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A Study of Technological Barriers to Instructor E-Readiness in the Online Learning Environment

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A Study of Technological Barriers to Instructor E-Readiness in an Online Environment

by

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We hereby certify that this dissertation, submitted by Glenda Gay, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Proposal Submitted to Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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A critical factor of e-learning success is the e-learning readiness of the online user. However, there is a scarcity of studies on online instructors' e-learning readiness (E-Readiness) in an online learning environment. The purpose of this study was to evaluate whether there were correlations among online instructor E-Readiness dimensions and factors at the design and delivery stages that affect system outcomes. In this study, the DeLone and McLean model was used as a framework for research to test E-Readiness with the System Design stage (comprising System Quality, Information Quality, and Service Quality), System Delivery stage (comprising System Use, and User Satisfaction) and Net Benefits stage (comprising Net Benefits).

A total of 113 online instructors at a Caribbean university system completed a Web-based questionnaire containing previously validated and adapted items. The questions were answered using a five-point Likert scale and the survey results were analyzed using aggregates and linear regression statistical methods. The results revealed that the e-learning systems success score of the university was 4.07 out of 5 or 81.4%, while the E-Readiness score of online instructors was 4.53 out of 5, or 90.6%. Linear regression analysis showed that E-Readiness was a significant and positive predictor of the System Design, System Delivery, and System Outcome stages and their associated dimensions. The results of multiple linear regression analysis showed that the constructs together accounted for 42.2% of the variance in Net Benefits. Of the six predictors in the model, User Satisfaction provided the largest unique contribution when the other predictors in the model were held constant. The other predictors in the model (System Quality, Service Quality, Information Quality, System Use and E-Readiness) were not statistically significant and provided no significant or unique contribution to Net Benefits. Further information is provided regarding factors affecting net benefits among online instructors using online learning environments. This information can be used to address online instructors' barriers to technology use.

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There comes a point in your life when you realize:
Who matters, Who never did, Who won't anymore, and who always will...
(Unknown)

You all are part of who I am.

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Chapter 1

Introduction

Background

Many tertiary level institutions rely on online learning environments (OLEs) to successfully deliver their distance programs (Menchaca & Bekele, 2008; Osika, Johnson, & Buteau, 2009; Seok, 2008; Wasilik & Bolliger, 2009). However, the focus of online instruction is now shifting from being a delivery system of content to one where more emphasis is placed on teaching methods and teaching experiences that engage online learners through various instructional tasks (Menchaca & Bekele, 2008; Osika, Johnson, & Buteau, 2009; Seok, 2008; Wasilik & Bolliger, 2009). This suggests that online instructors need to be subject matter experts who convey their knowledge and provide academic motivation to learners (Menchaca & Bekele, 2008; Seok, 2008).

Steel and Levy (2009) described technology as a delivery medium that affords a learning experience through the sharing of learning materials and educational resources. To achieve this learning experience, online instructors are expected to have some technical knowledge of the infrastructure that supports the OLE as well as sufficient skills to demonstrate effective participation, encourage collaboration, monitor and assess student learning, and foster a learning community for learners to feel connected (Bawane & Spector, 2009; Hogan & McKnight, 2007; Menchaca & Bekele, 2008; Panda & Mishra, 2007; Seok, 2008; Steel & Levy, 2009). The emphasis on studying technology

barriers for this study is rooted from research on electronic learning and information systems. Electronic learning (e-learning) is an Information System (IS) innovation that facilitates online users to engage in the learning process from anywhere and at any time (Sun, Tsai, Finger, Chen, & Yeh, 2008). Further research is needed to attempt to determine whether some level of technical knowledge of the OLE's infrastructure is necessary for online instructors to function effectively as well as to identify some skills that are sufficient for them to use in the OLE. This research could help to further identify some barriers that prevent necessary seamless integration between technology and instructors' teaching in the OLE (Baltaci-Goktalay & Huguet, 2008; Menchaca & Bekele, 2008; Panda & Mishra, 2007; Seok, 2008; Steel & Levy, 2009).

The IS success model by DeLone and McLean (1992) was used as a theoretical basis for the study. In general, the IS success model proposed by DeLone and McLean (1992) and updated some ten years later provides a theoretical basis in linking e-learning systems use to overall online user outcomes. Figure 1 depicts the IS success model.

