;
4. to create an intent in the client to change;
5. to translate an intent to action;
6. to stabilize adoption and prevent discontinuance; and
7. to achieve a terminal relationship. (p. 5)

Valente and Pumpuang (2007) conducted a meta-analysis on nearly 200 studies involving opinion leadership to diffuse an innovation. Appendix B shows the results of their study and the 10 different opinion-leader identification methods they distinguished.
Past studies compared opinion-leader identification methods. Past studies (Rogers & Cartano, 1962; Weimann as cited in Valente & Pampuang, 2007) examined different opinion-leader identification methods. These studies discovered a significant but not universal consensus between methods. The studies did find significant correlations supporting that opinion leaders identified by one method were also likely to be identified as opinion leaders given another methodology. However, Valente and Pampuang (2007) noted that none of these studies actually measured the effectiveness of these leaders, instead focusing on opinion leadership emergence.

More recently, scholars have begun to focus on social media’s effect on opinion leadership identification and emergence. Schäfer and Taddicken (2015) argued that opinion leadership is as important and prevalent as ever and that opinion leadership is still prevalent in social media environments. They discovered that opinion leadership is still viable across the varied disciplines that DOI theory covers from political issues to scientific matters to everyday segments of popular culture, such as fashion. More importantly, Schäfer and Taddicken pointed out the opinion leaders today have the ability to enact leadership “in novel, mediatized, and potentially more powerful ways” (p. 22).

The ever-increasing availability of media and interconnectedness of people via social media networks provides more opportunities and need for advice and orientation. The availability of knowledge and need for advice and opinions has reinforced the need and importance of opinion leadership in mediatized environments (Van der Merwe & Van Heerden, 2009). Numerous studies found opinion leaders, more than ever before, better positioned to offer advice, information, and opinion through social networks like Twitter, blogs, and other forms of multimodal communication (Erdal, 2011; Kavanaugh et al., 2006; Kavanaugh et al., 2007; Said-Hung & Arcila-Calderón, 2011). Bennett and
Manheim (2006) argued the contrary, finding that social networks and mediatized environments foster one-way communication, which mitigates the influence opinion leaders may have on their communication networks.

**Opinion Leadership in Kindergarten-Grade 12 (K-12)**

**K-12 school leaders as change agents.** According to Afshari et al. (2009), “The leadership role of the principal is the single most important factor affecting the successful integration of technology” (p. 236). Past research has shown the importance of school leadership’s direct influence on whether innovations become adopted or rejected (Byrom & Bingham, 2001; Han, 2002). Loucks and Crandall (1982) noted three important aspects of school leadership an instructional technology innovation diffusion:

1. Innovations rarely fail due to characteristics or shortcomings of an innovation itself, rather they fail because of flawed support by school leadership.

2. If teachers are expected to adopt an instructional technology innovation into their pedagogy, they require the direct support of their principal and the school’s leadership.

3. If the school’s leadership is to fully support their staff in adopting an innovation, the school’s leadership themselves must possess the knowledge and prerequisite skills necessary to use the innovation.

Macaulay (2010) stated, “It is essential that principals possess knowledge and proficiency in technology skills and technology integration in order to be effective instructional leaders” (p. 2008).

School leaders who do not understand an instructional technology are more apt to make poor decisions regarding the implementation of it, may waste a school’s financial and human resources in attempting to diffuse the innovation, or may fail to provide
instructional technology supplies at all. Ten years earlier, Mecklenburger (1989) wrote, Administrators must understand both the capabilities and limitations of technology. Only then can they plan for, budget for, purchase carefully, install properly, maintain dutifully, schedule adequately, distribute appropriately, and replace systematically the electronic technology best suited for their needs. (p. 7)

School leaders represent a leadership population that shows little exposure to change theories, their application, or the extensive literature base around IDT theory. Macaulay (2010) found that principals are not being prepared or trained on best practice in instructional technology or how to be instructional leaders for their teachers with technology. They concluded that little had changed in regards to principal’s technology leadership roles in schools in the last decade.

Persichitte (1999) stated that school administrators unaware of their role in technology leadership topics fail to see how IDT and change theories can serve to facilitate organizational changes at the micro and macro levels. This is a confounding notion considering that school leaders represent the headwaters of school organizational change and innovation diffusion. Schiller (2003) emphasized, “This gap in the research is rather strange because many studies relating to school effectiveness, school improvement and change show that principals play an important role in creating successful change in schools” (p. 172).

Polizzi (2011) studied K-12 principals’ support for educational technology integration in Italy. Polizzi’s research supported the notion that the level of a principal’s educational technology competence directly affects the level of educational technology integration into schools. Principals who use technology more often tend to give stronger support to educational technology innovations and devote resources to facilitate the use
of educational technology within the school. Afshari et al. (2009) found a strong correlation between principal’s computer use and transformational leadership styles and principal’s computer use and computer competence. Interestingly, school principal’s attitude toward educational technology was not correlated to teacher’s attitudes concerning educational technology innovations or use. Other research was congruent with Polizzi’s findings. Computer competence of school leaders, especially school administrators, is a significant barrier to their readiness to accept and adopt an instructional technology innovation. Computer competence of school principals has also been shown to affect directly their own use of technology in their roles as school leaders (Felton, 2006; Schiller, 2003).

Afshari et al. (2009) noted similar discrepancies in the literature regarding the role of the principal in supporting and diffusing instructional technology initiatives in K-12 education. Schiller (2003) supported the views of Afshari et al., adding that much of the K-12 instructional technology research overlooked the principal’s technology leadership capacity and the role principals must take as a technology leader within their schools. Wilmore and Betz (2000) suggested instructional technology innovations will only be successful in schools when the principal is actively engaged in the innovation and supports it by providing professional development to his or her staff. Yet, several studies found that K-12 school administrators and leaders often overlooked or failed to recognize the importance of providing professional development to their teaching staff when implementing an instructional technology innovation (Afshari et al., 2009).

Hope, Kelly, and Guyden (2000) stated that school leadership should seek understanding of both technologies being considered for adoption and how they can complement or enhance current school practice and systems. In addition to these two
facets of school leadership and technology adoption, Gibson (2001) noted that school leaders must also consider technology innovations within the context of existing practice, a school’s curriculum, existing resources and technology infrastructure, support for an innovation, and staff development. It is nearly impossible for an innovation to proceed to adoption if little is known about the innovation itself (Dawson & Rakes, 2003; Rogers, 2003). School leadership is the key in facilitating an effort to diffuse instructional technology innovations. Regardless of the amount of training given to teachers on how to use and integrate an instructional technology into their pedagogy, most teachers will fail to employ the training without the direct support and leadership of the principal (Dawson & Rakes, 2003).

Professional development for both school leaders and teachers is critical if innovations are to become institutionalized within a school. However, Dawson and Rakes (2003) found in their study of over 1,000 K-12 public and private school administrators that nearly a third of the principals surveyed were receiving the type of training necessary to lead their schools in integrating instructional technologies into their schools. Baylor and Ritchie (2002) examined the effect a school’s professional development, technology use, change in teachers’ technology skills, and leadership would have on the perception of instructional technology’s effect on learning. They found that teacher’s perceptions and morale around instructional technology was most determined by professional development offered around new technologies and the effect on student learning was a determined by the strength of school leadership. Beaver (1991) noted that 70% of principals in his study felt technology was an important part of being able to function in their role as principal, yet 73% of the respondents in his study admitted to having little or no technology competence. Even more confounding, Beaver’s study found that 77% of
the respondents noted they had not participated in any form of technology training (Heaton, Washington, & Schoeny, 1999). Similarly, Brockmeier, Sermon, and Hope (2005) found that principals were often underserved when it came to receiving professional development about evaluating and analyzing computer hardware and software for integration into school curricula.

The International Society for Technology in Education (ISTE, 2009) published the National Educational Technology Standards for Administrators, more commonly referred to as NETS-A. The NETS-A standards are grouped into five focus areas: (a) visionary leadership, (b) digital age learning culture, (c) professional practice, (d) systemic improvement, and (e) digital citizenship. NETS-A is a framework to guide school administrators towards becoming competent users of instructional technology (Anderson & Dexter, 2005; Macauley, 2008). However, Brockmeier et al. (2005) found that only 60% of principal respondents in their study agreed that the NETS-A framework was useful for facilitating the integration of instructional technologies into instruction. Anderson and Dexter (2005) examined the leadership attributes that affected instructional technology in schools through the framework of NETS-A. Anderson and Dexter’s results suggested that “a school’s technology efforts are seriously threatened unless key administrators become active technology leaders in a school” (p. 74).

**School leadership-diffusion networks.** Innovativeness is a function of an ability an individual possesses to share knowledge with others on innovative practice and to generate and communicate new knowledge in the aim of producing performance gains for schools and students (Hite, Williams, Hilton, & Baugh, 2006). Therefore, the dissemination “of knowledge, resources, and influence required for effective innovation within the public schools is likely to be influenced by the administrators’ perceptions of
others’ innovativeness” (Hite et al., 2006, p. 160). In this way, social networks between school administrators inside and outside of their respective schools and between school administrators and teachers serves as the conduit for innovations to incubate (Kahne, O’Brien, Brown, & Quinn, 2001; Smith & Wohlstetter, 2001). This supported earlier studies on network theory that suggested the significance informal networking structures can have on the overall effectiveness and innovativeness of organizations (Dyer & Singh, 1998; Gulati, 1995; Moore & Benbasat, 1991).

Hite et al. (2006) studied informal school administrative network structures within a small school district and their effect on perceptions of innovativeness. Perception of innovativeness among networks of school administrators has been a proven influence on educational innovativeness. Traynor and Traynor (1997) defined perception of innovativeness as the anticipated potential to innovate as it is related to an organization’s capacity to innovate. The greater the perception of innovativeness within organizations and networks connected to organizations, the more likely that innovation is indeed taking place. Hite et al. noted, “Perceptions of innovativeness create the pathways across which innovation flows may travel and are thus informed by both the structure and the directionality of these social relationships” (p. 163). This supported earlier claims in management network and innovation studies suggesting an educational organization’s ability to innovate is likely a function of the structures of its informal networks (Hite et al., 2005). Educational leaders need to recognize and nurture the informal networks that can provide important conduits, bridges, and frameworks for organizational innovation and reform.

Out-degree and in-degree. Perceptions of innovative administrators are an important variable of how innovative are schools and administrators themselves.
Administrators who are perceived by others as being innovative tend to be more active, visible, and play a greater role in innovation diffusion processes within their schools and districts. Administrators who are perceived by other administrators as innovative are known as in-degree. Administrators who perceive other administrators around them as being innovative are defined as having high levels of outdegree innovativeness (Hite et al., 2006).

Both in-degree and out-degree innovativeness can play important roles in how innovative a school and district is. If school administrators consider their peers as innovative, and those peers consider their administrator peers as innovative, then innovative cultures are more likely to be present. These cultures in turn have been found to promote organizational stability, growth and change, and innovative practice. Innovative administrators are more likely to share resources with in-degree and out-degree networks as expectations of innovation result in a culture of risk taking and sharing of resources and practices resultant in change. However, if levels of in-degree and out-degree are low within schools or districts, school cultures can suffer as innovativeness suffers at the hand of fear of change (Hite et al., 2006). This supported earlier work of Bandura (1977) that stressed the importance of social networks in developing local capacity and a culture of social learning, two attributes critical to innovative organizations and environments. Social administrative networks that drive educational innovation have never been more crucial than in “in today’s reform-driven educational climate” (Hite et al., 2006, p. 162). Therefore, it is critical administrators can recognize and develop their own social networks that can provide channels, bridges, and partnerships that allow organizational reform to flourish. Without collective, socially supported efforts toward educational innovation, schools and districts could potentially
find themselves innovating less and failing to meet the dynamically changing landscape of their schools and learners.

**Administrator demographics.** Hite et al. (2006) found that school administrator demographics such as age and experience were related to administrator perceptions of innovativeness. The longer an administrator was found to have held his or her position, he or she was found to have increased administrative visibility and perceived stability. Differences in administrator experience also indicate that administrators will have different backgrounds; access to resources; and more diverse social networks, strengths, and experiences. This supported earlier findings (Hite et al., 2006) that associated individual school administrator demographics with innovation, innovativeness, and willingness to adopt educational innovations. Administrators who have been highly stable in their careers, working at fewer schools, have had more time to introduce, develop, and diffuse innovations within their schools. As a result, these administrators have been found to receive credit for being innovative, increasing their in-degree and out-degree in terms of innovativeness. This enhances networking, thereby, further increasing an administrator’s facilities to innovate and his or her visibility as an innovator among peers.

Age has also been another important factor in perceptions of school administrator innovativeness. Age has been shown as a negative correlate in regards to school administrator innovativeness. Older school administrators have been found more likely to maintain status quo practices and avoid risk taking in their schools. Younger school administrators tend to be less invested in maintaining the status quo within their schools, have more time and eagerness in attempting innovative problem-solving approaches, and more resilience if innovations do not diffuse as planned. Therefore, administrators who have the highest in-degree of innovativeness of their administrative peers tend to be
younger, have more years in administration, and have worked in fewer schools (increased stability; Hite et al., 2006).

**International Schools**

The definition of what an international school is remains somewhat nebulous, making an exact count of international schools globally difficult if not impossible (Hayden & Thompson, 2008). Terwilliger (1972) developed four main characteristics that international schools have in common: (a) a significant number of students who are not permanent citizens of the host country of the school; (b) a board of directors composed of both foreigner parents and local, host country parents; (c) staffing policies for the recruitment and retention of teachers and administrators; and (d) a curriculum that is aligned to the school’s mission, vision, and expected learner outcomes. Brummitt (2007) offered a rather simplified and updated definition of an international school stating, “A school is included simply if it teaches wholly or partly in English outside an English-speaking country” (p. 35).

The largest numbers of international schools are those with national affiliations and identities such as American international schools, British international schools, and Canadian international schools. A major difference between these international schools and other nationally grouped international schools is that the language of instruction is in English (Hayden & Thompson, 2008). Further distinctions that make international schools differ from domestic or national schools include (a) curricula that differs from the curriculum offered within the host country of the international school, (b) a large portion of students who are nonnationals of the host county (this is a changing demographic as some countries relax restrictions prohibiting host country from attending international schools), and (c) a significant portion of the teaching and administrative staff who are
comprised of expatriates (Hayden & Thompson, 2008). Another distinguishing facet of international schools is that leadership is shared between the head, or superintendent of the school, and a board of directors. However, in some privately owned, for-profit international schools, no board may exist and the head of the school is left to negotiate and strategically plan for the school with the owner or holding corporation of the school. The international school with the aforementioned characteristics caters largely to the children of expatriated and repatriated, globally minded, professional parents. For them, K-12 schools offer education that might not otherwise be available in host countries to students and families that are largely transient and dependent on the length of a parent’s contract in determining how long a child stays enrolled at an international school.

Although definitions and characteristics of international schools will likely remain to morph and develop as international education continues to mature, one unquestionable fact of international K-12 schools is the dramatic growth of international schools in the latter parts of the 20th century and the early part of the 21st century (Hayden & Thompson, 2008). Brummitt (2007) found there were 1,071 international schools in April 2000 and that figure had increased to 4,179 in 2007. Over the same period, the number of international school students doubled from 800,000 to over 1.6 million. Some recent estimates put the number of K-12 international schools at “5,000 international schools and two million students by 2010; 7,000 schools and 2.6 million students by 2015; nearly 9,000 schools and 3.3 million students by 2020” (Brummitt, 2007, p. 39). The latest study by Brummitt examined the areas of K-12 international school growth globally. Asia was the most rapidly expanding segment of international schools with nearly a 334% increase in international schools, followed by Europe (85%), Africa (73%), and the Americas (64%).
As countries recognize the demand and need within the global landscape of having a thriving international school market, explosive growth in international schools has also occurred in the United Arab Emirates, Korea, Vietnam, Thailand, India, and most recently China. China, alone, as of 2007, hoped to have 3,000 international schools within the next 10 years (Brummitt, 2007). The rapid growth in Asia is correlated to a relaxing of restrictions that once limited nationals to attend nationally hosted schools only. Lowe (2000) noted that international schools are often viewed by members of the host country socioeconomic elite as a way to give their children a competitive edge in the global labor and economic markets and to prepare them for university in North America or Europe.

The rapid expansion in international education will require huge increases in the number of qualified staff needed to fill both teaching and administrative vacancies. As Brummitt (2007) stated,

Dramatic growth, however, comes at a cost and has created a new set of problems. The recruitment and retention of suitably qualified staff is getting harder for many schools and is likely to get much worse. Funding will have to be found for the inevitable increase in staff salaries and benefits. With so many new schools there are big differences between the best and worst—and an increasing need, therefore, to make sure that as many as possible subscribe to recognizable standards of international education. (p. 39)

Some have noted that growth has spurred a lack of overall control on international schools both within single countries and globally including requirements for standardization or quality. However, this lack of control does not condemn international education to poor quality standards; however, it does raise the potential for poorly
developed school infrastructures, curricula, and staffing control (Hayden & Thompson, 2008). Hayden and Thompson (2008) and Murphy (1998) found that accreditation from a reputable agency has become an important benchmark to achieve in demonstrating some confirmation of overall quality of a school by an outside, independent accrediting body. Another negative aspect of the rapid expansion in international education is the rapid turnover of school leadership. Hawley (1994, 1995) found in his study of international school administrative tenures most average only 2.8 years. High turnover rates of administrators and teachers result in barriers for carrying out executable long-term, strategic planning in international schools (Leggate & Thompson, 1997).

The future of international schools continues to unfold at a time where many U.S. domestic schools and other national schools around the globe struggle to meet the needs of 21st century learners. However, with economic globalization comes an increased need to educate students who understand cultures and perspectives that differ from their own. Fostering these characteristics is embedded in many if not all of international school missions and visions. International schools will continue to face hurdles in terms of rapid expansion in the light of a dwindling pool of qualified administrators and educators. Quality control issues will continue to plague the reputation of international schools if schools do not seek or meet basic qualifications set forth by accrediting bodies outside of a school’s host country.

**Instructional Technology in Kindergarten-Grade 12 (K-12) Education**

Technology in K-12 education has become common place. A person would be hard pressed to find a school that has not been wired for Internet connectivity, does not provide laptops or computers for students to use, and that integrates an array of software and applications into pedagogy and student learning. In many regards, computers and
tablets have become standard equipment much like the pencil or pen. Afshari et al. (2009) asserted that technology is a key component of high-quality education moving forward into the 21st century. Many researchers believed that instructional technologies could effectively be used to enhance both teaching and learning (Bauer & Kenton, 2005; Flanagan & Jacobsen, 2003). Studies have found that features of new and emerging instructional technologies are complimentary to findings dealing with neuroscience and the science of learning and hold potential to improve learning and education (Bransford, Brown, & Cocking, 2000; Roschelle, Pea, Hoadley, Gordin, & Means, 2000). Other research (Means, Penuel, & Padilla, 2001; Sandholtz, Ringstaff, & Dwyer, 1997) highlighted teachers more consistently using technology to transform pedagogy and curriculum as access to technology in schools has continued to grow and improve.

Technology has been shown to have positive effects in teaching and learning. The positive attributes of integrating technology into pedagogy and learning include increased opportunities for cooperative learning; the acquisition of basic technology skills and competencies; the ability to differentiate instruction based on the instructional level of the student; increased parent-teacher communications; connection of students with other students, classrooms, and professionals from around the world; and increased opportunities for formatively assessing students (Afshari et al., 2009; Whitehead, Jensen, & Boschee, 2003). Kozma (2003) found that the interactive nature of emerging instructional technology was a key feature in enabling students to “receive feedback on their performance, test and reflect on their ideas, and revise their understanding” (p. 1).

Several research studies found that instructional technologies are becoming more integrated into pedagogy. The trend from teaching instructional technology skills and applications has largely moved from teaching isolated instructional technology skills in a
laboratory setting and moved towards integration of instructional technology skills being learned as they apply to content being taught in the classroom (Means et al., 2001; Sandholtz et al., 1997). Technology when integrated into well-designed teaching has the ability to move away from simply replacing or substituting tasks students could do with analog methods and becomes transformative.

Transformative technology integration allows teachers and students experiences that otherwise are impossible to do without technology (Attaran & VanLaar, 2001; Puentedura, 2009). Norris, Sullivan, Poirot, and Soloway (2003) found that the use of technology also impacted students’ time on task, resulted in higher test scores, increased student technology self-efficacy, and increased student motivation. Kozma (2003) found that teachers are leveraging instructional technology to change their role in the classroom. In the information age, teachers are no longer the primary source of information. Instead, they are providing students with structure, scaffolding, and advice, monitoring their growth and assessing their learning. Kozma’s (2003) findings add a layer of detail to research and similar findings conducted in the United States (Means et al., 2001; Sandholtz et al., 1997). Kozma (2003) also found that when teachers implement instructional technologies into their planning and teaching and when students use instructional technology to design products, conduct research, analyze data, and assess their own learning, they develop new instructional technology skills. Among these skills, Kozma (2003) listed problem solving, collaboration, increased interpersonal communication, and the analysis and synthesis of new information.

However, instructional technology research has opponents that are not as positive in their critique of technology’s effect on learning. Cuban, Kirkpatrick, and Peck (2001) found that the presence of technology alone seldom led to teacher and student use. Norris,
Sullivan, Poirot, and Soloway (2003) noted, “The literature points to the potential for impact, the reality is sobering: to a first-order approximation, the impact of computing technology over the past 25 years on primary and secondary education has been essentially zero” (p. 1). Pelgrum and Plomp (2002) and Wenglinski (1998) found a negative correlation between the use of instructional technology and school achievement. However, this argument has been countered by equal amounts of research substantiating instructional technologists’ claims that technology can positively influence learning if it is designed and implemented under circumstances defined by research findings and best practices (Norris et al., 2000). Therefore, opponents of K-12 instructional technology may be correct in their findings but for the wrong reasons. Norris et al. (2003) emphasized, “It’s true that classroom technology has not had a positive impact on reaching and learning, but it’s equally true that the lack of impact is overshadowed by a widespread lack of technology access” (p. 25).

Norris et al. (2003) found that in their survey of approximately 4,000 K-12 classroom teachers from around the United States, the most obvious reason technology has not significantly impacted teaching and learning was that students have not used technology in the first place. This was found to be a direct result of a lack of access to technology within schools. They found a significant correlation between technology access and its use in schools. Similarly, the largest predictor of instructional technology use by teachers was also access to instructional technologies within the classroom. Norris et al. noted, “Conversely, and contrary to conventional wisdom, teacher characteristics and demographics (e.g., time on the job, subject matter, gender) were of relatively little consequence in predicting technology use” (p. 16).
Globalization of Education

The economic and financial globalization is considered by some to be the most important development globally in recent decades. With the addition of the Internet and real-time connectivity now the norm across the world, countries and cultures are more connected than they ever have been in human history. In order for countries to compete globally, governments are more willing to open their markets to the global economy. Thus, the standard of living in many countries increased proportionately including educational opportunities outside of public and national educational options (Simmons & Elkins, 2004).

The transformation of traditional learning contexts mirrors an increased technological emphasis in supporting global economies and ensuring success for a larger, more diverse, population of learners (Hicks, Reid, & George, 2001; Williams, 2002). The trend of developing industries and economies in countries that lag behind other countries technologically is demanding a global workforce capable of increased collaboration and leveraging technology to solve complex problems (Mathur & Oliver, 2007; Kerr, 2005). Therefore, the need for countries to have infrastructures that allow for stable access to information and a workforce proficient in information technology have never been greater. Countries not able to produce learners with these skills, or without technological infrastructure that facilitates participation in global trade, risk falling behind.

Globalization serves to magnify technological discrepancies in poorer countries, further impeding economic growth and increasing poverty levels. International education is one means “for developing countries to improve their knowledge base regarding technology and to provide educators with a means to train future generations on technological issues to facilitate the country’s own economic progress in a global community” (Mathur &
Globalization has led to increased movement of professionals relocating around the world for short-term placements. In turn, the need for schools to educate children of expatriate professionals has increased proportionately due to pragmatics and an increased perception of international education as being more competitive and superior to nationally based educational systems (Hayden & Thompson, 2008). The growing dominance of the English language as the international language of business and the effect of globalization will continue to propel international school growth into the future. Most notable in the rapid growth of international education is that of developing countries such as Brazil, India, China, Thailand, Vietnam, and Korea. As economies develop in countries, so do the educational needs within each country to produce learned citizens who are able to navigate cultural differences, communicate with individuals around the world, think critically, and leverage technology to solve complex problems.

**Research Questions**

Three main research questions were overarching of all other research questions and SQs in this study. The three research questions were based on a naturalistic approach to research in that this research was aimed at looking at factors influencing EARCOS school leaders’ decision making when it came to adopting or rejecting DE innovations in their schools (Rubin & Rubin, 2012). These research questions were selected to allow for semistructured interviewing where interviews could follow and expand on points made during the interview. This allowed interviews to be more organic and allowed for the emergence of themes and codes that might not have otherwise been considered (Rubin & Rubin, 2012). The three research questions that guided this study were as follows:

1. Which themes would emerge from school leaders in different schools and host
cultures in East Asia?

2. Were certain themes more prevalent than others?

3. Based on the results of the IS and the demographic survey, was there a correlation between the innovativeness of individual school leaders and the perceived level or innovativeness of their schools by staff?

**Central questions (CQs).** The following are the CQs addressed during this study:

1. What factors are most predominate in EARCOS school leaders’ decisions in adopting or rejecting instructional technology, specifically DE, innovations into their schools?

2. What factors in EARCOS schools have driven the consideration of adopting DE into traditional K-12 school?

3. To what extent do school leaders recognize and utilize opinion leadership in their schools in the innovation diffusion process?

4. What extent do EAI school leaders imply elements of IDT into their decision making when considering instructional technology innovations in their schools?

**Subquestions (SQs).** The following are the SQs addressed during this study:

1. What is the role of school leadership in the development of DE in their schools?

2. Does the role played by school leaders in the adoption or rejection of instructional technologies differ between school leaders at different levels of a school’s administrative hierarchy?

3. Is there a difference between DE diffusion process within EARCOS schools when compared to other instructional technology innovations that schools have undertaken (i.e., 1:1 laptop initiatives, LMS adoption).
Limitations

The largest limitation of this study was the small sample size of the study’s participants and the niche educational setting of K-12 international schools. Further limitations included the fact that school leaders were only considered for the study if their school met the criteria of the study, having an established LMS in place and an established 1:1 laptop initiative in operation. Future studies would need to be expanded to other private K-12 international schools outside of the EARCOS and around the world, including K-12 private and independent schools in the United States. The addition of these schools and their leaders’ perspectives would provide a well-rounded and valid portrait of school leaders’ knowledge of IDT theory and the role it plays in their decision making around the adoption or rejection of instructional technologies in their schools. Past research documented the role leadership plays in the adoption, implementation, and institutionalization of instructional technologies in schools. However, little attention has been paid to structuring these studies with the framework of the DOI framework. Moreover, the examination and identification of opinion leadership characteristics and the role it plays within schools represents a deficiency in K-12 instructional technology research.

Following the collection, transcription, coding, and summarizing of interview and survey data collected from EARCOS school leaders, emergent themes provided insight into the role opinion leadership and DOI theory plays in school leaders’ adoption or rejection of DE technologies in their schools. Future implications of this study might provide insight on how to best introduce and diffuse instructional technologies, including DE, into K-12 international schools. In this way, this study could serve as a precursor to establishing an innovation diffusion process for school leaders to consider and utilize.
when considering the adoption of instructional technologies in their schools. Such a process could expedite the rate of diffusion of instructional technology innovations in schools and reduce ambiguity and increase adoption and institutionalization of innovations within K-12 international schools.
Chapter 3: Methodology

Aim of Study

This chapter describes the methods employed for data collection and analyzing data in this study. The primary purpose of this qualitative study was to examine the decision-making process of international school leaders in the EARCOS when considering instructional technology innovations. Specifically, this study aimed to frame school leadership’s decisions to adopt or reject instructional technology innovations in regards to DE within the context of IDT. The areas discussed in this chapter include (a) the employment of grounded theory methodology to guide data collection in this study, (b) purposeful sampling of international school leaders in the EARCOS, (c) collecting of data through interviewing and a demographic and individual IS, and (d) the processes used in transcription and coding of interview and survey data.

Rubin and Rubin (2012) stressed the difference between positivist and naturalistic approaches to qualitative data gathering. The decision process in adopting any innovation regardless of the organization or setting is a complex process (Rogers, 2003). Therefore, a naturalist research philosophy was apropos given that “naturalistic research is focused more on understanding what has happened in a specific circumstance than on trying to predict what will happen next” (Rubin & Rubin, 2012, p. 16) Interviews played an integral part in the data-gathering process of this study.

Qualitative Research

A qualitative approach utilizing Rubin and Rubin’s (2012) approach to qualitative interviewing was employed to conduct this grounded theory study. Constructivist grounded theory design was chosen by the researcher as he attempted to generalize his findings from the collected qualitative data that employed a relatively small sample size.
The researcher was interested in the views, beliefs, values, and assumptions of school leaders and their adoption of DE within their schools (Charmaz & Belgrave, 2002). Richardson (2011) stated, “Conducting a qualitative analysis of the data thus allowed for a deeper and richer understanding of how these innovation characteristics affect the choices to adopt based on challenges and barriers experienced by the end user” (p. 27).

Additionally, this study represents a very small body of research that is emanating from the study of international schools and education (Creswell, 2011). Ten international school leaders in the EARCOS were interviewed and surveyed using the IS scale to gather data on their perceptions of adopting instructional technology innovations, namely DE, into K-12 international schools. International school leaders represented a single unit of analysis (Creswell, 2011) in this study. Interviews were conducted via Skype. All interviews were transcribed by hand at the time of the interview.

Interviews were conducted using procedures described by Rubin and Rubin (2012) and DeWalt and DeWalt (2011). Interviews followed the responsive interviewing protocols outlined by Rubin and Rubin where predetermined initial questions were asked and then follow-up questions were asked based on the responses of the interviewees. This naturalistic manner of interviewing allowed the researcher to gather more in-depth data around EARCOS school leaders’ knowledge of opinion leadership, IDT, and the likelihood of DE adoption. Interviewing facilitated data to be collected on the “experiences, motives and opinions of others” (Rubin & Rubin, 2012, p. 3). Interviewing also allowed the researcher insight into decisions making and adoption of innovation processes in schools that were unfamiliar to the researcher. Interviewing allowed data to be collected from school leaders in a setting natural and comfortable to them, allowing the researcher greater insight into fundamental processes involved with adopting or
rejecting various educational technology innovations (DeWalt & DeWalt, 2010). Transcriptions were used to analyze and code interview data. The research followed Creswell’s (2011) process for collecting qualitative data by identifying a unit of analysis, specifying the population and sample size, obtaining permissions and consent, identifying the processes and instruments to collect data, and obtaining International Review Board (IRB) approval.

**Rationale for Grounded Theory Study**

Charmaz and Belgrave (2002) explained, “Grounded theory is a systematic method for constructing a theoretical analysis from data” (p. 347). Utilizing the grounded theory approach, the researcher constructs themes and concepts as they emerge organically through the coding and transcription of collected data (Rubin & Rubin, 2012). Due to the constructivist nature of allowing codes and themes to emerge from the data rather than predetermine codes and themes, the researcher is able to discover or reveal themes and codes that might have otherwise never been considered (Rubin & Rubin, 2012).

Grounded theory was chosen for this study because adoption of instructional technology, instructional technology, IDT, and international schools were all familiar subjects and topics for the researcher (Rubin & Rubin, 2012). Creswell (2011) said grounded theory “offers a micropicture of educational situations rather than a detailed microanalysis” (p. 448). All participants included in the study had a grounded knowledge of adopting innovative practices and processes within the context of their current or prior school postings. This approach is congruent with the characteristics of grounded theory (Strauss & Corbin, 2014). Bloomberg and Volpe (2012) reported that the grounded theory approach allows the researcher to generate or discover a theory of a process.
grounded in the views of the research participants. Thus, grounded theory research “involves multiple stages of data collection” (Bloomberg & Volpe, 2012, p. 33) and the constant revision of emergent themes and codes (Charmaz, 2008; Corbin & Strauss, 1994, 2008; Corbin, Strauss, & Strauss, 2014).

Interviews about the processes, pathways, and decision making that underlie the adoption or rejection of instructional technology innovations in regards to distance learning revealed the organizational and personal nuances that go into adopting and diffusing innovations within international school leaders’ schools. Discussions with international school leaders that focused on opinion leadership, identifying opinion leaders within their staff, and categorizing staff into different adopter categories (Rogers, 2003) revealed a wide variation between schools as organizations and school leaders as individuals. These discussions were helpful in identifying common themes across school leaders and their associated schools. The data collected through interviews reflected both the researcher’s and school leaders’ mutual constructions and illuminated the existence of multiple realities within the context of adopting an educational technology innovation, including DE, into the school (Charmaz, 2006, 2008). In this way, school leaders’ intentions and decisions on adoption of instructional technology innovations followed similar paths along a continuum that emerged as processes within the context of adopting and diffusing innovations (Rogers, 2003).

Because the data collected from school leaders were grounded in their collective experiences, the data became more relevant in providing understanding and comprehension (Charmaz, 2006). A description of commonalities in international school leaders’ processes in adopting or refuting innovations into their schools could serve as a useful guide to other school leaders around the globe who are considering adoptions of
innovative pedagogical methodologies. By illustrating international school administrator’s previous experiences in adopting innovations, this study aimed to assist international school leaders to expedite the DOIs within K-12 international school educational settings.

Creswell (2011) reiterated the reliance on interviewing for grounded theorists in allowing researchers to “capture the best experiences of participants in their own words . . . consistent with the constructivist approach” (p. 442). Where applicable, interviewees were interviewed while they were in the school’s they served at the time of the interview. Data gathered from questions were used to yield follow-up questions and which data were most relevant to collect next (Creswell, 2011; Rubin & Rubin, 2012). Emergent design afforded the researcher flexibility to adapt questions to individuals rather than utilizing a static bank of questions that were consistent regardless of the interviewee, their school, or their past or present experiences (Creswell, 2011). In-depth analysis was conducted ongoing and continuously through data collection to identify common themes that were emergent in the interview data across school leaders. In this way, the study employed the comparative method described by Conrad (1978) to revisit continually the data to examine it for emerging concepts and “interrelationships between variables” (p. 103).

School leaders were identified from response to an e-mail sent to all EARCOS. Responses either signaled an acceptance to be part of the study or to refute participation. Nonresponses to the e-mail invitation were considered nonparticipatory. Ten leaders volunteered to be interviewed and surveyed using the demographic and IS as part of the study. Data were collected in interviews using Rubin and Rubin’s (2012) qualitative interviewing methods. Sampling was sent to a diverse range of schools to identify
patterns among schools and international school leaders (Creswell, 2011; Glaser & Strauss, 1967). Additionally, the researcher analyzed each school represented by a school leader separately. In-depth analysis allowed the researcher to identify school demographic, school resources, and variances in technological professional development between school leaders (Dawson & Rakes, 2003). Surveying schools as organizations was necessary to obtain a complete picture of where school leaders operated. School leaders alone rarely can institutionalize change (Kotter, 1995) so understanding other organizational demographics and forces that played into innovations diffusion decision making was necessary.

**Participants**

An e-mail invitation to participate was sent to EARCOS school leaders who represented schools meeting the requirements for the study. In order to participate, the schools the EARCOS leaders represented needed to have a 1:1 laptop program and a LMS in place. The invitation was sent to upper administration of selected EARCOS schools. Upper administrators in this study included superintendents, deputy superintendents, and curriculum coordinators. Upper administration was targeted for the study because they were directly responsible for facilitating and implementing educational innovations or transforming existing organizational practices (Kotter, 1995). This was congruent with Rogers’ (2003) notion of opinion leaders within organizations who, due to their access to information and organizational leadership, are able to exert influence over other school staff in order to promote institutionalization of an innovation. Kouzes and Posner (2007) stated, “Leadership is inextricably connected with the process of innovation” (p. 165).

International school upper administrators are involved in all aspects of the school
including but not limited to (a) human resources; (b) budgeting; (c) communicating and partnering with school board members; (d) implementing and facilitating delivery of existing curricula; (e) serving as a liaison between the school and the parent and student community; (f) developing school partnerships with outside, third-party entities for fund-raising and or advancement; and (g) school-wide and community publications and marketing. International school leaders are able to influence organizational change because they have the unique perspective that spans all departments and has contact with all school stakeholders. Selecting EARCOS school administrators from the EARCOS represented purposeful, concept sampling (Bloomberg & Volpe, 2012; Creswell, 2011). Participants represented a specific global region of international schools rather than a random sampling of international schools from other geographical and cultural areas.

Purposeful sampling was used to identify study participants. The sampling was homogeneous because all EARCOS school administrators were affiliated with schools that were currently executing a 1:1 laptop program and utilizing a LMS to deliver materials or instruction to students electronically. Conrad (1978) emphasized that theoretical sampling dictates participants or groups within studies should be selected on “their theoretical relevance” (p. 104). The requirements for schools allowed the researcher to focus on schools that were the most progressive in terms of their adoption of instructional technologies and learning platforms. The intent was to attempt to understand if a central phenomenon persisted across all leaders who participated, generating a central theme (Creswell, 2011; Rubin & Rubin, 2012). Out of 142 EARCOS member schools, 60 schools satisfied the above criteria. E-mails sent from the research to superintendents of these 60 schools asked for upper administration volunteers from the criterion selected schools. Ten replies from the initial e-mail invitation were received.
The 10 replies came from schools in Korea (three), China (three), Thailand (two), Malaysia (one), and Taiwan (one). All 10 school upper administrators fulfilled the requirements by leading schools with existing 1:1 laptop programs and a LMS in operation.

A standardized e-mail for all participants in the study explained the study more in-depth, the basic structure of the interviews, and how interviews would be conducted and recorded (see Appendix C). A formal invitation to participate in the study was attached to the e-mail. After participants had indicated interest in participating in the study via e-mail, they were e-mailed back the study’s consent forms. Once consent forms were received, an appointment for the interview was established. A follow-up e-mail was sent with the appointment date and time and the demographic and ISs were attached. These survey were completed and returned prior to interviews taking place.

**Consent.** Confidentiality and anonymity were defined in this initial communication and survey to ensure participants were aware of IRB protocols and that their privacy would not be compromised during the study or analysis of collected data. Interviews and surveys questionnaire proceedings were undertaken using IRB sanctioned protocols and instruments. The researcher carefully explained permissions and participant’s rights in the study and the researcher’s responsibilities to ensure anonymity and safety of all study participants. All participants were asked to sign the adult consent form in order to participate in the study. Signed copies of the consent form were sent back to each participant once received by the researcher. The researcher kept the original signed consent forms in a locked file cabinet throughout the study.

**Data Collection Tools**

Participants were given the option of choosing the voice over Internet protocol
(VOIP) videoconferencing platform of their choice for their interview. All participants in the study chose Skype as their preferred videoconferencing platform. Videoconferencing facilitated real-time interviewing and allowed the study’s participants’ body language and facial expressions to be noted during the interview. Interviews followed procedures and responsive interviewing protocols described by DeWalt and DeWalt (2010) and Rubin and Rubin (2012). Predetermined initial questions were asked and then follow-up questions were asked based on the responses of the participants.

Two surveys were sent to each of the 10 participants in the study. Once an interview had been scheduled and the signed consent form was returned, each participant was e-mailed the demographic survey and the Hurt-Joseph-Cook IS (Hurt et al., 1977). Demographics represent one of the four pillars of qualitative research as identified by Bloomberg and Volpe (2012). Collecting a demographic survey was important to assist the researcher in identifying potential underlying factors and perceptions between study participants “as well as the similarities and differences in perceptions among participants” (Bloomberg & Volpe, 2012, p. 105). Demographics were surveyed as they formed an important foundation for how the researcher interacted with the study participants and if the demographics of participants in any way influenced the researcher-participant dynamic during the in-depth interviews (DeWalt & DeWalt, 2011). The demographic survey questions can be found in Appendix D. The IS survey (see Appendix E) allowed the researcher valuable insight into the perceptions of the study participants in regard to how innovative they viewed themselves.