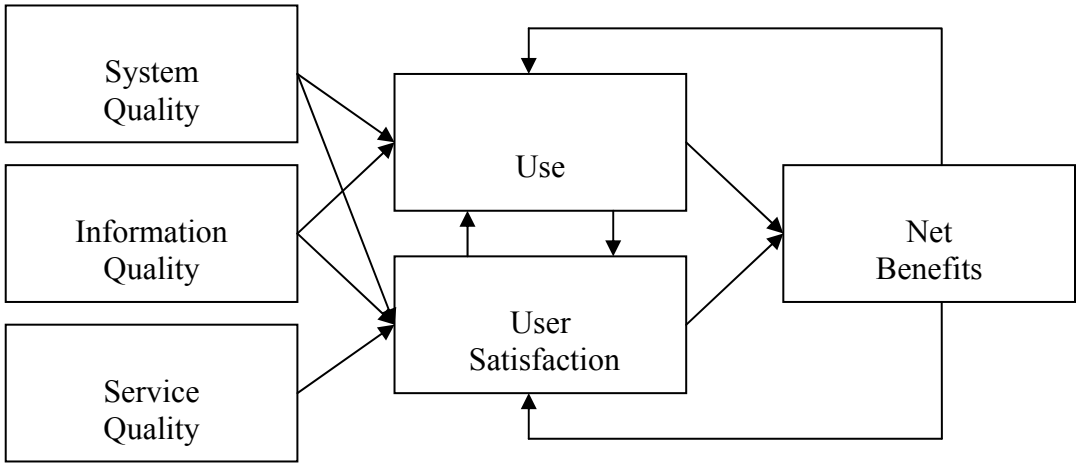

Figure 1. DeLone and McLean's updated IS success model (2004).

The model comprised six success factor dimensions, namely *System Quality* (technical quality of the OLE as an IS), *Information Quality* (quality of information that may be obtained from the OLE), *Service Quality* (quality of support and services that assist online users), *System Use* (extent and nature of System Use in the OLE), *User Satisfaction* with the IS, and *Net Benefits* obtained from its use (DeLone & McLean, 2004). To measure and assess e-learning success, the interdependence of these six technological and human elements were grouped into the IS Design, Delivery, and Outcome stages by Holsapple and Lee-Post (2006) as illustrated in Figure 2.