**The IS.** The IS represents a scale developed by Hurt et al. (1977). The IS was Hurt et al.’s attempt to quantify the definition of innovativeness. Hurt et al. defined *innovativeness* as a willingness to change (Rogers, 2003). The IS scale was formulated to
support weaknesses in postinterview techniques applied in assessing an individual’s propensity towards innovativeness. Among the weaknesses in these “post-facto techniques” (Hurt et al., 1977, p. 59) are respondent and interviewer biases, restricted sample sizes, the lack of a properly randomized sample, and the potential for improper interpretations of qualitative data (Hurt et al., 1977). The IS employs a 7-point Likert-type scale. A Likert scale was employed by Hurt et al. because of its ease of use to administer, the ability of the scale to measure innovativeness across a wide range of contexts, and that Likert scale reports are associated with high reliability. The IS Likert scale ranged from 1 (strongly disagree) to 7 (strongly agree).

The IS was a 20-item scale based on Rogers and Shoemakers’ five innovativeness categories (Hurt et al., 1977; Rogers, 2003). The IS was adept at measuring the willingness to change of survey respondents prior to the introduction of an innovation (Hurt et al., 1977). Eight of the 20 questions were negatively keyed. These eight questions were reverse scored. The IS mean of innovativeness was 102. The internal validity of the scale had a reliability of .89 (Nunnally’s $r = .89$).

**Procedures**

This study followed Rubin and Rubin’s (2012) guide for designing of and collecting data from high-quality interviews. Three basic steps were employed in order to ensure the quality of the interviews and explore the richness of the data collected from interviewing study participants (Rubin & Rubin, 2012). The three steps included the following:

1. The researcher chose interviewees who had firsthand experience and credibility leading international schools in the EARCOS. Homogeneity within the experiences of the sample was offset by varying points of view on the role of DE in K-12 international
school education. School leaders who were interviewed varied widely in their experiences with instructional technologies at previous schools and their self-perception of personal and organizational innovativeness.

2. During the interview, hand-written transcriptions were taken. Once initial interviews were conducted, interviews were transcribed using Microsoft Word so that themes could emerge from the data. Commonalities and differences were noted between interviews, and gaps were identified that signaled the need for follow-up interviews to collect additional data and to clarify data from initial interviews.

3. Interview data were revisited multiple times and throughout the entire interviewing process to allow themes to emerge until thematic saturation occurred and no new themes appeared (Charmaz, 2008; Charmaz & Belgrave, 2002; Conrad, 1978; Creswell, 2011).

Following the interviews, the recordings and notes collected during initial interviews were transcribed using grounded theory (Rubin & Rubin, 2012). This allowed themes to emerge organically from the data and facilitated coding of the transcripts (Charmaz, 2012; Rubin & Rubin, 2012). Transcriptions were sent to study participants to verify the recorded interview and statements as accurate (Bloomberg & Volpe, 2012).

**Data Analysis**

K-12 EARCOS school upper administrators were asked in the interviews about how instructional technologies diffused within their organization. Initial questions were open ended to allow themes to emerge organically as the interview transpired (see Appendix F). Questions and follow-up questions were designed with the intent of having EARCOS school upper administrators explain the role, if any, opinion leadership played in diffusing instructional technology innovations and DE in their organizations and the
perceived readiness of their schools to incorporate DE as an alternative to face-to-face delivery of instruction and curriculum.

School leaders were asked during the interviews about the potential benefits and barriers of adopting DE into their schools and to identify the channels by which innovations diffused within their schools. DE has shown several advantages over face-to-face, traditional, pedagogical models. The research suggested these benefits include the following:

- Providing schools with additional method of offering courses to students without hiring additional teaching staff (Wicks, 2010).
- A reduction of in-school scheduling conflicts (Wicks, 2010).
- Meeting the needs of growing populations given limited space in brick-and-mortar schools (Picciano & Seaman, 2009).
- Ease of distributing materials and resources without interruptions to pedagogy (King, Young, Drivere-Richmond, & Schrader, 2001).
- Establishing a niche in a highly competitive educational marketplace;
- “Students performed modestly better than those receiving face-to-face instruction” (Means, Toyama, Murphy, Bakia, & Jones, 2009, p. ix).
- The facilitation of globally connected instruction and learning.
- Individualized instruction to meet a diverse population of learners (Berge & Mroczowski, 2001; Pollock & Cornford, 2003; Folkers, 2005; Milligan & Buckenmeyer, 2008).
- Additionally, interviews provided the research with insights on what EARCOS school leaders perceived to be limitations or barriers to the adoption and diffusion
of DE within their schools. Barriers to implementing DE that have been identified included the following:

- Staff concerns about a lack of time needed to develop online courses and materials (Murphrey & Dooley, 2000).
- Concerns over the necessary competencies to be effective in designing and delivering online instruction and the lack of training provided organizations to staff (Barbour, Siko, Gross, & Waddell, 2012; Murphrey & Dooley, 2000).
- Perceived lack of credibility of DE within school staff and parent communities.
- Access to reliable Internet connections and technical support for teachers and students inside and outside of school (Ding, 2002; Potter as cited in Li & Lindner, 2007).
- Lack of established best pedagogical and assessment practices and standardized policies and procedures.

**Structure Semistructured Interviews**

**Conducting the interview.** Interviews were conducted using procedures outlined by Creswell (2011) and Rubin and Rubin (2012). Creswell (2011) recommended the following steps when conducting interviews:

1. Identify participants for interviewing through purposeful sampling.
2. Obtain participant consent.
3. Determine the type of interview procedures to be followed. In this study, interviews were conducted via Skype.
4. Take notes during the initial interview when asking open-ended questions (Rubin & Rubin, 2012). Notes allowed the researcher to better formulate follow-up
questions and probes with the initial interview and for subsequent interviews where they were necessary for clarification.

5. Respect participant’s schedules and begin and end promptly per previously agreed-upon schedules.

6. Transcribed the notes using Microsoft Word shortly after the completion of the interview so that interview content remained fresh and was easy to recall.

7. Send the interview transcription to the participant within 1 week of the interview. Participants verified the transcription was accurate and represented the content of the conversation.

**Ethical Considerations**

Creswell (2011) and Rubin and Rubin (2012) stressed ethical considerations such as confidentiality, anonymity, informed consent, and transparency about the motives and purpose of the study are paramount in conducting ethical research. Protecting the research participant was important in this study. As Rubin and Rubin stated,

Interviewees should be no worse off, and ideally should be better off, for having taken the time to talk with you. Not harming interviewees means not exploiting them, not publishing material that would cause them to be arrested or lose a job, promotion, or part of their income. (p. 89)

Great care was used to avoid “deductive disclosure” (Kaiser, 2009, p. 1632). This was especially important given the extent to which international school leaders were familiar with one another and the location and identity of the schools in which they were present at the time of the study. The researcher coded participant and school identities where participants were employed at the time of the study in order to avoid any internal disclosures (Kaiser, 2009).
Cultural bias was also an important consideration in this study as participants represented different nationalities and operated within school environments that spanned six countries. Avoiding cultural bias is difficult as nearly all qualitative studies that involved interviewing “requires crossing cultural boundaries” (Rubin & Rubin, 2012, p. 180). Therefore, preparation was taken to anticipate any significant cultural differences and make affordances for them before beginning interviews. These preparations included examining the participant’s demographic survey results prior to the interview, allowing participants to choose the videoconferencing platform they were most comfortable using, and wording questions to take into account different cultural affordances and prejudices (Rubin & Rubin, 2012).

The researcher understood that ethics were an important element of conducting this or any other study involving human subjects. Participants were made aware of their right to refuse participation at any stage of the study without repercussion. The researcher obtained written consent of all participants in the study. All collected electronic data were stored in password protected, cloud-based file storage platforms and were copied to an external hard drive for backup that was stored in a locked file cabinet. Any paper-based notes, surveys, or documents pertinent to the study were also stored in a locked file cabinet. The researcher acknowledged the need to abide by all IRB requirements set forth by Nova Southeastern University as well the IRB.

Trustworthiness

Qualitative research strives to demonstrate an accurate picture of a phenomenon that is under study. Lincoln and Guba (1985) argued that credibility is one of the most important parts of any researcher attempting to establish trustworthiness in a study. It is the job of the researcher to provide, with enough detail, an accurate description of the
methodologies and results of qualitative research so that other researchers can decide if the research and findings are similar to contexts of other research in the field and if results can be applied or generalized to other settings (Rubin & Rubin, 2012; Shenton, 2004). Rubin and Rubin (2012) stated, “A major strength of qualitative interviewing is that is produces highly credible results” (p. 64).

Trustworthiness in qualitative research is accomplished through accuracy and credibility and the comparison of multiple data sources (Rubin & Rubin, 2012). A written consent form was sent to all participants who indicated interest in participating in the study. Once consent forms were received, interviews were scheduled. The demographic and IS surveys were e-mailed to participants. Demographic surveys were used to collect participant demographic data. The IS survey was used to collect quantifiable data on the perceptions of innovativeness in participants themselves and the organizations they led at the time of the study. The IS has been shown to exhibit highly credible and valid results (Hurt et al., 1977; Hurt & Teigen, 1977; Simonson, 2000). The IS produced quantifiable data about participant perceptions of self in regards to innovativeness. Both surveys were employed in this study to ensure trustworthiness and to employ multiple data sources to ensure validity and trustworthiness (Bloomberg & Volpe, 2012; Creswell, 2011).

Yin (2013) reiterated the importance of utilizing research methodologies and measures that were congruent with the concepts and themes being explored by the researcher. This study employed grounded-theory methodology. Interviews were the main conduit for data collection in this study. The researcher employed open-ended interview techniques as recommended by Rubin and Rubin (2012) and Creswell (2011). Open-ended interviewing allowed the researcher to dig deeper into participant responses where needed and allowed themes to emerge organically for participant responses
Transcription is the method researchers use to ensure accuracy when employing interviews in their study. To ensure trustworthiness of interview transcriptions, the researcher took the following steps: (a) Interviews were transcribed and coded all interview recordings within 1 week of the interview, (b) interview notes were taken during the interviews, and (c) interview notes and transcriptions were all revisited during the write-up of the analysis (Rubin & Rubin, 2012). Open-coding methods were used to allow themes to emerge from the data. Creswell (2011) recommended that researchers use open coding of interview data until a saturation point is reached and no new themes emerge.

The researcher acknowledges the relatively small sample and scope of this study. The methodology employed in this study had advantages and disadvantages, which limited the scope of results being generalizable to other settings outside of EARCOS member international schools.

**Advantages and Disadvantages**

**Advantages.** EARCOS member schools and school leaders that participated in the study represented a diverse population within the East Asia region of international schools. Schools ranged from student populations of 400 students up to larger schools with enrollments of over 1,500 students. Most schools were single-campus schools with K-12 housed on one campus while three schools were set up as minidistricts with multiple K-12 campuses. One school in the study had a lower school (prekindergarten-Grade 5) and an upper school (sixth grade-12th grade) on separate campuses.

School leaders represented a wide spectrum of experience. Many school leaders had multiple school leadership postings in other countries prior to leading the schools where interviews took place during the study. Due to the nature of international
education, these leaders had multiple perspectives of education and host country cultures not usually afforded to school leaders who spend their entire careers in domestic educational environments.

Another advantage of this study is to add to the body of research involving international schools and IDT theory as it relates to the K-12 international educational environment. Blandford and Shaw (2001) stated there is a scarcity of research covering international K-12 schools and international school leadership. Hazen et al. (2012) noted the near absence of literature describing the role of school leadership in accepting or rejecting educational innovations within international schools. It was the aim of this study to add to the emerging body of IDT research in K-12 education, specifically international school education.

Disadvantages. Due to the geographical separation of participants in this study the researcher was forced to use telephone and VOIP communications to conduct interviews. A limitation of interviewing participants at a distance using telephone or VOIP technology was that the researcher did not have face-to-face contact with all participants. Transcribing notes by hand had the potential for missing the participants’ facial cues or body language during the interview. Not observing these cues had the potential to limit the understanding of the researcher’s “ability to understand the interviewee’s perceptions of the phenomenon” (Creswell, 2011, p. 227; Rubin & Rubin, 2012).

Another disadvantage of this study was the relatively small sample size involved in the study. It is typical in qualitative research, especially studies using open-ended interviewing, to have small sample sizes (Creswell, 2011). Small sample sizes can be both an advantage and disadvantage, however. Small sample sizes allow the researcher to
go more in-depth with each participant. However, it also limits the extent to which results can be generalized to other populations (Creswell, 2011). Not many international schools have well-established 1:1 laptop programs and operational LMSs in place, which were two requirements for participation in this study. The requirements significantly reduced the purposeful sampling of potential international school leaders eligible for this study.

**Potential Research Bias**

The researcher strove to avoid potential research bias throughout the course of this study. Creswell (2011) and Rubin and Rubin (2012) both stated that researchers, regardless of the methodology of the study, should attempt to remain as neutral and open to data that are collected and themes that may emerge. The researcher in this study was biased in that he was employed as an instructional technologist in an EARCSOS school at the time of the study. The researcher had also been directly involved in diffusing instructional technologies and improving instructional design pedagogies for staff. Although these experiences provided the researcher with insight into IDT practices within schools, they were an unavoidable element in biasing the researcher’s perspective.

**Limitations**

The most obvious limitation of this study was the relatively small sample size and the niche environment of K-12 education within which international schools operate. Creswell (2011) warned that smaller sample sizes risk having the potential error of yielding different results when generalized to larger populations, thereby decreasing transferability and trustworthiness of the study (Shenton, 2004). This study dealt with a very select population of K-12 international school leaders who met the criteria of the study. Random sampling was not possible in this study. The small sample size of the study in itself is worth noting. Many school leaders were reluctant to take the time for a
synchronous interview as well as to complete the two surveys. The timing of the study also impacted the sample size. The study was initiated during a busy time of the school year for EARCOS school administrators. Many participants in the study were involved with teacher recruitment for the following school year at the time of the study. Finally, other school leaders may not have participated in the study because they did not identify with the study’s themes of innovation, opinion leadership, or DE.

**Summary**

This chapter outlined the methodology employed in obtaining data utilized to discover emergent themes and concepts from the study. The methodology was utilized to collect and triangulate data from interviews and a survey dealing with perceived individual innovativeness. Guba (1981) and Shenton (2004) iterated the importance of multiple data-collection methods to minimize individual limitations of a single data-collection method. Participants in this study were upper administrators in EARCOS K-12 international schools that were leading schools with established 1:1 laptop initiatives and who were utilizing an LMS as a way to deliver web-enhanced, blended, or fully online courses within their school.

A summary of the steps employed to obtain the sample in this study and to collect data are presented below:

1. EARCOS school leaders were e-mailed a description of the study and an outline of the requirements of participants including approximate amounts of time required to complete interviews and surveys.

2. Respondents who replied to the e-mail and offered to take part in the study formed the sample population for this study.

3. Participants were sent a confirmation e-mail notifying them of their acceptance
to take part in the research.

4. Consent forms were sent to participants in the study. Accompanying this was a full description of the aim of the research, the problems the research aimed to address, the participant’s role in the study, and their rights to privacy and to view the results of the study once completed.

5. Interviews were scheduled with each participant.

6. Once an interview had been scheduled, demographic and IS surveys were sent to participants.

7. Surveys were completed and sent back to the researcher electronically. Responses for the interviews were entered into Microsoft Excel.

8. Interviews took place using Skype. Detailed notes and recording were made during each interview.

9. Transcriptions of all interviews were made within a 1-week timeframe following each interview.

10. Transcriptions were sent to all participants for member checking and to ensure validity and credibility of collected data (Guba & Lincoln, 1994).

11. Participants verified transcripts and returned them to the researcher with their initials signifying the transcribed data were accurate.

12. Interview data were coded and analyzed to allow themes and concepts to emerge.

13. When necessary, second interviews were scheduled to ask follow-up questions or probes to dig deeper into emergent themes until thematic saturation was reached (Rubin & Rubin, 2012).

14. A thank-you letter (see Appendix G) and copy of the final dissertation was
electronically mailed to all study participants once final approval of the study and dissertation had been approved by Nova Southeastern University.

All data collected from participant interviews and surveys are presented in Chapter 4, Results. The implications of these data, and recommendations for future research, are found in Chapter 5, Discussions and Suggestions for Future Research.
Chapter 4: Results

Overview

DE is defined as bridging an instructional gap through the use of technology where a student and instructor are physically separated (Simonson, Smaldino, & Zvacek, 2015). DE has the ability to enhance the course offerings and learning experiences for learners in K-12 international schools around the world. DE has been shown to provide benefits such as increasing the level of motivation in students, expanding educational access to students who might not otherwise have access to instructors or course content, delivering high-quality learning experiences, and improving educational choice for students (Barbour & Reeves, 2009; Berge & Clark, 2005; Cavanaugh et al., 2009; Kellogg & Politoski, 2002). However, the diffusion of DE in K-12 education has been hampered by the associated costs associated with developing online courses and maintaining the infrastructure necessary to connect learners with instructors and content, existing organizational constructs, school leaders unable to shift predominant educational paradigms within their institutions, and a fear and misunderstanding of DE and technological innovation in general (Berge & Muilenburg, 2000).

This study was designed to examine the role opinion leadership and DOI theory played in the diffusion of K-12 DE in EARCOS schools. Although K-12 DE is flourishing in many regions of the world, most notably the United States, the diffusion of DE in K-12 international schools has comparatively lagged far behind. Rogers’ DOI theory was employed to frame the role opinion leadership played on the decision making of international school upper-level administrators to diffusion DE within their respective K-12 international school. As a result of exposing the processes and decision making involved in adopting DE and instructional technology initiatives in K-12 EARCOS
schools, the diffusion process of innovations might be mapped resulting in expedited diffusion of future innovations in K-12 international schools.

Participants

**Determining sample size.** EARCOS is an independent, nonprofit organization that interacts with 142 East Asian schools organizing professional development opportunities for schools and school administrator and teacher conferences. In addition, EARCOS publishes research pertaining to international schools and serves to disseminate information about pedagogical and technological innovations, while facilitating communication between schools within the East Asia region. Out of 142 EARCOS schools, only 60 of the schools satisfied the criteria of having an established 1:1 laptop program (inclusive of schools with 1:1 BYOD laptop initiatives) and a LMS that was utilized by faculty and students at the time of the study. A mailing list of all EARCOS school upper administrators in EARCOS schools that satisfied the participation criteria was obtained from the EARCOS. Upper administrators in this study included superintendents (heads of school), deputy or assistant superintendents, and curriculum directors. Kotter (2012) noted these positions are most often directly responsible for diffusing and institutionalizing educational innovations within schools. Qualifying school leaders were e-mailed asking for participation in the study beginning in November of 2016. Over a 3-month period extending to March, 2016. School leaders were contacted with the aim of identifying 12-15 EARCOS school leaders to participate in the study. E-mails were sent repeatedly through the EARCOS office to qualifying schools and leaders as well as from the researcher to qualifying schools and leaders. Participants who took part in the study recommended and contacted via e-mail other individual school leaders they felt would take part in the study.
E-mail communication to EARCOS school leaders included a letter of invitation to the study (see Appendix C) that outlined the purpose of the study and the components of the study including a demographic survey (see Appendix D), IS (see Appendix E), and a semistructured interview consisting of six questions and the study’s consent form (see Appendix F; Creswell, 2011; Rubin & Rubin, 2012). Throughout this period, e-mails were sent to school leaders asking for further participation from EARCOS leaders as well as the researcher who directly communicated with EARCOS school leaders asking for participation in the study. Ultimately, 10 EARCOS school upper administrators emerged and agreed to participate in the study. The possible reasons for the study’s small sample size included the timing of the data collection, the schedules of EARCOS school administrators, the physical separation of the study participants and the researcher, and the fact that synchronous interviews over Skype were used as the main qualitative data collection tool. The study’s small sample size, the possible reasons why the sample size was small, and the limitations of this study due to the small sample size will be discussed in further detail in Chapter 5.

On boarding of participants was completed once the study’s consent forms had been signed by both the participant and the researcher and both parties had received an electronically scanned copy of the signed consent form. Once the consent form was received, the researcher electronically mailed the two surveys and a date and time was scheduled for interviews conducted through the VOIP platform Skype. Interviews were scheduled with the respective school leader directly or their administrative assistants (Creswell, 2011).

**Interviews**

Face-to-face interviews are preferred in qualitative studies because they tend to
facilitate relationship building between the researcher (interviewer) and the participant. However, due to the geographical separation of participants in this study, conducting interviews face-to-face was not viable. Visible cues such as facial expressions, nonverbal communication cues, and body language can be lost when interviews are conducted remotely over the telephone or other modes of correspondence. Skype was employed in this study because video calls permitted the researcher and the interviewee to see each other in real time, including these nonverbal cues. In addition, preliminary e-mails with the participants in exchanging the study documents and scheduling the interview allowed the researcher and the interviewee to build a modicum of rapport before the Skype interview took place (Rubin & Rubin, 2012).

**Research Questions**

Three main research questions were overarching of all other research questions and SQs in this study. The three research questions were as follows:

1. Which themes would emerge from school leaders in different schools and host cultures in East Asia?
2. Were certain themes more prevalent than others?
3. Based on the results of the IS and the demographic survey, was there a correlation between the innovativeness of individual school leaders and the perceived level or innovativeness of their schools by staff?

**CQs.** The following are the CQs addressed during this study:

CQ1. What factors are most predominate in EARCOS school leaders’ decisions in adopting or rejecting instructional technology, specifically DE, innovations into their schools?

CQ2. What factors in EARCOS schools have driven the consideration of adopting
DE into traditional K-12 school?

CQ3. To what extent do school leaders recognize and utilize opinion leadership in their schools in the innovation diffusion process?

CQ4. What extent do EAI school leaders imply elements of IDT into their decision making when considering instructional technology innovations in their schools?

SQs. The following are the SQs addressed during this study:

SQ1. What is the role of school leadership in the development of DE in their schools?

SQ2. Does the role played by school leaders in the adoption or rejection of instructional technologies differ between school leaders at different levels of a school’s administrative hierarchy?

SQ3. Is there a difference between DE diffusion process within EARCOS schools when compared to other instructional technology innovations that schools have undertaken (i.e., 1:1 laptop initiatives, LMS adoption).

Interview Questions

Six interview questions were posed during Skype interviews to study participants. The six interview questions were aimed at gathering data around the three central research questions and the three CQs and SQs of the study, as follows:

1. When attempting to diffuse an innovation in your school, are there individuals who you perceive as change agents above others? If so, could you please answer the following two questions?
   
   - A1: If so, what characteristics do these individuals possess that led you to classify them as change agents?
   
   - A2: What positions within your school do these individuals hold (e.g., teacher,
coach, administrator, or support staff)?

2. When attempting to diffuse an innovation in your school, are there individuals who you perceive as opinion leaders—people who influence others to try things because they already have done so?

- B1: If so, what characteristics do these individuals possess that led you to classify them as opinion leaders? Do opinion leaders differ from the individuals you considered as change agents in Question 1?

- B2: What positions within your school do these individuals hold (e.g., teacher, coach, administrator, or support staff)?

3. Are there administrators at other schools you view as opinion leaders in the EARCOS region?

   Follow up C1: If so, what characteristics do these individuals possess that led you to classify them as change agents?

4. When seeking to implement an innovation within your school, whether it is a technical, pedagogical, or organizational shift, are there various stages or procedures that are employed to assist in diffusing the innovation?

5. What role do you personally see DE or blended learning playing in international schools presently or in the future?

   - E1: If none, expand on that if you could?

6. To what extent is your school employing DE or blended learning as an instructional delivery method?

   - D1 (if no examples given): In your personal opinion, are there organizational or environmental factors present in your current school that serve as barriers in developing distance or blended instruction at your school?
• D2 (if examples given): In your personal opinion, which organizational or environmental factors present in your current school served to foster the development of distance or blended instruction?

• D3 (if examples given): Were there specific persons within the organization who were instrumental in diffusing or institutionalizing DE in your school?

**Data Collection Instruments and Reliability**

Two surveys were sent to participants ahead of the scheduled interview. Prior to the interview study, participants were asked to complete an 11-question demographic questionnaire and the 20 question IS (Hurt et al., 1977). Interviews were scheduled once the demographic survey and the IS had been completed and returned to the researcher. Interviews were then scheduled and participants were allowed to list the VOIP videoconferencing platform they preferred. All interviews were conducted over Skype in this study. No interviews were conducted via phone call or face-to-face. Interviews were conducted with EARCOS school upper administrators. All study participants held one of the following positions within their respective schools: superintendent, deputy superintendent, or directors of curriculum/educational programs.

Interviews consisted of six open-ended interview questions previously sent to the participants (Creswell, 2011; Glesne, 2011). Participant responses to questions were recorded by the researcher by hand. Following the interview, the notes were immediately reviewed to assess completeness and coherence of the interview notes when compared to the interviews. Interview transcriptions were drafted from handwritten notes into Microsoft Word within 2 weeks following the interview so that the interview content and the conversation details were fresh in the researcher’s head (Glesne, 2011). The six interview questions were each transcribed beginning on a new page. Interview
transcriptions ranged from 8-12 pages in length depending on the breadth of the participants’ responses to the interview questions.

**Demographic information.** A demographic survey was sent to the study participants ahead of their interview. The demographic survey was used to gather detailed participant information that could later be used for comparative analysis with the results of the IS. The demographic survey collected the following information: age, gender, ethnicity, highest level of education (degree) attained, name of the school and position held at the time of the study, the number of years the participant had served in a leadership position in his or her current school, previous educational leadership experience, number of years the participant’s school had a 1:1 laptop program and LMS in place, and the educational technology innovations he or she had participated in diffusing within their school.

Bloomberg and Volpe (2012) and DeWalt and DeWalt (2010) noted the importance that participant demographic information gathering played in gaining a deeper understanding of the research participants. In addition, demographic information allowed the researchers to examine the extent these characteristics influenced other aspects of a study’s results.

**Quantitative Information**

**Individual IS.** Hurt et al.’s (1977) IS was used to collect qualitative data about participants’ perceptions of their own levels of innovativeness. Rogers’ (2003) defined *individual 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. 475). The IS was Hurt et al.’s attempt to quantify the definition of innovativeness. Hurt et al. stated that the IS “has the potential to predict willingness to adopt innovations across
populations and socioeconomic status” (p. 63). The IS employs a 7-point a Likert type scale because of its ease of use to administer, the ability of the scale to measure innovativeness across a wide range of contexts, and Likert scale reports are associated with high reliability. The IS Likert scale ranged from 1 (strongly disagree) to 7 (strongly agree). The IS was a 20-item scale based on Rogers and Shoemakers’ five innovativeness categories: (a) innovators, (b) early adopters, (c) early majority, (d) late majority, and (e) laggards/traditionalists (Hurt et al., 1977; Rogers, 2003).

The IS was adept at measuring the willingness to change of survey respondents prior to the introduction of an innovation (Hurt et al., 1977). The IS mean of innovativeness was 102 and a standard deviation of 14. Scores ranged from the low of 22 to the high of 139. The internal validity of the scale had a reliability of .89 (Nunnally’s $r = .89$). The IS has been proven as a valid predictor of an individual’s level of innovativeness (Simonson, 2000).

**Results of Data Collection Instruments**

Quantitative data were collected via two instruments: (a) demographic survey and (b) the individual IS.

**Demographic survey results.** The 10 participants in the study ranged in age from 41 to 64 years old. The average age of participants in the study was 50.9 years old ($M = 50.9$). Ten percent of the participants were in the 60- to 70-year-old age category, 30% of the participants were in the 50- to 60-year-old age category, and 60% of the study participants were in the 40- to 50-year-old age category. Table 2 represents the ages of the study participants broken down by age category.

The demographic survey collected data on participant’s gender. Male EARCOS school leaders were more predominant that female EARCOS school leaders in the study.
Male participants were 70% ($N = 7$) while females school leaders composed 30% of the participants ($N = 3$). Table 3 presents the gender classifications of the participants in the study.

Table 2

*Study Participants Broken Down by Age Category*

<table>
<thead>
<tr>
<th>Age range</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>50-60</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>60-70</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3

*Study Participant Gender Classifications*

<table>
<thead>
<tr>
<th>Gender</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>30</td>
</tr>
</tbody>
</table>

The demographic survey collected data on participant’s ethnicity of which 90% of the study participants were White ($N = 9$), and 10% of the respondents were classified as other. This participant wrote “middle Eastern” as his or her ethnicity ($N = 1$). Table 4 presents the ethnicity classifications of the participants in the study.

The demographic survey collected data on participant’s level of education at the time of the study. Participants were asked to list the highest degree obtained at the time of
completing the demographic survey.

Table 4

*School Leader Participants Ethnicity*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>9</td>
<td>90</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>10</td>
</tr>
</tbody>
</table>

Ten percent of the study participants had completed a bachelor’s degree ($N = 1$), 40% of the respondents had completed a master’s degree ($N = 4$), and 50% of the respondents had completed a doctorate degree ($N = 5$). Table 5 presents the breakdown of participant’s level of educational attainment at the time of the demographic survey data collection.

Table 5

*School Leaders Level of Educational Attainment*

<table>
<thead>
<tr>
<th>Highest degree attained</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor’s degree</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Master’s degree</td>
<td>4</td>
<td>50</td>
</tr>
<tr>
<td>Doctorate degree</td>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

EARCOS school leaders held varying job titles at the time of the study. Among the titles that were listed in the demographic survey results were (a) Head of School (60%), (b) Deputy Head of School (30%), and (c) Head of Academic Affairs/Curriculum (10%). Because schools use different titles for similar positions, titles were standardized...
for comparative analysis for the study. For example, one head of school’s job title at the school was Director of Learning, yet he was the director of the school. Therefore, the top leadership administrative position in the school was referenced as head of school for this study. Table 6 presents the breakdown of EARCOS school leaders’ job titles at the time of the demographic survey data collection.

Table 6

*Key Leadership Professional Status Description*

<table>
<thead>
<tr>
<th>Professional title</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head of School</td>
<td>6</td>
<td>60</td>
</tr>
<tr>
<td>Deputy Head of School</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Head of Academic Affairs/Curriculum</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The demographic survey asked EARCOS school leaders to list previous experience in positions of educational leadership. The descriptions of previous school leadership experience varied greatly between the study’s participants. All of the study participants \(N = 10\) listed being a divisional principal at another school before their current school leadership role. Other leadership positions listed included (a) head of department, (b) assistant/deputy head of school, (c) curriculum director, and (d) director of educational technology.

**Innovativeness Scale (IS)**

All of the study participants \(N = 10\) completed the IS. The results of the IS can be seen in Appendix H. The participants mean score was 117.7 \((M = 117.7)\) with a
standard deviation of 11.97 ($SD = 11.97$). The scores ranged from a minimum of 94.00 to a maximum score of 138.00. The IS contained eight questions that required reverse scoring. Hurt et al.’s (1977) normative mean score was 102 and Simonson (2000) described a mean score of 105.1 for a sample of 1693 ($N = 1693$) with a standard deviation of 14.46. Participants in this study had a higher mean score and lower standard deviation when compared to Hurt et al.’s and Simonson’s (2000) findings. Roger (2003) suggested the normative distribution of scores on the IS resulted in innovator categories. Those with highest scores were categorized as innovators, followed by early adopters, followed by early majority, followed by late majority, and finally individuals scoring the lowest were categorized as laggards. The mean score of 117.7 in this study skewed the normative distribution Rogers (2003) described to the left, indicating individuals in this study ranked themselves as more individually innovative when compared to other normative sample populations that had been given the IS. The figure a representation of the frequencies of scores for study participants.

**Normative Assessment of the Innovativeness Scale**

In order to compare participant’s mean scores on the IS, a normative assessment was conducted. Normatively assessing participant scores involves comparing the mean of all participant scores against the mean scores of another sample using the same instrument. Simonson’s (2000) study using the IS to measure innovativeness in a population measured 1,693 ($N = 1,693$) teachers, administrators, and students. The mean IS score was 105.1 ($SD = 14.46$). This differed from the findings of Hurt et al.’s (1977)
accepted mean of 102 \((SD = 14.00)\).

\[\text{Figure. Distribution of East Asia Region Council of Schools school leaders’ individual Innovativeness Scale scores.}\]

In order to compare means, a one-sample t test was run to compare the study participant’s collective mean IS score against both Hurt et al.’s (1977) mean IS score and Simonson’s (2000) mean score. The one-sample t test was conducted to see if the participants IS mean score was significantly different from the mean scores of Simonson’s (2000) study \((M = 105.1)\) and the mean scores of Hurt et al.’s IS mean scores \((M = 102)\). The mean IS score of participants in the study, 117.7 \((SD = 11.97)\), was higher from both Simonson’s (2000) mean score and Hurt et al.’s mean score.

When the current study was compared to Simonson’s study mean, \(t(9) = 3.32, p < .01\). The 95% confidence interval for the IS when compared to Simon’s study mean ranged from 101.06 to 126.26. The effect size \(d\) of 1.05 indicated no effect. Therefore, the hypothesis that the participants’ mean score would be 105.1 at the .05 level was
rejected. When the current study was compared to Hurt et al.’s (1977) study mean, t(9) = 4.15, *p* < .01. The 95% confidence interval for the IS when compared to Hurt et al.’s (1977) study mean ranged from 109.14 to 126.26. The effect size *d* of 1.31 indicated no effect. Therefore, the hypothesis that the participants’ mean score would be 102.0 at the .05 level was rejected. Table 7 represents the difference in normative IS scores to that of the participants in the study.

Table 7

*Individual Innovativeness Scale Scores*

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th><em>M</em></th>
<th><em>SD</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Normative group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hurt et al. (1977)</td>
<td>662</td>
<td>102.0</td>
<td>14.00</td>
</tr>
<tr>
<td>Normative group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simonson (2000)</td>
<td>1,693</td>
<td>105.1</td>
<td>14.46</td>
</tr>
<tr>
<td>EARCOS school leaders</td>
<td>10</td>
<td>117.7</td>
<td>11.97</td>
</tr>
</tbody>
</table>


**Correlations Between IS and Demographic Variables**

A Pearson product-moment correlation coefficient (*r*) was used to assess the degree that age was related to individual innovativeness in the study’s sample. The Pearson coefficient examined whether there was a linear relationship between participants age and overall IS score and gender and overall IS score. Correlation coefficients were computed only across age and innovativeness score. The Bonferroni approach was used to control for Type I error across the correlations. A *p* value of less than .01 was required for a correlation to be considered significant. The results of the
correlational analysis revealed the correlation between age ($r(8) = -.03, p > .01$) and IS score were significant at $p < .01$. Age was not shown to be a predictive attribute of individual innovativeness.

**Qualitative Data**

Qualitative data were obtained through interviews using Skype to connect the research to the participants. The goal of the study was to interview EARCOS school leaders in East Asia to gain insight on the role opinion leadership and their personal knowledge of DOI in diffusing DE in their respective schools. The study consisted of 10 participants (seven male and three female) and 10 interviews were conducted. All 10 participants were asked the same main six interview questions. Interviews were semistructured. Therefore, interviews varied between participants as specific follow-up questions were asked based on participant responses to the six main interview questions. An interview script was used for each of the interviews (see Appendix F). Interview responses were transcribed by hand in real time by the researcher. Transcription notes were then processed using Microsoft Word. Each interview question began on a separate page. Participants were e-mailed the final transcription as a Word file. Participants were asked to read over the entire transcription for accuracy. Participants signed the final page of the transcript file as required by the study. Signatures verified that the information in the transcript was a true and accurate representation of the contents of the interview.

**Interview Responses by Question**

**Interview Question 1.** The first question asked, When attempting to diffuse an innovation in your school, are there individuals who you perceive as change agents above others? If so, could you please answer the following two questions? The first question had two follow-up questions regarding positions change agents identified they held in
their school and the characteristics these individuals held. The first questions were formulated to gain insight in CQ1 and CQ2. Participants’ responses were coded for emergent themes. Themes that emerged from Interview Question 1 included stakeholder positioning, connectedness and technological competency, growth mindset, and coalition building.

**Stakeholder positioning.** All participants stated they recognized certain individuals in their schools they characterized as change agents. In addition, participants unanimously stated change agents were present at varying positions within the school including administrator, teacher, instructional coach, and specialists. Two administrators noted they felt administrators had more influence as change agents due to a wider sphere of influence. Eight participants felt teachers were most often change agents in their schools instigating innovations and change from inside the school.

**Connectedness and technological competency.** Participants noted change agents as individuals who were connected both in social media virtual networks and within the school with their face-to-face network of peers and coworkers. Change agents were seen as having good rapport with fellow teachers and various stakeholder groups within the school. Trust of peer staff and other stakeholders was cited as an important characteristic distinguishing them from individuals not identified as change agents. Participants observed change agents in their school leveraging personal learning networks and displaying tenets of connectivist learning theory (Siemens, 2014). Change agents were described as “technologically savvy” and leveraged technology for their own learning and to find and explore potential innovations.

**Growth mindset.** Participants recognized a growth mindset (Dweck, 2006). Individuals recognized as change agents by participants had continued their formal
education, obtaining advanced degrees, and remained highly literate in current research in their areas of expertise. Participants also unanimously observed change agents as comfortable with taking risks and not averse to failing when exploring innovations. Participants noted change agents in their schools and networks exhibited criticality at times when innovations were not congruent with their belief systems or contradicted practice change agents found effective. All participants classified change agents as “out of the box thinkers” and individuals who were not “blindly accepting” of current organizational or education paradigms.

*C*oalition *b*uilding. Change agents were described by participants as individuals capable of building coalitions and getting “others on board.” Participants noted change agents in their network or their schools had earned the trust and rapport of their peers or other stakeholder groups. Change agents were recognized as highly competent in the position they held in the school.

**Interview Question 2.** The second question asked the participants about their views on opinion leadership in their schools and the role it played in diffusing innovations. Specifically, the question asked, “When attempting to diffuse an innovation in your school, are there individuals who you perceive as opinion leaders—people who influence others to try things because they already have done so?” A follow-up question asked participants to identify the associated characteristics that defined opinion leaders and differentiated them from change agents. The second question and associated follow-up questions were formulated to gain insight in CQ1, CQ2, and SQ1. Participants’ responses were coded for emergent themes. Themes that emerged from the second interview question included (a) opinion leadership positioning, (b) rapport and coalition building, (c) organizational knowledge, and (d) negative opinion leadership.
Opinion leadership positioning. Participants observed significant ($N = 7$) overlap of change agents and opinion leaders within their respective schools. A minority of participants ($N = 3$) felt administrators were the strongest opinion leaders in international schools. The reasons for administrators being strong opinion leaders included (a) a wider sphere of influence than teachers, specialists, or instructional coaches; (b) more time to dedicate to diffusing and institutionalizing innovations on a widespread scale; and (c) access to financial resources to provide training and professional development groups that were impacted by an innovation.

Rapport and coalition building. Opinion leaders were described by participants unanimously as having significant rapport with peer working groups and possessing high degrees of social intelligence. Participants stated opinion leaders were viewed as “thought leaders” by other individuals with whom they worked. This perception of opinion leaders as thought leaders enabled opinion leaders to build coalitions and positively influence other individuals in order to diffuse an innovation. Participants noted the ability of opinion leaders to enlist the help of other opinion leaders in order to achieve institutionalization of an innovation.