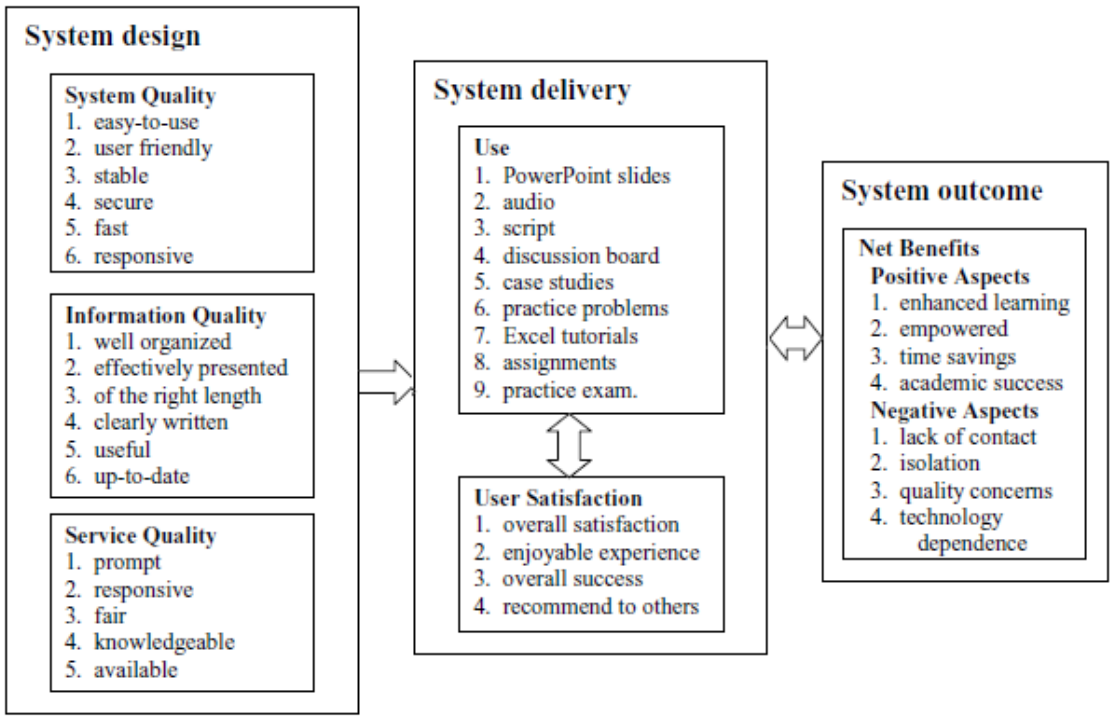

Figure 2. The E-Learning Success Model showing the three IS stages (Holsapple & Lee-Post, 2006, p. 71)

This model describes and measures success sequentially such that system design success is essential for system delivery success, while system delivery success impacts

subsequent system delivery success based on the system outcome stage. The model by Holsapple and Lee-Post (2006) suggests that in an e-learning context, online users must use the technology to complete their online tasks in the OLE. The quality of the technology and information disseminated must be high since the online learning process is mainly an individual experience. Good System Quality enhances online learning by reducing any technological issues, while good Information Quality allows for better presentation and understanding of course content through online instructors who apply their training to provide better online learning experiences and thus improve Service Quality. These both enhance online learner satisfaction which influences the Net Benefits regarding positive and negative aspects of e-learning. IS literature has identified possible barriers that may impact negatively on the relationship between online instructors' ability to effectively use the technology and effectively teach using the technology. The barriers are categorized in the IS stages as follows:

1. System design stage:
    i. Systems quality issues, such as the stability, security, speed and responsiveness of the technology (Menchaca & Bekele, 2008; Panda & Mishra, 2007),
    ii. Service quality issues, such as online instructor technology training to provide adequate learner-teacher interactions (Gall, Gall, & Borg, 2003; Pagliari, Batts, & McFadden, 2009),
    iii. Information quality issues involving characteristics such as accuracy and clarity as well as the various information formats required for fast retrieval (Chen, 2010; Mutula & van Brakel, 2006),

2. System delivery stage:
    i. System use issues, such as the extent to which the technology tools are actually used (Holsapple & Lee-Post, 2006),
    ii. User satisfaction issues, such as online instructors' dissatisfaction when accessing and interacting in the OLE (Hiltz, Kim, & Shea, 2007),
3. System outcome stage:
    i. This stage assesses the Net Benefits of the OLE regarding the positive or negative aspects of online instructors' experiences with adoption, integration and dependence on technology for online teaching (Palmer & Holt, 2009).

Dada (2006) described E-Readiness as 'a measure of the degree to which a country, nation or economy may be ready, willing or prepared to obtain benefits which arise from information and communication technologies (ICTs)' (p. 1). Holsapple and Lee-Post theorized that E-Readiness impacts successful course outcomes and e-learning satisfaction and used an E-Readiness survey to categorize students who indicated considerable readiness for online learning from those whose responses indicated that they were not well prepared. Their survey was aimed at confirming that the online learners were not forced into the e-learning environment, but were prepared and willing to be involved in the OLE. The E-Readiness survey measured four factors namely, online learners' academic preparedness, technical competence, lifestyle aptitude, and learning preference towards e-learning. Those online learners who responded with a score of 4 or more on a five-point Likert-type scale on the latter three readiness measures were

considered to be e-ready. This research will attempt to provide another view of E-Readiness from the perspective of the online instructor specifically through their online interaction with the technology at the system design and system delivery stages. The model also proposes that a critical factor of e-learning success is the e-learning readiness (E-Readiness) of the online user as shown in Figure 3.