Organizational knowledge. Participants noted that opinion leaders, more so than change agents, possessed significant organizational knowledge. Opinion leaders were able to see innovations through a lens of “existing school structures” and had the ability to examine innovations as being “complimentary or congruent to the school’s mission and vision.” In this way, participants noted opinion leaders tended to be more pragmatic than individuals they recognized as change agents. Tenure was also noted as an indicator of an individual’s standing as an opinion leader within the school. Participants noted it was difficult to possess significant organizational knowledge if a teacher’s tenure at a
Negative opinion leadership. An interesting observation made by participants when considering opinion leadership was the idea of “negative opinion leadership.” School leaders (N = 3) noted in some cases individuals with “significant social capital” at the school had the ability to influence others negatively. These participants also noted examples of innovations that had difficulty in diffusing or had longer gestations to institutionalization than other innovations because of negative opinion leadership. Participants noted most often negative opinion leaders had the ability because of the rapport they had established and their tenure within a school to have a polarizing effect on working peers or other stakeholder groups. Participants felt that in instances of negative opinion leadership, the responsible opinion leaders exhibited negative opinion leadership traits due to (a) an incomplete understanding of an innovation that was proposed, (b) a lack of organization knowledge that prevented the individual from seeing the “benefit of the innovation for the greater good,” and (c) a fear of having to change an established practice. Administrators were also viewed as having the potential to affect negatively innovation within their schools. One participant noted that school administrators can be “afraid to tear up the rule book and start over.” The same participant also noted schoolboards can negatively affect innovation in schools because of the pressure they exert on the school’s upper administration to “keep things status quo.” In this sense “the school board can be influential in stifling a culture of innovation within a school.”

Interview Question 3. The third question asked the participants if there were other individuals in the EARCOS region that they considered to be opinion leaders and innovative in their practice. Specifically, the question asked, “Are there administrators at
other schools you view as opinion leaders in the EARCOS region?” A follow-up question asked participants to identify the associated characteristics that characterized other school leaders as opinion leaders. The third question and associated follow-up question were formulated to gain insight in CQ1, CQ2, SQ, 1 and SQ2. Participants’ responses were coded for emergent themes. Themes that emerged from the third interview question included (a) connectedness and networking, (b) persistence, (c) regional and organizational barriers to innovation, (d) school size, and (e) persistence.

*Connectedness and networking.* Connectedness was a characteristic EARCOS school leaders associated with opinion leaders in other EARCOS schools or within their network of other school administrators. Participants recognized individuals they considered opinion leaders were active on social media networks and attended many of the regional international school conferences. Participants also noted local area networks, composed of school leaders they viewed as opinion leaders in the same city or host country, were networks where they had recognized opinion leadership. Participants recognized that connected school leaders they deemed opinion leaders were also well read and stayed current on the latest research regarding K-12 international (and domestic) educational theory and practice. These individuals had taken risks and innovated their school systems or pedagogical structures significantly. However, their communication of these changes at conferences and through social media was the biggest indicator of individuals being recognized as opinion leaders by the school upper administration peers.

*Persistence.* Participants noted opinion leaders had strong drive and motivation. These qualities were most often exhibited through persistence. Persistence was seen as a necessary quality in K-12 EARCOS school administrators as school boards were identified as being organizational structures that could hinder innovations within schools.
Furthermore, participants noted some peers who were not identified as opinion leaders were not “comfortable at the tip of the spear,” being out in front of organizational change and the pressure associated with it. Individuals deemed as opinion leaders by the school administrative peers were not risk averse and were “critical of the status quo.” Schools with school boards that exhibited resistance to change were more likely to have administrators who were less likely to “step out from the status quo.” One participant noted individuals he perceived as opinion leaders were adept at keeping their schools as nimble as possible so that change and innovation could take place quickly. These school leaders were also comfortable with the fact some stakeholders may not value school innovations with equal vigor as the opinion leaders and that they were not adverse that “there might be casualties along the way.” At times, alienating some stakeholders was recognized as an unfortunate but real outcome of innovating at the school-wide level.

*Regional and organizational barriers to innovation*. One participant noted that school administrators were not great organizational examples of opinion leaders when it came to innovating due to the fact that they “were dealing with survival.” School administrators often had too many extraneous issues to deal with to be involved with initiating or diffusing innovations in their schools. Finally, traditional school structures including scheduling, AP and international baccalaureate (IB) curricula and examinations, and college admissions or other high-stakes tests often inhibited school innovations.

Another participant noted that in some international school regions, the council of schools that was prevalent in the region (i.e., EARCOS in East Asia) could “serve as a filter of ideas and innovations.” Regional councils of international schools often decide on the speakers, ideas, and themes that get presented at their yearly administrative and
“they are the gatekeepers of ideas and innovations in the region.”

School size. School size was seen as an important factor in school administrators viewing peers as opinion leaders. Larger EARCOS schools and the administrators leading them were seen as opinion leaders over smaller EARCOS region schools. The larger schools tended “to be the more established schools in the region.” In larger EARCOS regional schools, those viewed as opinion leaders had innovated school infrastructures or pedagogical structures in ways that had significant changes to student learning. Leaders of larger schools who were considered opinion leaders also exhibited positive deviance. Positive deviance was described as taking an innovation from another school and adjusting it to fit existing school structures, mission, and vision. In so doing, these leaders had created entirely new innovations in the process of modifying them.

Interview Question 4. The fourth question asked the participants if they followed a specified plan when attempting to diffuse innovations within their schools. Specifically, the question asked, “When seeking to implement an innovation within your school, whether it is a technical, pedagogical, or organizational shift, are there various stages or procedures that are employed to assist in diffusing the innovation?” A follow-up question asked participants to identify the components of an innovation diffusion plan if such a plan existed. Or, if no formal plan was employed, to describe the processes used to diffuse innovations. The fourth question and associated follow-up question were formulated to gain insight in CQ2, SQ2, and SQ3. Participants’ responses were coded for emergent themes. Themes that emerged from the fourth interview question included (a) established and nonestablished innovation diffusion planning, (b) the use of research and small pilot groups to strengthen rationale for an innovation, (c) assessment and refinement, (d) stakeholder buy-in and coalition building, and (e) professional
development and support in incorporating the innovation into current school practice and culture.

Established and nonestablished innovation diffusion planning. Participants seemed to be divided into two factions when describing how they led innovation diffusion within their organizations. Sixty percent \((N = 6)\) stated they no had predetermined procedures or processes in place for innovation diffusion, and 40\% \((N = 4)\) stated they used a premeditated and documented process for innovation diffusion within their current schools. However, these two groups had informal similarities when diffusing innovations. Among these were a stage of research and knowledge gathering about the innovation and the critical examination of the innovation through the lens of the school’s existing mission and vision, the impact on student learning, and established strategic plans. One participant shared a set of five delimiters that an innovation had to satisfy before being considered. One participant explained the use of a design-thinking model developed by Stanford University as a cyclical process used to introduce, develop, refine, and assess the validity of an innovation.

Research and small pilot groups. All participants \((N = 10)\) noted that research and information gathering preceded any wide scale DOI within their school. Research and information gathering was used to inform other stakeholders about the innovation itself and the benefits of the innovation over current practice or systems. Research appeared to be conducted by teachers and school administrators. However, with innovations that were diffusing from the school’s upper administration to the entire school population, research and information gathering appeared to be concentrated amongst a school’s administrative team. The research phase for three of the participants also included researching school culture, morale, and current realities to predetermine where “roadblocks” may present
themselves that might inhibit diffusion of an innovation. Two participants noted that “innovation fatigue” was something they had to consider before introducing an innovation to stakeholders charged with utilizing the innovation. One participant noted that existing structures of school itself—school schedules and a school’s physical structures—had the potential to inhibit the diffusion of an innovation. Research was also conducted to examine the viability of an innovation and its congruence with existing school constructs, namely the school’s mission, vision, and expected school learning results.

*Assessment and refinement.* The use of small pilot groups was unanimous among study participants. Piloting innovations with small groups allowed groups to modify the innovation to fit existing school constructs better. Participants noted the use of “leaders within their teams” as small pilot group members tasked with exploring and using the innovation. Small pilots served as “sounding boards” to begin vetting of an innovation being considered. Positive deviance (Spreitzer & Sonenshein, 2004), where an innovation was introduced and then modified, and in so doing a different innovation was developed, was mentioned by two participants of the sample. All participants explained the pilot phase was also used to assess the validity and effectiveness of the innovation by the end users and stakeholders affected by the innovation. Further research was collected during the pilot stage if it was needed to understand better the implications of the innovation before proceeding. One participant stated that “not every change is a good one sometimes we make mistakes.” Participants noted that not all innovations brought into the school were considered for full-scale diffusion and, in rare cases, innovations that were vetted and had gone through assessment and refinement failed in being diffused and adopted.

*Stakeholder buy-in and coalition building.* Participants were unanimous in
describing the importance of “stakeholder buy-in” and coalition building. Coalition building appeared to take place from the onset of the introduction of an innovation continuing through the research and piloting phases. In instances of school-wide innovations, purposeful information sharing and feedback gathering sessions for stakeholders were used. Two participants noted the use of external experts who were recognized opinion leaders in the innovation being considered. External experts were used to train staff members and added “external validity” for stakeholders when learning about the innovation.

All participants mentioned the importance of stakeholder buy-in if an innovation was diffused quickly and smoothly. Stakeholder buy-in was seen as a way to minimize “diffusion-dips” where diffusion of an innovation might slow. Two participants offered an example of where stakeholders buy-in was not successfully obtained, noting that the innovation eventually failed to diffuse. Communication, clearly articulated plans for implementation of an innovation, and transparency were all mentioned as facets of coalition building to ensure diffusion. School boards, upper administrators, and parents were seen as key stakeholder groups when attempting diffusion of school-wide innovations.

*Professional development and support.* Professional development and support was deemed critical by all participants to diffuse innovations within their schools. This was particularly stressed by participants in the cases of large-scale, school-wide innovations. Professional development for school staff involved the articulation of expectations in regards to the use of the innovation. Articulating expectations of the innovations use and implementation was seen as mitigating an “opt-in/out” mentality by stakeholders and ensured consistency across stakeholder groups, particularly teachers.
One participant noted administrators were seen as innovation amplifiers, facilitating widespread adoption of the innovation by providing time and structures for the innovation to be implemented. Structures for support of an innovation included small group and staff professional development sessions, the use of external experts to train staff, and clearly articulated expectations and normative behaviors related to the use of the innovation.

**Interview Question 5.** The fifth question asked the participants what perceptions they had of distance or blended learning. Specifically, the question asked, “What role do you personally see DE or blended learning playing in international schools presently or in the future?” Follow-up questions were asked if participants responded “none” or “very little” and if they had taken courses or participated in online learning or degree programs offered through DE. The fifth question and associated follow-up question were formulated to gain insight in CQ3, CQ4, and SQ2. Participants’ responses were coded for emergent themes. Themes that emerged from the fifth interview question included (a) globalization and college readiness as diffusion drivers of DE, (b) influence of school size on use of DE, and (c) rigor and control of DE compared to face-to-face delivery models.

**Globalization and college readiness.** Participants noted that K-12 international schools in the EARCOS region lagged behind trends in DE in other countries, notably North America. Reasons for this were listed as smaller school sizes, schools being independent, standalone organizations, and less need for remediation courses than domestic, U.S. based schools. Global economies and the global movement of individuals including international families and their children were noted by two participants as drivers for increased interest in DE in international schools. Eighty percent ($N = 8$) of
participants saw DE as having great potential for growth in international education in general, while 20% \((N = 2)\) noted that over time their expectation of DE’s diffusion into K-12 education had eroded greatly. One participant noted he did not see DE poised to make substantial growth in international education within the next 10 years. One participant noted he or she felt higher education was way ahead of K-12 education in terms of DE. The participant felt DE was starting to “trickle down” into K-12 education including international within EARCOS region schools and beyond.

One participant noted that DE will grow as the idea of communities change for students due to the proliferation of social media and how kids interact with one another socially online. Technology was viewed by this participant as having the ability to break down barriers that could potentially exist between teacher and student, between students themselves, and students and the course curriculum and its content. Teachers and administrators in EARCOS international schools appeared to be the largest constituents enrolled in DE courses. Teachers and administrators in all participant schools were leveraging DE courses, taking professional development courses, or completing advanced degree programs offered through online and brick-and-mortar universities in the United States and Europe.

College readiness was a theme participants unanimously stated as a reason for developing DE courses in their school or offering DE courses to students through third-party providers. Participants felt it was the responsibility of K-12 international schools to prepare their students with the necessary skills needed to be successful online learners. Participants noted that regardless of their students’ choice for continuing their education after matriculating from international schools, they would all be exposed to independent, DE delivery models in higher education. Fifty percent \((N = 5)\) felt the potential of DE
was untapped in international schools in general and specifically within the school of their current posting.

School size and DE. School size was noted by 90% ($N = 9$) as a direct determinate of the extent DE was used and incorporated into existing curriculum and diploma programs within EARCOS region schools. School leaders who represented smaller schools ($> 700$ students) incorporated DE to a greater extent to their larger school counterparts. Most notably, smaller schools were required to employ DE in their course offerings in order to meet the requirements of the IB diploma program. Smaller schools lacked the human resources to offer all the courses necessary for students to fulfill the IB diploma program. All participants were using the online course provider Pamoja for IB courses offered through DE. All participants felt that DE had the potential to offer greater learning choices to their students and the potential to individualize student learning within K-12 international school education. Thirty percent of participants ($N = 3$) noted using DE courses for credit remediation or to supplement course offerings for the AP diploma programs offered at their schools. Courses were developed by U.S. based universities or private K-12 online course providers.

Rigor and control of DE. Perceptions of DE’s effectiveness and rigor varied between participants. Twenty percent ($N = 2$) perceived that DE lacked the same rigor offered by face-to-face education. These participants remained skeptical of DE courses offering the same quality of education as courses delivered traditionally face to face. One of these two participants felt that although the rigor of DE courses might be less than that of face-to-face courses, student achievement in either delivery format was similar. One participant noted he felt DE did not offer the same control over content and student learning as face-to-face courses. DE courses in this instance were seen as being more
impersonal with content delivered to online participants without the ability to focus on
the individual learner’s strengths or deficiencies. DE was seen as offering curriculum in a
“shot-gun” approach where learners had to “catch what they can” as content was
delivered.

**Interview Question 6.** The sixth and final question asked the participants the
extent that DE was being used in the school where they were posted at the time of the
interview. Specifically, the question asked, “To what extent is your school employing DE
or blended learning as an instructional delivery method?” Follow-up questions were
asked to identify conditions and or individuals that allowed or prohibited the use or
development of DE at their school. The sixth question and associated follow-up question
were formulated to gain insight in CQ3, CQ4, and SQ1. Participants’ responses were
coded for emergent themes. Themes that emerged from the sixth interview question
included (a) factors leading to use of DE in EARCOS schools and (b) barriers in the use
and development of DE in EARCOS schools.

*Factors leading to use of DE.* All participants’ schools were using third-party DE
course providers to supplement course offerings to students. The IB curriculum and
supplementing courses offered at their school with DE courses was mentioned by all
participants. Pamoja, a course provider for online IB courses was widely used. Other
course providers, the Global Online Academy and Virtual High School were also
employed at three schools but the extent to which students enrolled in courses through
these providers was significantly smaller than students enrolled in Pamoja courses. The
leading factor that drove the use of DE in EARCOS schools was school size. Smaller
schools with smaller teaching staffs employed DE in their schools more regularly than
larger schools. Larger schools, with larger teaching staffs, could offer all the required
courses in the IB and AP curriculum and did not need to supplement course offerings with DE.

The trend of declining enrollments in EARCOS schools and across other global regions of international schools was suggested as a potential driver for the increase use of DE in international schools. With decreased enrollment, schools are forced to decrease teaching staff thereby leading to a reduction in course offerings. This was seen as a driver for the promotion of DE in schools. Other factors such as political destabilization, force majeure, or health-related epidemics were also noted by several study participants as factors that promoted the exploration of DE and its uses in EARCOS school. School closure was a threat and concern schools identified that would promulgate the use and development of DE in EARCOS schools.

**Barriers to DE in EARCOS schools.** The largest barrier to the diffusion in EARCOS schools was school size. The size of the school determined the number of teaching staff and therefore the number and variety of courses offered. Other barriers mentioned by participants were as follows:

- Lack of prioritization for DE over other school initiatives.
- Learning as a social construct that does not transfer to online learning environments.
- Lack of funding for the development of in-house DE courses.
- Time zone issues with course providers located in Europe and/or North America.
- No need for DE courses
- No other EARCOS schools developing or widely implementing DE within their schools therefore, DE is not considered as something pressing by other
Data Analysis

**Coding procedures.** Following the interviews, the recordings and notes collected during initial interviews were transcribed using the open-coding method described by Creswell (2011) and Rubin and Rubin (2012). Open coding allowed themes to emerge (Charmaz, 2012). Handwritten notes collected during the interview were transcribed using Microsoft Word. Transcriptions were sent to study participants to verify the recorded interview and statements as accurate (Bloomberg & Volpe, 2012). Interview answer responses were examined to understand EARCOS school’s upper administrator’s knowledge and use of DOI theory (Rogers, 2003) and their perceptions of DE and the extent to which DE was being used in their schools. Responses formed a narrative of EARCOS school leaders’ thoughts around opinion leadership and DE. As noted by Rubin and Rubin, “By putting together descriptions from separate interviewees, researchers create portraits of complicated processes” (p. 3).

Data collection was conducted using three IRB approved protocols. Two of the protocols were surveys. The demographic survey was used to develop biographical knowledge of each participant including previous school leadership experience and instructional technology innovations they had diffused in schools where they had been an upper administrator. The IS survey was used to quantify study participants’ perceptions of their individual innovativeness (Hurt et al., 1977). Data from the two surveys were used to examine relationships between variables in order to see if significant correlations existed. Statistics assisted in further development of the narrative that emerged from the thematic coding of participant interviews.

The typed transcript summary contained the participant’s corresponding code
used to keep study participant’s identity anonymous. The date and time of the interview was also included in the typed transcription. Transcriptions were structured so that each interview question began on a separate page. The transcriptions were sent to study participants via e-mail. Participants signed the final page of the transcript as final verification of the information’s accuracy. Signed and electronically scanned transcripts were returned to the researcher via e-mail as either Microsoft Word files or as a portable document format. The information gathered from interviews and the two surveys was recorded and presented in this chapter. The final analysis of the study’s data is presented in Chapter 5.

Summary

This chapter described the quantitative and qualitative data collected from 10 upper administrators in EARCOS region schools. The data collected were centered on exploring the extent to which EARCOS school leaders were familiar with and utilized the DOI theory when adopting or rejecting innovations. Individual innovativeness was assessed using the IS (Hurt et al., 1977). Perceptions and status of DE in EARCOS schools was explored through in-depth, responsive interviews (Rubin & Rubin, 2012) conducted over Skype that centered around six main interview questions. The six main interview questions were accompanied with follow-up questions that were formulated to gather a deeper understanding of the participant’s reasoning. Follow-up questions varied between participants in response to their individual answers to questions. Collected data were represented in data tables and figures accompanied by narrative descriptions of the quantitative data. Interviews were coded allowing themes to emerge. Themes were described in detail for each of the six interview questions.

IS. The IS survey results showed a lower mean score ($M = 117.7$) and standard
deviation ($SD = 11.97$) than scores collected by Simonson (2000) and Hurt et al. (1977). Simonson’s study revealed a mean of 105.1 ($SD = 14.46$) while Hurt et al. study produced a mean score of 102 ($SD = 14$). In order to compare means, a one-sample $t$ test was run to compare the studies participant’s collective mean IS score against both Hurt et al.’s mean IS score and Simonson’s (2000) mean score. When compared to Simonson’s study mean, $t(9) = 3.32$, $p < .01$. An effect size $d$ of 1.05 indicated no effect. When compared to Hurt et al.’s study mean, $t(9) = 4.15$, $p < .01$. An effect size $d$ of 1.31 indicated no effect.

**Correlations between IS and demographic variables.** A Pearson product-moment correlation coefficient ($r$) was used to assess the degree that age was related to individual innovativeness in the study’s sample. Correlation coefficients were computed among one of the demographic survey questions—age. The results of the of the correlational analysis failed to produce correlations between age ($r(8) = -.03$, $p > .01$) and IS scores. Age was not shown to be predictive attributes of individual innovativeness.

**Qualitative interview data.** Interview data was transcribed with hand-written noted collected during interviews. This data were then transcribed using Microsoft Office Word. Transcripts made note of the date, time of day, and duration of the interview. Participants were assigned a code for anonymity per IRB protocols. Transcripts were reviewed by participants to verify the validity of the data collected during the interviews. The interviews consisted of six open-ended questions with each question having follow-up questions. Interview questions were aimed at answering the study’s CQs. Responsive follow-up questions were determined by participants’ responses and varied from participant to participant. Each question was coded allowing themes to emerge. The themes for each of the six interview questions were described in detail in this chapter.
Chapter 5: Discussion

Introduction

The problem addressed in this study was the use and knowledge of DOI theory by EARCOS school leaders in implementing DE in their schools. Barriers and benefits of DE and EARCOS school leaders’ perceptions of DE were also examined. Rogers’ (2003) DOI theory was used as the theoretical framework for the study. The study was composed of three data-gathering elements. Two of the elements were surveys administered to collect qualitative and quantitative data. The demographic survey was administered to gather biographical data on each participant and the individual IS to gain insight into the study participants’ perceived level of personal innovativeness. The third data-gathering component was synchronous individual interviews that took place over Skype. Interviews were used to gather information regarding EARCOS schools leaders’ knowledge and use of opinion leadership when introducing innovations into their schools. Interviews also provided information on EARCOS school leaders’ perceptions and use of DE within the school of their current posting. Interviews allowed study participants to identify perceived barriers and benefits of DE given current realities of international schools. Interview responses yielded support for Rogers’ (2003) DOI theory while illuminating deficiencies in EARCOS school leaders’ knowledge of IDT and opinion leadership.

Methodology

Grounded theory. Grounded theory research is a common research methodology employed in attempting to develop a theory that explains processes and interactions of individuals related to a specific topic. Creswell (2011) defined grounded theory as “a qualitative strategy of inquiry in which the researcher derives a general, abstract theory of
process, action, or interaction grounded in the views of participants in a study” (p. 229). This study focused on opinion leadership and DE in K-12 EARCOS international schools. Grounded theory involves multiple stages and strategies for collecting data in order to examine interrelationships between data and established related theories (Charmaz, 2006; Corbin et al., 2014). Data and analysis happen simultaneously in grounded theory research facilitating generation of new theories about the process and concepts being explored (Charmaz, 2006).

In this study, EARCOS K-12 international school upper administrators were interviewed in an attempt to generate a theory describing the processes involved in leveraging DOI theory when introducing innovations within their school, specifically DE. Additionally, a demographic survey and individual IS were used to gather biographical information on participants and to assess their individual perceptions about their own level of perceived innovativeness. Demographic data, the IS survey data, and data obtained through personal interviews with the study participants were triangulated in order to form a more complete picture of EARCOS school’s leader’s perceptions of DOI and DE.

Chapter 1 discussed the explosion in international school education globally. The EARCOS region represents one of the fastest growing regional council of schools. China and the United Arab Emirates represent two countries where international education is expanding most rapidly. However, DE and its integration into K-12 international education have been slower to diffuse than in other parts of the world including the United States and Europe. International education is hardly new but the proliferation of it globally in the last decade has been exacerbated by the global connectedness of countries, ideologies, and cultures within the context of global economies. It is of little surprise then
that international education was vastly underrepresented in the research literature (Blandford & Shaw, 2001). This fact is further compounded by the lack of educational research on international school leadership and the roll international school leaders’ play in the acceptance or rejection of instructional technology innovations, including DE (Hazen et al., 2012). A majority of K-12 educational leaders believe that DE will play a significant role in the future educational landscape and that the majority of college-bound students will take at least one online course while enrolled in higher education (Allen & Seaman, 2013). International schools, as standalone, private schools have been slower to adopt DE into their pedagogy and instructional design.

Chapter 1 also introduced the rationale for utilizing DOI theory as the theoretical framework for this study. DOI is the most well-researched framework for studies involving innovation diffusion across a wide array of fields including communications, sociology, medical, and educational research (Dearing, 2009). Being one of the most widely used theories to examine innovation diffusions in various populations, it was apropos that the framework be the lens through which to examine EARCOS school leaders use of opinion leadership and the other components of DOI theory when considering diffusion instructional technology innovations within their school. In the case of this study, DE.

Chapter 2 presented past literature on all relevant topics and subtopics of this study including DOI and the historical perspectives of Rogers’ DOI theory in education; school leadership; and its effect on the diffusion of instructional technologies within schools, K-12 DE, and the rise of international schools in the age of globalization. The study’s research questions were listed as well as the limitations of the study. Ultimately, the literature review served to investigate how opinion leadership influences
organizations, namely international schools, ability to develop, implement, and diffuse instructional technology innovations such as DE in K-12 EARCOS international schools in relations to Rogers’ (2003) DOI theory.

Chapter 3 described the methodology for this qualitative study that included the purposeful sampling of 10 EARCOS school upper-level administrators within the EARCOS region on East Asia. The study participants were interviewed in order to obtain an understanding of their perceptions and understanding of opinion leadership and DOI theory when considering instructional technology innovations and DE within their schools. Participants were also surveyed for demographic information and their self-assessment of their individual innovativeness using the Hurt et al.’s (1977) IS. The grounded theory approach was used to generate a theory of innovation diffusion within EARCOS schools and to assess the extent to which DE was utilized within instructional design and pedagogy in EARCOS schools (Bloomberg & Volpe, 2012).

Chapter 4 described the data that were collected by the two surveys and the interviews conducted during the study. The two surveys were the IS (Hurt et al., 1977) and a demographic survey. The survey consisted of six main interview questions that each contained follow-up questions that were responsive to initial answers given by participants to each of the main interview questions. The research questions were formulated to be consistent with the focus of the study. The three focal points of the study were as follows:

1. Which themes would emerge from school leaders in different schools and host cultures in East Asia?
2. Were certain themes more prevalent than others?
3. Based on the results of the IS, was there a correlation between the
innovativeness of individual school leaders the extent to which DE had diffused within their school?

Interview questions were used to seek insight into four CQs and three SQs. The CQs were as follows:

CQ1. What factors are most predominate in EARCOS school leaders’ decisions in adopting or rejecting instructional technology, specifically DE, innovations into their schools?

CQ2. What factors in EARCOS schools have driven the consideration of adopting DE into traditional K-12 school?

CQ3. To what extent do school leaders recognize and utilize opinion leadership in their schools in the innovation diffusion process?

CQ4. What extent do EAI school leaders imply elements of IDT into their decision making when considering instructional technology innovations in their schools?

The SQs were as follows:

SQ1. What is the role of school leadership in the development of DE in their schools?

SQ2. Does the role played by school leaders in the adoption or rejection of instructional technologies differ between school leaders at different levels of a school’s administrative hierarchy?

SQ3. Is there a difference between DE diffusion process within EARCOS schools when compared to other instructional technology innovations that schools have undertaken (i.e., 1:1 laptop initiatives, LMS adoption).

Chapter 5 is the summary of the study. Chapter 5 serves to look critically at the data gathered and to examine the themes that emerged through the semistructured
interviews of EARCOS school upper administrators. Conclusions and inferences drawn from the data analysis are done so through the lens of Rogers’ (2005) DOI theory, the theoretical framework for this study. Chapter 5 illustrated the initial processes in gaining a deeper understanding of EARCOS school administrators’ knowledge and use of formalized innovation diffusion structures within their own schools when attempting organizational change. In addition, Chapter 5 discusses the viewpoints of EARCOS school leaders related to DE in K-12 international education and the extent to which DE is being employed with EARCOS schools at the time of this study. Chapter 5 includes the potential benefits of DE in K-12 international education and its barriers given the unique settings and externalities that characterize K-12 international schools and education. Limitations of this study and their impact on the study’s findings are also included. Finally, the significance of this study within the context of international school educational research and recommendations for change within EARCOS school leadership use of formalized innovations diffusion frameworks and the expansion of DE in EARCOS schools is discussed.

**Meanings and Understandings**

DE has great potential in redefining K-12 educational structures in traditional brick-and-mortar schools including international education the world over. Specifically, DE has been shown to have six discrete benefits over face-to-face instructional pedagogies that include (a) higher levels of motivation, (b) expansion of educational access, (c) high-quality learning opportunities, (d) improvement in student outcomes and skills, (e) educational choice, and (f) administrative efficiency (Barbour & Reeves, 2009; Berge & Clark, 2005; Cavanaugh et al., Kellogg & Politoski, 2002). The findings in this study supported earlier research findings that DE, when implemented successfully within
schools, can serve to expand educational offerings and allow for greater choices in educational programming that otherwise may not be available to students. DE in EARCOS was most often used to compensate for human resource limitations that impacted and limited the course offerings of smaller EARCOS schools. All of the schools in the study who were utilizing DE to expand course offerings and choice were using DE course providers outside of the school.

**Barriers of Implementing Distance Education**

**Cost.** No educational delivery method or pedagogical approach is perfect unto itself. DE is no exception. DE has been shown to have discrete barriers that can inhibit or prohibit its implementation and diffusion within K-12 educational settings, international schools included. Research on DE’s barriers to implementation cited costs as a major reason for lack of adoption (Setzer & Lewis, 2005). Cost was mentioned by study participants as one reason for DE’s lack of diffusion within EARCOS international schools. The cost of developing in-house DE courses and programs as well as the cost to partner with external DE organizations that offer appropriate courses for EARCOS school students can be prohibitive and lead schools away from considering it as an alternative method for course delivery.

**Organizational constructs.** EARCOS international schools, like domestic schools in the United States, possess underlying and existing organizational constructs that have contributed to the sluggish adoption of DE in EARCOS schools. Organizational constructs that were noted by the study participants included existing class schedules a lack of prioritization for DE over other school initiatives. Berge (2007) concluded that DE requires a greater amount of organizational support if schools wish to make it a central component of instruction. Cultural shifting included moving away from an
overarching importance on learning to valuing learning in addition to being strategic in planning and incorporating structures to assure the quality of course design. He noted that this will only occur because of a cultural shift from valuing education to valuing learning, strategic planning, and quality assurance. As institutions strive to make their DE programs successful, they need to attend to issues that become barriers to achieving this goal.

EARCOS teacher’s inadequate training and skill sets in developing and teaching in a heavily blended or fully online course delivery methodology was noted by EARCOS school leaders. Mathur and Oliver (2007) also noted that inadequate teacher training and skills served to inhibit DE in K-12 educational settings. Although EARCOS school leaders made mention of this skill deficiency, none of the study participants described attempts to remediate these skill deficiencies in their teaching staff through professional development aimed at developing DE courses and teaching online.

Finally, DE continues to be misunderstood and untrusted in K-12 education and higher education as a pedagogical delivery system. This sentiment was echoed by study participants who questioned the validity, rigor, and quality of online learning experiences when compared to traditional, face-to-face pedagogies. In addition, DE was seen as an isolating learning experience where the learner is not only geographically separated from others in the course by space but also disconnected by way of the technology involved in learning online. Croft, Dalton, and Grant (2010) noted that the separation of instructor and student can lead to feeling to feelings of isolation. Study participants noted that learning is seen as a largely social construct where the flow of dialogue and ideas is paramount in student learning experiences. The misconception that DE is not a pedagogical delivery system that can be equally social and collaborative as traditional
pedagogies is a misconception that continues to pervade EARCOS school leaders’ perceptions of DE within their school setting. Thus, uptake of DE has been limited by perceptions of DE that are not necessarily accurate but stem from an incomplete understanding of the various attributes that comprise quality K-12 DE course design and delivery that mitigate if not make obsolete many of these preconceived notions of DE deficiencies.

Research indicated that student isolation can be mitigated with design of courses that make affordances for student to student and student to teacher opportunities for communication. Veletsianos and Navarrete (2012) demonstrated that the integration of social networks into online learning decreased perceived student isolation in online courses. Croft et al. (2010) noted that humanizing material and designing courses with the mechanisms to provide timely feedback on student contributions can decrease the feeling of isolation in students. In addition, Croft et al. found that providing platforms to for students to share ideas and comment on other students’ contributions and encouraging students to communicate directly with other students within a course decreased feelings of isolation. Boling, Hough, Krinsky, Saleem, and Stevens (2012) noted that social exchanges were cited most frequently by students as their favorite aspect of online learning. Kim, Kwon, and Cho (2011) found that quality instruction, the integration of media, and a high degree of student interactivity were correlated to increased social presence in online learning.

**DE adoption.** Outside DE programs that were mentioned by EARCOS school leaders were Pamoja, Global Online Academy, and Virtual High School. Pamoja was the most widely used of the outside DE course developers because they are the sole offer of IB accredited online courses. All of the EARCOS schools in this study offer the IB
diploma program to their high school students, therefore the use of Pamoja as a significant partner of DE for EARCOS schools in this study was anticipated and confirmed. None of the EARCOS schools in this study had developed their own DE courses or programs.

Rogers’ Diffusion of Innovation (DOI) Theory

Rogers’ (2003) DOI theory provided the theoretical framework from which to examine and analyze the extent to which EARCOS school leaders utilized formalized innovation diffusion frameworks when attempting to institutionalize change within their schools. The individual IS allowed study participants to self-evaluate their own level of individual innovativeness. Rogers (2003) developed adopter categories to “classify individuals on the basis of their innovation” (p. 50). These categories include early adopters and innovators, early and late majority, and laggards. Participants in this study as a sample ranked themselves as more innovative ($M = 119$) than individuals in Hurt et al.’s (1977) study ($M = 104$) and Simonson’s (2000) study ($M = 105.1$). Categorizing leaders in terms of their innovativeness is useful for school leaders to identify innovators, early adopters, and the early majority stakeholders in their schools. These three categories of Rogers’ (2005) classification of adopter categories are the most important in the DOI within organizations.

Rogers’ (2005) DOI theory was also the framework used to examine the extent to which EARCOS school leaders had knowledge of opinion leadership and the extent they utilized opinion leadership within their schools when considering diffusing an innovation. Rogers (2003) defined opinion leadership as “the degree to which an individual is able informally to influence other individuals’ attitudes or overt behavior in a desired way with relative frequency” (p. 54). EARCOS school leaders acknowledged the importance
opinion leaders played in diffusing innovations within their school. Opinion leaders exert their influence when the relative advantage and observability of an innovation is clear (Rogers, 2003; Valente & Pumpuang, 2007). EARCOS school leaders lacked formalized knowledge of opinion leadership, yet many participants articulated aspects of opinion leadership traits that opinion leaders in their schools possessed.

Several of these attributes noted by EARCOS school leaders were described by other researchers. Valente and Pumpuang (2007) found that opinion leaders influence their communities in at least four different modalities: (a) persuading others, (b) establishing or reinforcing organizational norms or best practices, (c) leveraging existing organizational resources in aiding in the diffusion of an innovation, and (d) raising awareness of an innovation. EARCOS school leaders all listed the ability of individuals that they perceived as opinion leaders being able to influence other stakeholders inside and outside of their immediate spheres of influence. EARCOS school leaders recognized that opinion leaders in their schools also were able to raise awareness of an innovations perceived usefulness within the context and constructs of the existing school mission and vision. EARCOS school opinion leaders recognized innovations that were congruent with existing school norms and best practices and were able to see the benefits of innovating and communicate those to stakeholders.

**Interviews**

Six open-ended interview questions were posed to 10 EARCOS K-12 international school leaders. Perceptions of change agency and opinion leadership were discussed. The extent to which EARCOS school leaders were employing DE in their schools and their individual perceptions of DE was also discussed. Interviews ranged from 23 to 54 minutes in length with the average interview 39 minutes. Interviews were
transcribed using handwritten notes during the interview. The handwritten notes were then transcribed using Microsoft Word and copies were sent to the study participants for verification of their validity and completeness. The responses to the interviews yielded qualitatively rich data that provided insight into EARCOS school leaders’ knowledge and use of opinion leadership and DE. Transcripts were then coded for emergent themes. Themes were compared across the 10 individual interviews to compose a list of themes common across all study participant’s interview data.

Interviews supported Rogers’ (2003) DOI theory findings and aspects of DOI theory were present in the EARCOS school leaders’ responses. However, it was evident that EARCOS school leaders lacked formalized knowledge of both opinion leadership as well as having formalized structures in place for diffusing innovations within their schools. The role of opinion leadership in the role of DE was not noted among study participants. This was attributed to the fact that all but two schools represented in the study were utilizing DE to supplement course offerings but none viewed DE as something the school was pursuing or investigating on a large scale. Barriers that influenced the lack of DE diffusion within EARCOS schools in the study included costs, the lack of a pressing and recognizable need, DE not implemented by schools on a large scale, and existing school constructs inhibiting the diffusion of innovative pedagogical practices such as DE.

Implications of the Study

Trends and themes. Themes from Skype interviews began to emerge from the participant responses to the six main interview questions and the subsequent follow-up questions that were asked. The four themes to emerge were (a) school leaders acknowledge of opinion leadership and innovation diffusion theory does not follow
formalized theories or processes; (b) school-wide instructional technology innovations adhered to Rogers’ (2003) five characteristics of innovations especially in the areas of relative advantage, compatibility with existing school practices and norms, trialability, and observability, while employing some characteristics of opinion leadership when diffusing innovations; (c) DE in EARCOS schools lags behind the diffusion of K-12 DE in other regions of the world; and (d) barriers to adoption of DE in EARCOS schools exist. Barriers that were acknowledge included school size, absence of need, and cost.

**Change agents and opinion leadership.** School leaders’ knowledge of opinion leadership and innovation diffusion theory does not follow formalized theories or processes. Early adopters and innovators were not the same individuals as opinion leaders and change agents within a given school. EARCOS school leaders were able to articulate and differentiate between change agents and opinion leaders within their organization. However, in some instances, there was overlap of these two roles and the individuals who were categorized as such by school leaders. Rogers (2003) defined *change agents* as “individuals who seek to secure the adoption of new ideas in a direction deemed desirable by a change agency” (p. 316). All EARCOS school leaders could identify individuals in their organizations at all stakeholder levels that met this definition. However, EARCOS school leaders appeared to consider innovators and early adopters as change agents even though they felt at time the innovations they introduced were not always congruent with the direction, mission, or vision of the school. In this sense, it appears that EARCOS school leaders did not possess a clearly defined formalized notion of change agents or change agency.

EARCOS school leaders defined change agents largely by their ability to seek new innovations and trial them with small samples of students or teachers, the ability to
operate with uncertainty and take risks, and not be deterred by failure. Change agents were also described as being highly networked both within the school where they worked but also as maintaining social networks outside of the school through social media and attending conferences. Finally, EARCOS school leaders agreed that change agents within the school were seen as being highly competent in the roles in which they served by their peer groups within the school.

Where EARCOS leaders’ definitions of change agents diverged from Rogers’ (2003) definition of change agency was that school leaders felt that change agents served as conduits for innovations to enter the school but not as the individuals directly responsible for the diffusion of these innovations to larger populations of the school. EARCOS school leaders saw change agents as innovative, but not as individuals responsible for institutionalizing change within the school. This notion confounds Rogers’ (2003) ideals of change agency. Rogers (2003) described change agents as the individuals directly responsible for influencing other individuals to accept an innovation after it is deemed desirable by an organization. Individuals described as change agents by EARCOS school leaders did not follow a formalized process of introducing an innovation. Rogers (2003) outlined seven steps of introducing an innovation via change agents. These included (a) developing a need for change, (b) establishing rapport with others to establish an information exchange network, (c) diagnosing problems, (d) creating an intent to change, (d) translating intent into action, (e) stabilizing adoption and preventing discontinuance, and (f) developing capacity of individuals to be their own change agents.