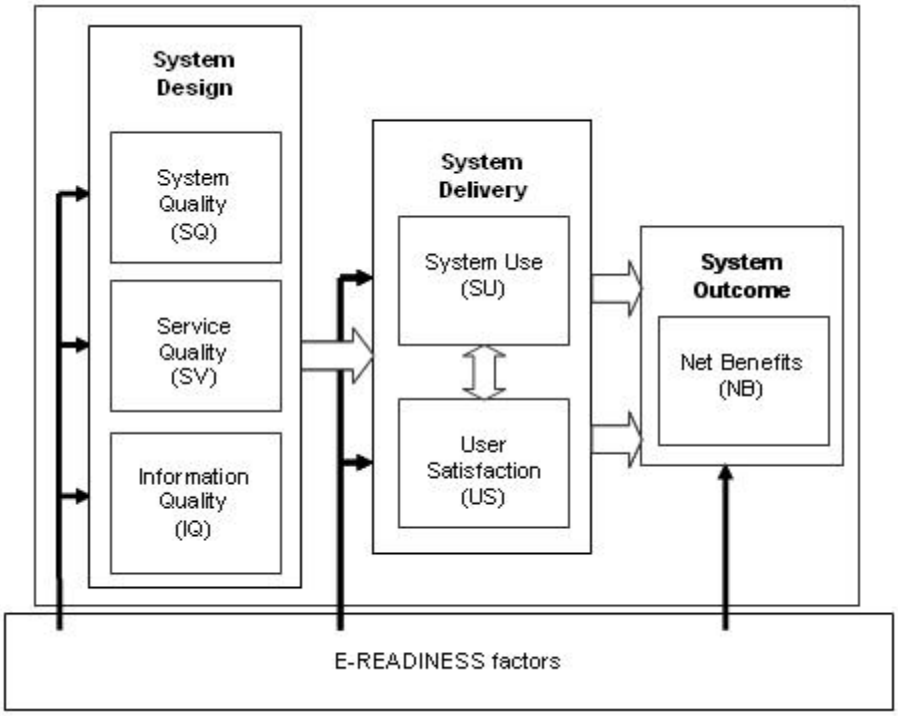

Figure 3. Conceptual model for online instructors' E-Readiness towards technology in the OLE

Problem Statement

One of the critical barriers to widespread use of technology in the OLE is online instructors' lack of awareness of the various technology tools that can improve their effectiveness in their courses (Allen & Seaman, 2007). This may be due to online instructors being experts in their subject areas, but are not familiar with using ICTs, or instructional design (Gasaymeh, 2009). Baltaci-Goktalay et al. (2008) stated that it is

important to understand online instructors who are affected by the change to online teaching, particularly their perceptions and concerns regarding the use of technology in the OLE. According to Lou and Goulding (2010) people as a unit can add value to an organization's E-Readiness, provided they understand the processes and use technology to enhance the goals of the organization. Therefore, technology used for online teaching and learning has the potential of transforming the way online instructors function thus influencing their satisfaction or dissatisfaction with OLE (Fillion, Limayem, Lafarriere, & Mantha, 2009).

Studies have addressed the significance of E-Readiness as a key component in various sectors including health (Schreurs & Moreau, 2008), agriculture (Purnomo & Lee, 2010), industrial organizations (Aydin & Tasci, 2005), and the design of online learning programs particularly online learners (Holsapple & Lee-Post, 2006; So & Swatman, 2010). Additionally, E-Readiness measures have been examined globally, using organizations in Hong Kong (So & Swatman), Indonesia (Purnomo & Lee), Malaysia (Kaur & Abas, 2004), Taiwan (Zhang & Hung, 2009), Turkey (Aydin & Tasci), and the United States (Holsapple & Lee-Post). However, searches have produced few studies on E-Readiness of online instructors, and no studies have been found as yet on instructor E-Readiness in Caribbean tertiary institutions.

The addressable problem of this study is the unknown extent to which online instructors' E-Readiness in the OLE impacts system design, system delivery and system outcome. The Economist Intelligence Unit (EIU) has for the last 20 years been capturing the top 70 countries that improve their state of E-Readiness. They evaluated a country's availability and adoption of ICT, along with its development of the social, cultural, and

economic building blocks that are essential for their effective use. In its 2010 report, the EIU also attempted to gauge the extent to which ICT was being used in the various countries. In its ranking and scores for 2010, two of the three Caribbean countries with university campuses targeted for this study, namely Jamaica, and Trinidad, were ranked 44th and 46th respectively. Jamaica received a score of 4.75 out of 10 for its connectivity E-Readiness, while Trinidad received a score of 3.25. These scores do not indicate how the online instructors at these tertiary level institutions are affected in their OLE for E-Readiness, and should be investigated.

Dissertation Goal

The goal of this research was to explore technological barriers at the Information System (IS) design and delivery stages that affect system outcome and whether there are correlations among selected online instructor E-Readiness factors and factors at the IS stages. The scope of the study involved all online instructors hired to facilitate approximately 40,000 online learners enrolled at three campuses and 13 non-campus territories of an English-speaking Caribbean university system. Measures of IS success in the OLE have been evaluated at both the individual and organizational levels (Klobas & McGill, 2010). Since the focus of this research investigated IS success from the online instructor's point of view, the success measures from the six elements were used to evaluate the influence of online instructors' E-Readiness on system delivery and system outcome in the OLE using survey instruments.

This study was built from previous research by Holsapple and Lee-Post (2006) and Wasilik and Bolliger (2009). Holsapple and Lee-Post surveyed 39 online learners and

used action research to identify barriers to successful e-learning on four success dimensions, Information Quality, use, User Satisfaction, and individual impact. Holsapple and Lee-Post used an online readiness survey that comprised four measures namely, academic preparedness, technical competence, lifestyle aptitude, and learning preference toward e-learning. Online learners who responded to the readiness measures with at least a 4 on the Likert-type scale were considered to be e-ready. A key finding was the need to focus on student E-Readiness in the system design stage which impacts successful course performance and e-learning satisfaction. Holsapple and Lee-Post also proposed a measure for quantifying overall success of e-learning for online learners.

Wasilik and Bolliger (2009) focused on elements that directly influenced 101 online instructors' satisfaction with teaching in an OLE. The findings revealed a problem with online instructors' challenges with learning about and teaching with the technology. Wasilik and Bolliger concluded that it is essential that online instructors attain and maintain acceptable levels of satisfaction with online teaching to engage online learners through various instructional tasks. Despite these barriers, over 90% of the participants in the study indicated that teaching online was a satisfying experience and looked forward to teaching the next online course. Unlike the Holsapple and Lee-Post study that used both traditional and online learners, and the Wasilik and Bolliger study that used online instructors at a single campus, the study was conducted using a large and diverse sample of approximately 1500 online instructors from across three campuses and their 42 associate distance learning sites to examine online instructors' E-Readiness in the OLE.

Research Questions

In exploring technological barriers at the three IS stages, measures of the six dimensions namely, System Quality, Service Quality, and Information Quality, from the system design stage; System Use and instructor satisfaction from the system delivery stage, and Net Benefits from the system outcome stage will be investigated to determine whether there is a relationship between those success measures and online instructor E-Readiness in a large Caribbean university system. Delone and McLean (2004) noted that 'IS success is a multidimensional and interdependent construct, and it is necessary to study the interrelationships among those dimensions' (p. 1803). They also suggest that future research should investigate the relationships among the six success dimensions within the boundary of e-learning.

The overarching research question therefore was 'Are there relationships among the six success dimensions and with online instructor E-Readiness in a large Caribbean university system?' Furthermore, the researcher of this study sought to answer additional research questions including mapping the IS success dimensions in the OLE (DeLone & McLean, 2004; Holsapple & Lee-Post, 2006) and evaluating online instructors' E-Readiness score in a Caribbean university system (Holsapple & Lee-Post, 2006):

1. What is the e-learning systems success score at this university?
2. What is the e-learning readiness score among online instructors in this university system?
3. Is there a positive relationship between E-Readiness and System Design (i.e., System Quality, Service Quality, and Information Quality)?

4. Is there a positive relationship between E-Readiness and System Delivery (i.e., System Use, User Satisfaction)?
5. Is there a positive relationship between E-Readiness and System Outcome (i.e., Net Benefits)?

Relevance and Significance

Studies have explored several models to measure E-Readiness in business organizations using factors to determine an organization's readiness or willingness to compete in the global environment (So & Swatman, 2010). According to Lou and Goulding (2010) a precise definition and meaning of E-Readiness does not exist as different groups describe it according to their focus. For example, E-Readiness can be based on factors such as the country's economic, political and social landscape (Economist Intelligence Unit Limited & IBM, 2010), website assessment, telecommunication infrastructure, and human resources (United Nations, 2005), academic preparedness, technical competence, and e-learning style (Holsapple & Lee-Post, 2006), or whether the country is developed or developing (So & Swatman, 2010). Furthermore, E-Readiness assessment instruments may include questions or use terms that are not familiar by users in the various sectors and cultures, thus making them invalid for analysis. A comparison of E-Readiness instruments showed that those designed for educational institutions were mainly to assess individual online learners and not stakeholders especially online instructors (Aydin & Tasci, 2005; So & Swatman, 2010). This researcher of the study attempted to determine an E-Readiness score among Caribbean online instructors that could be used to compare with online instructors at

tertiary level institutions worldwide. This could possibly highlight any imbalances with the technology that need improvement compared to those that are stable.