Change agents as defined by EARCOS school leaders did not follow the roles of change agents as defined by Rogers (2005). Rather, EARCOS school change agents
tended to be adept at establishing a need for change and building strong communication networks based on their rapport with other staff members. Where EARCOs school leaders’ definitions of change agents diverged from more formalized definitions of change agency, however, was in the areas of creating intent to change, stabilizing the adoption process, or empowering others to be their own change agents. In this way, individuals defined as change agents by EARCOS school leaders tended to be innovators rather than true change agents because they were ones introducing innovations and helping to diffuse those innovations among a small population of peers without stabilizing adoption of an innovation or empowering other individuals to become change agents.

EARCOS school leaders’ perceptions of opinion leadership were incomplete when compared to formalized definitions of opinion leadership roles within organizations. Rogers (2003) defined opinion leadership as the “degree to which and individual is able to influence other individuals’ attitudes or behavior in a desired way with high frequency” (p. 333). EARCOS school leaders’ definitions and characterizations of opinion leaders tended more toward definitions of change agents rather than true opinion leaders. EARCOS school leaders acknowledged differences between individuals they deemed to be change agents and opinion leaders. In contrast to the highly innovative nature of change agents in EARCOS schools, opinion leaders were not always considered highly innovative. Rather, opinion leaders in EARCOS schools were seen as highly cosmopolite and networked with other stakeholder groups within the school. All participants noted that individuals they deemed as opinion leaders within their schools were adept at “coalition building” and “getting people on board” with an innovation that the school was attempting to diffuse school wide.
Opinion leaders were seen as necessary individuals to diffuse large scale, school-wide innovations. In contrast, change agents were individuals seen as early adopters who were most often seen with small scale innovations affecting a smaller proportion of the school population. The notion of the scale of the innovation appeared to be a delimiter in EARCOS school leaders’ delineation of change agents versus opinion leaders within their school. EARCOS school leaders did acknowledge instances, however, where change agents, namely school administrators, who were attempting to diffuse an innovation school wide made use of opinion leaders within different stakeholder populations. In this way, EARCOS school leaders’ views on change agents and opinion leadership was congruent with more formalized definitions of change agents and opinion leaders such as Rogers (2005). One possible reason for this lies in EARCOS school leaders’ perceptions of opinion leaders in their school possessing a high degree of organizational knowledge. One participant noted opinion leaders were characterized as individuals with the ability “to see change through the lens of existing school structures.” Opinion leaders were viewed as being more pragmatic than change agents examining the extent to which innovations were congruent with the existing school mission and vision. Most often, opinion leaders were teachers who had high levels of rapport within the faculty and staff stakeholder groups. Most often, this rapport was a direct correlation of these individuals being perceived as highly competent in their job responsibilities and in some cases possessing a high degree of connectedness to other teachers in the building that they could persuade to adopt the innovation.

Connectedness. The notion of connectedness extended outside of the participant’s school to other school leaders who they deemed opinion leaders in the EARCOS region. This included the individuals being highly active on social media networks such as
Twitter, attending other educational regional conferences where they regularly presented on a variety of topics, and who were well versed in school “best practice” and educational theory and research. This echoed Rogers’ (2005) generalization that opinion leaders have greater exposure to mass media and mass communication channels than nonopinion leader individuals. Rogers’ (2003) notion that opinion leaders tend to be more cosmopolite than nonopinion leader individuals was also supported. Cosmopoliteness is the ability to bring new ideas from outside the organization and spread them across boundaries between various groups (Rogers, 2003). In this way, school leaders defined as opinion leaders exhibited a degree of heterophily in their networks not seen in their nonopinion leader school leader peers. Rogers (2003) defined heterophily as the degree to which individuals who interact are different in certain attributes. Similarly, EARCOS school leaders’ definitions of change agents mirrored that of opinion leaders who were characterized as risk takers who had made significant innovative changes within their current or past school postings.

In addition to the extent to which EARCOS school leaders were connected to other EARCOS school leaders via various communication channels, school size also seemed to influence EARCOS school leaders’ perceptions of other school leaders as opinion leaders. In general, EARCOS school leaders who were leading larger EARCOS schools who had initiated change within their schools were perceived as being more of an opinion leader to peer school leaders at smaller EARCOS schools. One explanation for this is the larger EARCOS schools in the region tended to be better funded and resource rich when compared to their smaller school counterparts. Sargent (2014) noted that smaller schools with less resources are less likely to take advantage of innovative pedagogies due to the fact they have the weaker links communication channels of the
DOIs. This notion corresponded to Rogers (2003) notion that opinion leaders with high degrees of heterophily tend to be more innovative that schools or leaders that tend to be more hemophilic in their communication channels. Study participants noted that larger schools tended “to be the more established schools in the region.” However, the extent to which school size determined a school leaders perceived level of opinion leadership was further influenced by their ability to institutionalize change within their school to influence pedagogies or systems that directly impacted student learning.

**Negative opinion leadership.** Study participants noted that in some cases negative opinion leadership or change agency was present in their schools. The notion of negative opinion leadership in education is something current research did not focus on. The term negative opinion research revealed only one study on the subject conducted in 1985; however, this study was concerned with the adoption of alloy metal innovations and not education. Queries on the idea of negative option leadership in education failed to provide any research results.

Negative opinion leadership ideas in this study contrasted with Rogers (2005) definitions of late adopters or laggards as innovator categories that are skeptical or those tending towards the status quo or “business as usual.” Participants noted unique circumstances where individuals who were characterized as opinion leaders and early adopters or late majority in relation to Rogers (2005) innovation categories would negatively influence or stall an innovation from diffusing if they did not see the relative advantage of an innovation or how the innovation benefited student learning within the constructs of the school’s mission and vision. Participants noted these individuals were cosmopolite within stakeholder groups within the school, had the ability to persuade others to see the benefits or drawbacks of innovations, and had strong rapport of their
peer working groups. EARCOS school leaders felt these individuals were not laggards or late majority as they were not averse to innovations and in other circumstances had been the early adopters or early majority and had actually served as opinion leaders leading to persuading their peer groups toward institutionalization of an innovation.

Negative opinion leadership is a concept that requires further investigation. Rogers (2005) noted that “further research is needed on network influences on individual’s innovativeness” (p. 257). Another interesting area for future research would be a comparison of individual IS (Hurt et al., 1977) scores in individuals who have demonstrated negative opinion leadership and those who are consistently characterized as innovators, early adopters, or the early majority.

In some instances, EARCOS school leaders perceived notion of negative opinion leadership actually was describing characteristics of the late majority or laggard adopter categories. Participants noted that negative opinion leadership can happen within school administrators in instances where they were risk averse and “afraid to tear up the rule book and start over.” Participants also noted that an incomplete understanding of an innovation was reason for individuals to be skeptical of the innovation and therefore reluctant to its diffusion. School boards were also seen as a potential barrier for innovation and adoption or DOIs preferring to “keep things status quo” and “stifling a culture of innovation within a school.” EARCOS school leaders’ perceptions of what was referred to as negative opinion leadership in some instances was more a reference to skeptical late majority or laggard adopter categories. However, the inability of EARCOS school administrators to differentiate between individuals who may be innovative but reluctant to an innovation and those who are laggards or late majority reinforces the study findings that EARCOS school administrators formalized knowledge of opinion
leadership and innovation diffusion theory is incomplete.

**Instructional technology diffusion.** School-wide instructional technology innovations adhered to Rogers’ (2005) five characteristics of innovations especially in the areas of relative advantage, compatibility with existing school practices and norms, trialability, and observability. Innovation diffusion within schools varied depending on the scale of the innovation. Smaller innovations in regards to instructional technology were initiated by teaching staff or other nonadministrative positions while larger innovations that involved many stakeholder groups were initiated and developed by EARCOS school leadership teams and upper school administrators. The DOI process differed slightly from Rogers (2005) theory of the innovation decision process. Rogers (2005) described the innovation decision process as following the stages of (a) knowledge acquisition, (b) persuasion, (c) decision making, (d) implementation, and (e) confirmation. In comparison, EARCOS school leaders when considering instructional technology innovations followed a modified innovation decision process described by Rogers (2005). EARCOS school leaders were unanimous in following an innovation decision process that included (a) information gathering to determine if the innovation had relative advantage and was aligned with the school mission and vision, (b) trialing the innovation with a small sample of the school’s teaching staff, (c) building coalitions and leveraging opinion leaders and change agents to expedite the diffusion process, and (d) provided job-embedded professional development to support the use of the innovation after adoption.

**Instructional technology innovations.** School-wide instructional technology innovations tended to be centered round technology hardware. Examples included 1:1 laptop initiatives or the diffusion of iPads into elementary classrooms. All schools in the
study had adopted a LMS at the time of the study. However, how LMSs were being used within schools seemed to vary greatly. Some schools were using their LMS as a student information system to house student demographic, health, and discipline data. Other schools were employing the LMS to offer web-enhanced delivery of curriculum to students. In two instances, there was mention of using the LMS for “flipped instruction.” Flipped instruction is characterized by students learning content outside of class using multimedia and then reinforcing concepts learned asynchronously in the classroom (Arnold-Garza, 2014). Clark (2015) emphasized flipped instruction has demonstrated improvements in the quality of instruction and use of class of time with the flipped model of instruction. In terms of academic performance, no significant changes were demonstrated between the flipped model of instruction students and those taught in a traditional classroom environment. (pp. 91-92)

None of the schools represented in the study were using an LMS for the delivery of DE. DE within the schools represented in the study who had students taking fully online courses used third-party course developers. Three online course offers were mentioned by study participants. Pamoja, Global Online Academy, and Virtual High School. Among the most popular was Pamoja. Pamoja is the only online course developer that is accredited to offer IB courses to schools. The use of third-party online course developers makes sense for international schools because they do not require large economic investments on the part of the school and do not require existing staff to develop the skills necessary to develop and teach online courses.

Compatibility with existing school practices and norms. EARCOS school leaders reinforced Rogers (2005) notion of compatibility as an attribute of innovation and its rate of diffusion. Participants noted that school-wide, large-scale innovations were generally
not considered beyond the knowledge stage of adoption if the innovation was not congruent with the established constructs of the school mission and vision. Impact on student learning was also cited as a major factor for continuing past the decision stage of adopting an innovation. In some instances, a technological innovation such as implementing coding and programming into the curriculum was introduced by an individual teacher but was not further considered until EARCOS school leaders and school principals had gained enough knowledge about the innovation and its potential for impact on student learning until gaining sufficient knowledge and observing a relative advantage of the innovation in use by students.

*Trialability.* Innovations were piloted frequently before being diffused to greater populations within schools. The notion of trialing innovations as “pilots” was echoed by all the study participants. Pilot groups were used in all the EARCOS schools represented in the study as a way to “test out” an innovation before attempting or considering school-wide diffusion of an instructional technology innovation. Examples included iPad initiatives, 1:1 device initiatives, integrating coding, programming, and design thinking into the curriculum and the integration or use of DE for content delivery and instruction. Pilot groups were usually composed of individuals in the school who EARCOS school administrators characterized as change agents or opinion leaders. Individuals responsible for piloting innovations were seen as being risk takers within the school, highly innovative, and competent in their job responsibilities.

Trialing innovations within EARCOS schools allowed for teachers and administrations to observe the relative advantage of an innovation while in use. Trailing of innovations also allowed for reinvention of an innovation. Rogers (2005) noted that reinvention normally takes place with innovations that are more flexible and designed for
a larger number of end users. Innovations that allow for reinvention generally lead to a faster rate of adoption. Reinvention also contributed to sustainability of an innovation being used (Rogers, 2003). EARCOS school leaders noted that innovations needed at times “to be tweaked” to better fit a larger population of the school. Finally, reinvention allowed an innovation to better suit the constructs of the school adopting the innovation, thereby increasing its relative advantage and compatibility.

Coalition building. All the EARCOS school leaders in the study unanimously described the importance of stakeholder “buy-in” when attempting to diffuse instructional technology innovations. This notion of stakeholder buy-in directly relates to Rogers (2003) persuasion stage within the innovation-diffusion process. Past research has demonstrated support for change agents and opinion leaders in persuading peer groups to adopt innovative technological processes in other fields (Cooper, 2015). An example of this was a school that was diffusing iPads into classrooms across an entire elementary school. The pilot allowed a small number of teachers who were opinion leaders within their peer groups to trial the devices. Diffusion was scaled up through these teachers who had communicated and demonstrated the benefits of implementing the devices into instruction. EARCOS school leaders all emphasized the role of school administrators and divisional teacher opinion leaders to build coalitions of other teachers and school stakeholder groups in order to diffuse instructional technology innovations at the school-wide level. Coalition building was also necessary to establish norms of use of the innovation. In the case of 1:1 laptop programs and iPad initiatives, coalition building established the need for all teachers to adopt the innovation rather than “opting in” to the innovation.

Coalition building was viewed as a way to prevent “innovation dips” where
diffusion lagged or stalled. Study participants noted the use of external experts who were hired to provide staff training and rationale for an instructional technology innovation. Participants noted that inviting external experts into the school aided in diffusion of the innovation as it added an element of external validity to the school’s decision to adopt an innovation. Information sharing and feedback sessions were essential in gathering end-user input to refine the diffusion of an innovation and, in some instances, the innovation itself. Gathering feedback was also viewed by EARCOS leaders as a way for stakeholders to feel as if they were a part of the diffusion process. This resulted in greater buy-in from staff. Communication, clearly articulated plans for implementation of an innovation, and transparency were all mentioned as facets of coalition building to ensure diffusion.

Participants noted instances within their schools where instructional technology innovations began to diffuse without proper attention to coalition building. Namely, the persons attempting the diffusion were not successful in building a coalition around the innovation resulting in the innovation being used sporadically and eventually being abandoned. Identifying individuals within the staff who were seen as opinion leaders by their peers, had high levels of rapport with peer group members, and could effectively communicate the relative advantage of the innovation that was being considered was paramount in successful diffusion.

*Professional development.* All EARCOS school leaders in the study noted that successful diffusion of any instructional technology innovation was supported with staff professional development. Wayne, Yoon, Zhu, Cronen, and Garet (2008) noted there is a need for more research on the effectiveness of staff professional development in diffusing innovations within schools and the specific elements of professional development that are
the most effective. Study participants unanimously noted that professional development was critical in eliminating an opt-out mentality of adoption of an innovation. Professional development was not seen solely as up-skilling staff on the use of an instructional technology innovation but also as an opportunity to articulate the expectations of school leadership’s adoption of an innovation. Providing staff development was seen as a method to amplify innovation adoption in that it formally provided structure and time to explore and become proficient with an innovation before full implementation in the classroom. Frost (2012) concluded that professional development was a way to diffuse innovations by empowering teachers to lead change initiatives within schools. Professional development in EARCOS schools most commonly took the form of staff in-services, small-group trainings led by teacher opinion leaders, and formal training sessions led by external experts via webinars or face-to-face.

**Perceptions of DE.** DE in EAROCS schools lags well behind the diffusion of K-12 DE in other regions of the world; namely, the United States and Europe. EARCOS school administrators’ perceptions of DE and the value it holds for student learning could be one contributing factor in the lack of adoption in EARCOS international schools. Study participants ranged from seeing no value in DE to others who saw value in DE and preparing students for higher education where much of student learning takes place in blended or fully online learning environments. EARCOS school administrators acknowledged DE as a viable learning platform but one not suited to standalone independent international schools. Eighty percent of study participants had or were enrolled in DE programs for their own professional development.

DE experiences of EARCOS school leaders ranged from taking standalone courses to fully online advanced degree programs. Several of the study participants noted
they had successfully used DE to provide staff professional development opportunities. Somewhat confounding was the fact that the perception of DE in all but one instance was seen as very positive and valuable, yet it was not used as a common delivery method of instruction in any of the participating EARCOS schools in the study. Interestingly, all study participants viewed DE as an innovative way of delivering content and learning. However, even though EARCOS school leaders rated themselves as above average in terms of individual innovativeness with a mean score of 117.7, DE was not an area where EARCOS school leaders were innovating within their schools. Two study participants noted they did not see the potential for diffusion of DE in international schools beyond supplementing course offerings of the school. These two participants also had the lowest IS scores of 94 and 112. These scores were significantly below the study’s mean IS score of 117.7. The participant with the lowest mean score had never taken a course online. None of the EARCOS schools in the study were actively pursuing in-school development of DE in their schools to compliment face-to-face delivery of instruction.

*College readiness.* DE was acknowledged as a significant driver in changing the educational paradigm and as “changing the educational landscape” in K-12 education and “part of our students’ educational landscape in the future.” However, not one EARCOS school in this study required students to take a fully online DE course to prepare them for DE learning in higher education. Acknowledgment did not equal diffusion in this study. Students who did take DE courses are at the discretion of the student and most often a result of the school not offering a course required for completion of the school’s diploma program. EARCOS schools lag behind the United State in preparing K-12 students for online learning. Many states in the United States now require students to take at least one fully online class in high school to prepare them for online learning.
Forced school closure. One reality that international schools face is that of forced school closure. In comparison to domestic schools in the United States and Europe, international schools face a number of potential factors including but not limited to force majeure, political instability or coup, abrupt changes in governmental oversight of international schools by the host country, or medical epidemics. DE is one way that EARCOS international schools could continue instruction in the case of forced school closure. EARCOS schools’ lack of DE possesses a potential threat for EARCOS schools to continue instruction in light of a forced school closure. EARCOS school leaders did acknowledge the potential for DE in the area of school closures; however, EARCOS schools represented in this study did not appear to have a comprehensive plan for the role DE would play in a forced school closure. All EARCOS schools had LMSs in place but without staff development in designing DE learning experiences or instructional design, the potential for DE to mitigate instructional appeared to be limited.

**Barriers to distance education in EARCOS schools.** Opinion leadership did not seem to play a role in the diffusion of DE in EARCOS international schools. All EARCOS schools represented in this study were not attempting to diffuse DE as an instructional technology or pedagogical innovation. Instead, DE appeared to be contracted to multiple DE course developers including Pamoja, Global Online Academy, or Virtual High School. EARCOS schools appeared not to be attempting to develop their own DE course offerings or programs.

**Absence of need.** One reason for this could be the ease of enrolling students into third-party course developers with accredited programs, high-quality instructors, and an understanding of the technological aspects of offering fully online learning programs. Berge and Muilenburg (2000) noted lack of technical expertise as a viable barrier to DE.
Furthermore, the course developer Pamoja is the only accredited IB course developer for IB accredited courses. Therefore, there is little need for schools who offer the IB diploma to develop their own DE initiatives when these courses could potentially not be accredited for students enrolled in them. As one participant noted, “There really isn’t a present need for developing our own DE at this point.” Barriers to adoption of DE in EARCOS schools appeared to exist. Barriers that were acknowledged included school size, absence of need, and cost.

*School size.* DE was perceived largely as a vehicle to offer classes a school cannot offer themselves for students but not as a vehicle for innovating educational practice within EARCOS schools. School size and the extent to which DE was being used in EARCOS schools appeared as an inverse relationship. Larger EARCOS schools with greater human resources and extensive course offerings were less likely to be using DE. In comparison, smaller schools that did not have the human resources to offer all the courses necessary for students to complete a diploma program were more likely to be using DE to supplement the course offerings taught by teachers within the school.

*Cost.* Cost was cited as a barrier to the development of EARCOS schools’ adoption of DE. EARCOS school leaders appeared to echo the findings of other research that supported cost as a major barrier to DE adoption and development. International schools are often independent schools that are either operating on a for-profit or nonprofit model. The cost associated with DE is significant for schools not to consider its development. Costs associated with DE include having the technical infrastructure to support it; providing technical expertise to manage DE components, including network infrastructures, hardware, and software; hiring new positions to manage DE within a face-to-face school; funding for staff development and teacher training; and the
additional funding necessary to develop and teach courses online. EARCOS schools like other international schools are governed by boards of directors. Many school boards are unwilling to invest in DE development when outside developers offer courses that students can easily enroll in and are accredited by international diploma programs such as the IB.