According to (Parthasarathy & Smith, 2009)Parthasarathy and Smith (2009) online education is a key indicator of an institution's willingness and ability to adapt to changing educational delivery methods. Instructor satisfaction is also considered to be one of the major contributors of quality in online learning (Menchaca & Bekele, 2008). Curran (2008) noted the importance of instructors' commitment to online education since it is valuable to the success of the educational institutions' programs. Instructor satisfaction with an OLE is an important element in the evaluation of online courses since it influences the success of online learning programs (Wasilik & Bolliger, 2009). Also, instructor satisfaction is one of the five critical components for quality delivery of online courses and programs, along with student satisfaction, learning effectiveness, access to the OLE, and institutional cost effectiveness (Sloan Consortium, 2002). The instructor satisfaction factor warrants further investigation as online learning continues to be a fast-growing delivery method in higher education (Allen & Seaman, 2007).

Results have suggested that experienced instructors view online learning as effective based on instructor-to-student interaction (Ulmer, Watson, & Derby, 2007), and online learners' prior experience with technologies (Clarebout & Elen, 2006; Shih, Muñoz, & Sánchez, 2006; Yan, 2006). However, these studies have focused on online learners and not online instructors. Panda and Mistra (2007) reviewed literature on instructors' attitudes towards OLEs and concluded that many studies focused more on barriers and motivators to OLEs from instructors' opinions and perceptions, rather than the technology used in the OLE. Some studies have documented the urgency to better

understand how tertiary level instructors are using OLE technologies in their online courses (Palmer & Holt, 2009; Steel & Levy, 2009). James and Baldwin (2005) also reported a dearth of research on the implications of using OLE technologies in tertiary level institutions, especially by online instructors (McGill & Hobbs, 2008; Palmer & Holt, 2009). This dissertation seeks to fill this void.

Wan, Wang, & Haggerty (2008) described e-learning as an OLE that provides interaction among learners and instructors who use information and communication technologies. According to Osika and Camin (2002), this involves providing appropriate procedures and infrastructure to enhance these online learning opportunities. To successfully achieve this, the technology aspect of the IS – connectivity, hardware and software – should be seamlessly integrated to provide an optimal learning and teaching environment (Menchaca & Bekele, 2008). The investigation of technology barriers in the OLE is an important issue in understanding those online instructors who are dissatisfied with the technology.

Further research is necessary to determine whether relationships exist between the level of overall instructor E-Readiness for an OLE and their experiences among the dimensions of the three IS success stages. Wang et al. (2007) suggested that such findings could further explain how to implement successful e-learning systems within organizations including universities that offer online learning. The results of this study will assist in understanding why some online instructors are reluctant to use the technology in their instruction, and why others are resistant to accepting the technology. It is hoped that the findings could offer some direction for administrators at tertiary level institutions when addressing policies that pertain to improving the online teaching

experience, quality of teaching in the OLE, and implementing online courses or programs in tertiary level institutions. As a result, a major contribution of this research will be to offer suggestions that may help IS researchers and practitioners and other policy makers reduce technological barriers and improve acceptance of the technology that affects online instructor satisfaction.

The significance of this study is twofold. According to Ndubisi (2006) institutions can only see benefits from the technology implemented when it is used by all participants in the organization. Even though tertiary level institutions are offering online courses to remain competitive with other institutions in the global market, only when online instructors make maximum use of the technology can the actual benefits be realized (Osika, Johnson, & Buteau, 2009; Venkatesh, Morris, Davis, & Davis, 2003). Additionally, while higher education institutions have widely promoted and incorporated OLEs in their online course and programs, online instructors have not quickly accepted them as anticipated, citing adoption and integration of the technology into their teaching practices as challenging (Steel & Levy, 2009). Hence, it is important to investigate the barriers that contribute to online instructors' dissatisfaction with technology in the OLE.