**Relevance of the Study**

Four prominent themes emerged as a result of the semistructured interviews collected from 10 EARCOS school leaders. This study revealed that barriers to the diffusion of DE in EARCOS schools exist. These barriers included the absence of perceived need, cost, and school size. Diffusion of innovations within EARCOS schools appeared to follow Rogers’ (2003) five characteristics of innovations. Specifically, innovations that had successfully diffused in EARCOS schools were compatible with existing school practices, norms, missions, and visions displayed high relative advantage. Innovations that diffused most efficiently also displayed high relative advantage over existing practices, were trialable by stakeholders before becoming institutionalized, and the benefits of the innovation were observable from the onset. The four themes answered the first 2 central research questions.

1. Which themes would emerge from school leaders in different schools and host cultures in East Asia?

2. Were certain themes more prevalent than others?

3. Based on the results of the IS, was there a correlation between the innovativeness of individual school leaders the extent to which DE had diffused within their school?

Three of the four themes were related to concepts of Rogers’ (2003) IDT theory:
the use of elements of opinion leadership and change agents in diffusing innovations, characteristics of innovations and opinion leaders influenced innovation adoption but varied between EARCOS school leaders, and resistance to change. The outcome of the third central research question involved exploring the correlation of individual innovativeness and the willingness to adopt and diffuse innovations such as DE within their schools. The results of the IS showed that EARCOS school leaders rated themselves more innovative ($M = 109.7$) than other IS normative groups. The research did not provide evidence of individual innovativeness as a correlation of an EARCOS school leader to adopt and innovation such as DE into their school. In fact, school size rather than the innovativeness of the school leader appeared to be the largest determinant of whether an EARCOS school was employing facets of DE to deliver instruction.

**Recommendations Based on the Results of the Study**

The researcher makes the following recommendations:

1. Encourage EARCOS international schools and their leadership to continue to explore and learn about DE as a social learning construct with no significant difference in learning outcomes when compared to traditional face-to-face instructional pedagogies (Means, Toyama, Murphy, & Baki, 2013).

2. Assist EARCOS international schools in further refining their definition and understanding of change agency and opinion leadership and the role each plays in diffusing innovations

3. Collaborate with EARCOS schools and their leadership to examine the role DE plays in preparing students for future academic success and lifelong learning.

4. Identify barriers to implementing DE into international schools and measures that can be adopted to mitigate them alongside EARCOS school leaders.
5. Work with EARCOS administrators to develop the skills and knowledge necessary to diffuse innovation efficiently within their schools.

6. Educate EARCOS school leadership on the importance school leadership plays in diffusing and supporting instructional technology innovation diffusion and adoption.

7. Extend IDT theory and opinion leadership to other regional councils of international schools.

8. Examine the perspectives teachers and other international school stakeholders have of opinion leadership and DE.

9. Guide the development DE guidelines and course development that is suited for international schools.

**Recommendations for Further Research**

The researcher makes the following recommendations for further research:

1. Increase the generalizability of these findings to other councils of international schools; namely, increasing the sample size of the study.

2. Determine if the perceptions of opinion leadership and DE of EARCOS school leaders extended to other stakeholder groups such as divisional school leadership and teaching staff.

3. Examine further the correlation of school size and the extent DE is utilized in instruction through the use of comparative data between larger numbers of EARCOS schools.

4. Continue to examine the benefits and barriers to the diffusion and adoption of DE in international schools.

5. Additional research should be conducted to explore the idea of negative opinion leadership; specifically, to discover if the notion of opinion leadership exists in
other schools and to compare and contrast characteristics of negative opinion leaders to that of late adopters and laggards (Rogers, 2003).

6. Determine if a “sweet spot” exists for the number of innovations that can be successfully diffused in a given time period without having deleterious effects on staff morale.

**Summary**

This study attempted to provide insight into EARCOS international school’s leadership’s understanding of opinion leadership and how it is used in diffusion instructional technology innovations within their schools, namely DE. The study found that EARCOS school leaders serve in an opinion leadership role more often for large-scale, school-wide innovations than do teachers. Innovations are more regularly introduced into the school by change agents within schools. Change agents were found to exist within all stakeholder groups within EARCOS schools. Opinion leadership appeared not to play a role in the acceptance or rejection of DE in EARCOS schools. EARCOS school leaders viewed themselves as highly innovative when compared to other normative groups that were administered Hurt et al.’s (1977) individual IS.

DE was positively viewed by all EARCOS school leaders as being innovative. However, no correlation was found to exist between EARCOS school leaders’ self-perceptions of innovativeness and their willingness to adopt DE as pedagogically equivalent to that of face-to-face instruction. DE was viewed as valuable by all the study participants; however, the extent to which it was actually used and implemented was largely determined by school size. Smaller schools seemed to accept DE more readily due to human resource restrictions imposed by a smaller teaching staff and subsequently smaller numbers of course offerings.
Nearly all EARCOS leaders reported having taken some sort of professional development via DE. DE learning experiences of admin ranged from a single, standalone course on specific job-related subjects to full advanced degree programs. EARCOS school leaders viewed DE as a valuable way to provide professional development to staff members that was more sustaining than single-day, one-off in school professional development. All EARCOS school leaders in this study recognized that DE would play a part in their students’ educational journeys after they matriculated from their school. DE was recognized as a way to mitigate interruptions to instruction given any number of potential threats of school closure faced by international schools.

This study also served to highlight potential barriers to widespread adoption of DE including cost of developing DE courses within the school, a lack of knowledge and skillset at all school stakeholder groups on best practices in DE delivery, and course design and a lack of perceived need. Other barriers included the perception of traditional face-to-face pedagogies as more of a social construct than DE could provide. Finally, the rigor and quality of DE courses when compared to courses taught face to face was questioned by EARCOS school leaders. The viewpoints of EARCOS school leaders and their reluctance to explore DE as a viable instructional methodology suggests the EARCOS school leadership may not have sufficient knowledge concerning the attributes that comprise DE or how to leverage these to enhance student learning and preparation for higher education.

International schools are a unique subset of K-12 education that holds great potential for further research. This is especially true in the areas of opinion leadership, innovation diffusion frameworks, and the potential of DE to redefine and reshape K-12 education. International schools, due to their independent nature, comparatively high
budgets, and funding, tend to be more nimble and quicker to innovate than domestic schools, which can be bogged down by lack of funding, state and federal governance, and lack of resources. DOIs, therefore, is an area that deserves more attention in international schools. Further research could assist schools in innovating more efficiently, expediting processes from introduction of an innovation to adoption. International schools are presently looking to market themselves as being innovative and offering a 21st century learning experience for its students. However, in order to do this, international schools will need to be open to DE as a viable, innovative method to educate its students; in so doing, DE has the potential to redefine K-12 international education.
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Appendix A

Five Categories of K-12 Online Schools
<table>
<thead>
<tr>
<th>Type of virtual school</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statewide supplemental programs</td>
<td>Students take individual courses from supplemental programs while attending a physical school or cyber school within the state for their main coursework. These programs are authorized by the state and overseen by state education governing agencies.</td>
<td>Michigan Virtual School, Idaho Digital Learning Academy</td>
</tr>
<tr>
<td>Single-district schools</td>
<td>These schools provide an alternative to the traditional face-to-face school environment and are offered by individual districts for students within that district who need individualized programs. Alternative schools offer online courses, face-to-face courses, one-on-one tutoring, and counseling as needed. These schools are typically operated by autonomous districts and are generally not tracked by state agencies.</td>
<td>Riverside (CA), Broward (FL), Plano (TX), Los Angeles, Jeff Co (CO), DESTRN, WOLF (NV)</td>
</tr>
<tr>
<td>Multi-district schools</td>
<td>These schools are operated within individual school districts but enroll students from other school districts within the state. This represents the largest growth sector in K–12 online learning. Multi-district schools offer online and hybrid courses.</td>
<td>Oregon Connections Academy, Insight School of Washington</td>
</tr>
<tr>
<td>Cyber charters</td>
<td>These schools are chartered within a single district but can draw students from across the state. In many cases, they are connected in some way to commercial curriculum providers. Cyber charters offer fully online and hybrid courses.</td>
<td>Georgia Virtual Academy, Minnesota Virtual High School</td>
</tr>
<tr>
<td>Consortium</td>
<td>These are supplemental programs that can be statewide, national, or global.</td>
<td>Virtual High School Global Consortium, Wisconsin eSchool Network, Oregon Virtual Education Center (ORVED)</td>
</tr>
<tr>
<td>Post-secondary</td>
<td>These programs are run by universities and colleges and offer both supplemental and fulltime options for K–12 students. They typically offer their services nationally. Most courses are fully online; some may be hybrid.</td>
<td>University of Nebraska Independent Study High School, Brigham Young University—Independent Study</td>
</tr>
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Appendix B

Methods, Techniques, Advantages, Disadvantages, and Instruments
Used for Identifying Opinion Leaders
<table>
<thead>
<tr>
<th>Method</th>
<th>Technique</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Celebrities</td>
<td>Recruit well-known people who are national, regional, or local celebrities.</td>
<td>Easy to implement, Preexisting opinion leaders, High visibility</td>
<td>Contradictory personal behavior, Difficult to recruit</td>
<td>Media or individuals identifyIndividuals volunteer for leadership roles</td>
</tr>
<tr>
<td>Self-selection</td>
<td>Volunteers are recruited through solicitation Surveys use a leadership scale and those scoring above some threshold are considered leaders</td>
<td>Easy to implement, Low cost</td>
<td>Selection bias, Uncertain ability</td>
<td>When you interact with colleagues, do you give or receive advice?</td>
</tr>
<tr>
<td>Self-identification</td>
<td>Leaders selected based on community observation</td>
<td>Easy to implement</td>
<td>Selection bias, Validity of self-reporting Staff misperceptions, Leaders may lack motivation</td>
<td>Staff determines which persons appear to be opinion leaders</td>
</tr>
<tr>
<td>Staff selected</td>
<td>Persons who occupy leadership positions such as clergy, elected officials, media, and business elites</td>
<td>Easy to implement, Preexisting opinion leaders</td>
<td>May not be leaders for the community, Lack of motivation, Lack of relevance</td>
<td>1. Do you hold and elected office or position of leadership? 2. Are you a member of any community organizations? Which ones? Persons who are knowledgeable identify leaders to be selected and rate all community members on leadership ability. Participant observers watch interaction within the community and determine who people go to for advice</td>
</tr>
<tr>
<td>Positional Approach</td>
<td>Judge's community members identify leaders</td>
<td>Easy to implement; Trusted by community</td>
<td>Dependent on the selection of raters and their ability to rate</td>
<td></td>
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<tr>
<td>Expert identification</td>
<td>Trained ethnographers study communities to identify leaders</td>
<td>Implementation can be done in many settings</td>
<td>Dependent on experts' ability Validity may depend on index case selection; It can take considerable time to trace individuals who are nominated Results are dependent on the representatives of the sample; May be restricted</td>
<td>Randomly or conveniently selected index cases are asked who they go to for advice</td>
</tr>
<tr>
<td>Snowball method</td>
<td>Index cases provide nominations of leaders who are in turn interviewed until no new leaders are identified Randomly selected respondents nominate leaders and those receiving frequent nominations are selected</td>
<td>Implementation can be done in many settings; Provides some measure of the social network</td>
<td>Randomly selected sample or cases are asked who they go to for advice</td>
<td></td>
</tr>
<tr>
<td>Sample socio-metric</td>
<td></td>
<td>Implementation can be done in many settings; Provides some measure of the social network</td>
<td></td>
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</tr>
<tr>
<td>Socio-metric</td>
<td>Entire community network can be mapped; May have high validity and reliability</td>
<td>Time-consuming and expensive to interview everyone; May be limited to small communities (i.e., less than 1,000 members)</td>
<td>All respondents are asked who they go to for advice.</td>
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<tr>
<td>All (or most) respondents are interviewed and those receiving frequent nominations are selected</td>
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Appendix C

Letter to Participant
Letter to Participate

Name of EARCOS School Administrator
Email Address:
Address:
Phone Number:
City, Country, Postal Code:

Dear EARCOS School Administrator:

I am a Doctorate of Education student in the Instructional Technology and Distance Education concentration at Nova Southeastern University. As a final requirement for the Doctor of Education/Instructional Design and Distance Education (ITDE) degree (Ed.D), I am engaged in dissertation research concerning EARCOS School administrators’ knowledge and use of innovation diffusion theory and opinion leadership when considering instructional technology innovations. Specifically, I am interested in researching adoption or rejections of distance education innovations in K-12 EARCOS schools. With approval from the university, I am requesting your participation in this important research. Your perspective in this research is needed and valued.

International schools are an interesting niche of the educational landscape. International K-12 education represents a population in educational research that is beginning to emerge. My aim with this study is to add to the growing body of research being done in international schools, K-12 distance education, instructional technology and educational diffusion of innovations.

The total time required for your participation in this study will be approximately 30-40 minutes. With your signed consent, you will be interviewed at your convenience in person, by telephone, or via a videoconferencing platform. Interviews will last from 15 to 20 minutes each. Additionally, two short surveys will be sent to you prior to the interview—the individual innovativeness scale survey (Hurt, Joseph, Teigen, 1977) and a brief demographic survey. Both surveys can be completed in 5-10 minutes. The information in the study will be confidential. No names will be used in the reporting of information.

Please confirm your participation by signing the included consent form and initialing it in the designated areas. In order to confirm authenticity, a witness must also sign the form with you. Upon receipt of your signed consent form, I will contact you to schedule an interview time and preferred method. Please, return the signed consent form by email to: jd1532@nova.edu or jeff.dungan@saschina.org. Additionally, included with this letter is the list of interview questions that you will be asked during the interview.

Thank you for your consideration and participation in this valuable research.

Sincerely,

Jeffrey R. Dungan
NSU email

___________________________________
Name of Participant
___________________________________
Name of Witness

_______________________________  ________________  ______________________
Date                  Signature of Participant

_______________________________  ________________  ______________________
Date                  Signature of Witness
Appendix D

Demographic Information Questionnaire
Demographic Information Questionnaire

Thank you for agreeing to participate in this research study concerning EARCOS School administrators’ knowledge and use of innovation diffusion theory and opinion leadership when considering instructional technology innovations. As part of this study, please answer the following questions.

Q1) Age: What is your age at the time of this survey

__________________________________________________________

Q2) Gender (Please circle one):

F     or     M

Q3) Ethnicity origin (or Race): Please specify your ethnicity (place and X next to your selection).

- White __________
- Hispanic or Latino __________
- Black or African American __________
- Native American or American Indian __________
- Asian / Pacific Islander __________
- Other __________________________

Q3) Education: What is the highest degree or level of school you have completed? If currently enrolled, highest degree received (Please place an X next to your selection).

- Bachelor’s degree _______________
- Master’s degree _______________
- Professional degree _______________
- Doctorate degree _______________

Q3) Name of school where you are currently employed:

__________________________________________________________.

Q4) Number of years you have served in your current leadership position at the school
listed in question #3 (Q3):  
___________________________________________________________________.

Q5) What is your position (title) at the school where you currently work?

________________________________________________________________________

Q6) Previous educational leadership experience: Please describe your previous educational leadership experience (positions and locations) in the field of K-12 or Higher Education?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Q7) How many years has your current school had a 1:1 laptop, tablet, or other device program in place?

________________________________________________________________________

Q8) How many years has your current school had a learning management system (LMS) in place?

________________________________________________________________________

Q9) What school-wide educational technology innovation(s) have been implemented in your school while you were serving in a leadership role? If none, please indicate that by leaving this question blank.
Appendix E

IS
Individual Innovativeness Scale Survey

Please Circle the Number that Most Closely Relates to your Opinion
SD = Strongly Disagree; D = Disagree; MD = Mildly Disagree; U = Uncertain; MA = Mildly Agree; SA = Strongly Agree

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>DM</th>
<th>D</th>
<th>U</th>
<th>MA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My peers often ask me for advice or information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2. I enjoy trying out new ideas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3. I seek out new ways to do things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4. I am generally cautious about accepting new ideas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5. I frequently improvise methods for solving a problem when the answer is not apparent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>6. I am suspicious of new inventions and new ways of thinking.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>7. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8. I feel that I am an influential member of my peer group.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>9. I consider myself to be creative and original in my thinking and behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>10. I am aware that I am usually one of the last people in my group to accept something new.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>11. I am an inventive kind of person.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<tr>
<td>12. I enjoy taking part in the leadership responsibilities of the groups I belong to.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>13. I am reluctant about adopting new ways of doing things until I see them working for people around me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>14. I find it stimulating to be original in my thinking and behavior.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>15. I tend to feel that the old way of living and doing things is the best.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>16. I am challenged by ambiguities and unsolved problems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>17. I must see other people using new innovations before I will consider them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>18. I am receptive to new ideas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>19. I am challenged by unanswered questions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>20. I often find myself skeptical of new ideas.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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Appendix F

Interview Questions
Central questions
1. What factors are most predominate in EARCOS school leaders’ decisions in adopting or rejecting instructional technology, specifically distance education, innovations into their schools?
2. What factors in EARCOS international schools have driven the consideration of adopting distance education into traditional K-12 school?
3. To what extent do school leaders recognize and utilize opinion leadership in their schools in the innovation diffusion process?
4. What extent do EARCOS school leaders imply elements of innovation diffusion theory (IDT) into their decision making when considering instructional technology innovations in their schools?

Sub questions
1. What is the role of school leadership in the development of distance education in their schools
2. Does the role school leaders play in the adoption or rejection of instructional technologies differ between school leaders at different levels of a school’s administrative hierarchy?
3. Is there a difference between distance education diffusion process within EARCOS schools when compared to other instructional technology innovations that school’s have undertaken (i.e. 1:1 laptop initiatives, LMS adoption)

Interview Questions
1. When attempting to diffuse an innovation in your school, are there individuals who you perceive as change agents above others? If so, could you please answer the following two questions?
   a. Follow up A1: If so, what characteristics do these individuals possess that led you to classify them as change agents?
   b. Follow up A2: What positions within your school do these individuals hold? (e.g. teacher, coach, administrator, support staff)?
2. When attempting to diffuse an innovation in your school, are there individuals who you perceive as opinion leaders—people who influence others to try things because they already have done so?
   a. Follow up B1: If so, what characteristics do these individuals possess that led you to classify them as opinion leaders?
   b. Do opinion leaders differ from the individuals you considered as change agents in question #1
   c. Follow up B2: What positions within your school do these individuals hold? (e.g. teacher, coach, administrator, support staff)?
3. Are there administrators at other schools you view as opinion leaders in the EARCOS region?
   a. Follow up C1: If so, what characteristics do these individuals possess that led you to classify them as change agents?
4. When seeking to implement an innovation within your school, whether it be a technical, pedagogical or organizational shift, are there various stages or procedures that are employed to assist in diffusing the innovation?
5. What role do you personally see distance education or blended learning playing in international schools presently or in the future?
   a. Follow up E1: If none, Expand on that if you could?
6. To what extent is your school employing distance education or blended learning as an instructional delivery method?
   a. Follow up D1 (if no examples given): In your personal opinion are there organizational or environmental factors present in your current school that serve as barriers in developing distance or blended instruction at your school?
   b. Follow up D2 (if examples given): In your personal opinion which organizational or environmental factors present in your current school served to foster the development of distance or blended instruction?
   c. Follow up D3 (if examples given): Were there specific person(s) within the organization who were instrumental in diffusing or institutionalizing distance education in your school?
Appendix G

Thank-You Letter
Dear Name of administrator:

Thank you for participating in the recent study concerning diffusion of instructional technology and distance education innovations at your school. I appreciate the time you took to interview and candidly give your perspectives based on personal experience. Held in strict confidence, your input was very helpful in the completion of this research.

I also wish to thank you personally. The completion of this dissertation also marks the completion of my doctorate of education. It would not have been possible without the research study in which you participated. I thank you and wish you success in your continuing academic pursuits.

Sincerely,

Jeffrey R. Dungan
Doctoral Candidate
Appendix H

IS Responses
1. My peers often ask me for advice or information.
2. I enjoy trying out 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 the 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 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 groups I belong to.
13. I am reluctant about adopting new ways of doing things until I see them working for people around me.
14. I find it stimulating to be original in my thinking and behavior.
15. I tend to feel that the old way of living and doing things is the best.
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.

Total Score