Secondly, online instructors and online learners use e-learning technology differently based on the country in which they reside (Chen, Lambert, & Guidry, 2010). Adeoye and Wentling (2007) investigated online instructors' cultural effects from 11 countries and found that cultures have significant effects on the usability of the technology in the OLE. Another study reported that online learners from Eastern countries (such as China and Taiwan) had minimal interactivity in the OLE when compared to online students from western countries (such as the USA), and suggested

that online instructors are vital in guiding online learners to interact with each other (Wang, Lao, Fan, & Lin, 2009). This study will help in understanding online instructors' technology use within a Caribbean culture compared with other documented studies.

Many Caribbean countries are known for their communication and online interactivity, as reported by the International Telecommunications Union (ITU) and published in the United Nations Children's Fund's (UNICEF) report on the State of the World's Children 2007 (International Telecommunication Union, 2007). The report revealed that in addition to fixed-line and cellular phones that are outnumbering the Caribbean population, Internet access is extremely popular with almost two-thirds of the population having this service. In addition, wired and wireless Internet access is available to all students across the campuses of the University, whether in computer laboratories or through the use of personal laptops. Since there has been little research conducted on a technologically interactive Caribbean culture, research is needed to determine how online instructors in a Caribbean university system are adapting to the increased use of various online and communication technologies and tools in an educational environment, where they were perhaps more familiar with informal methods of collaboration, such as text messaging, than formal interaction among anonymous online learners.

Limitations and Delimitations

The survey instrument was available to online instructors located in 16 Caribbean countries. Hence, the generalizability of this study may have been limited only to similar types of universities with campuses located in different islands. Although the population of online instructors at this Caribbean university is over 1000, the voluntary nature of

responding to the web-based survey may not have represented the full spectrum of online instructors who have issues with the technology and the results of the study may not be generalized to the population of online instructors. Also, not all instructors during that time may be representative of each territory or site. Additionally, since the survey instrument was self-administered, biases due to non responses or response selection may be a threat to its internal validity.

Lack of random sampling may impact the study's generalizability as the sample will be selected from those online instructors who were teaching during the semester that the data is captured. Although it saved time and money, the survey was delivered online and several issues may have arisen in relation to survey completion. Those online instructors who do have insecurities about the technology may have been hesitant to access or complete the online survey. This could result in an unbalanced number of instructors who are competent compared to those who are insecure with the technology participating in the survey. Also, online instructors' individual responses to the survey may be influenced as they would have been aware that their participation in a research study. Results of online instructors' self-reporting of their perceived technical readiness may also be affected because of people's tendency to judge their own computer competence higher or lower than it actually is.

Definitions of Terms

The following definitions provide further explanation of some specific terms used throughout this study:

e-Learning: "an Internet- or intranet-based and web-delivered teaching-learning system with or without face-to-face contact between the teachers and the learner" (Panda & Mishra, 2007, p. 326); "…the use of telecommunication technology to deliver information for education and training" (Sun, et al., 2008, p. 1183); "…a virtual learning environment in which a learner's interactions with materials, peers and/or instructors are mediated through information and communication technologies." (Wan, Wang, & Haggerty, 2008, p. 513).

e-Readiness: a measure of the degree to which a country, nation or economy may be ready, willing or prepared to obtain benefits which arise from information and communication technologies (ICTs) (2006).

Fully Online Course: A course is considered to be fully online if 80% or more of the materials are provided online (Allen & Seaman, 2008; Simonson, Smaldine, Albright, & Zvacek, 2009)

Information Quality: quality of information that may be obtained from the OLE (Wang & Wang, 2009).

Information System Success Model: provides a theoretical basis in linking e-learning systems use to overall online user outcomes. The model comprised six success factor dimensions, System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits (DeLone & McLean, 2004).

Instructor Satisfaction: "the perception that teaching in the online environment is effective and professionally beneficial" (American Distance Education Consortium, n.d.).

Net Benefits: the positive and negative aspects resulting from the use of an IS (Wang & Wang, 2009).

Online Learning Environment (OLE): web-based distance education that uses electronic libraries, asynchronous and synchronous discussion boards, and email to support communication between learners and instructors (Dringus & Terrell, 1999)

Service Quality: the effectiveness of the support and services that assist online users use of an IS (Wang & Wang, 2009).

System Quality: the performance of an IS itself (Wang & Wang, 2009).

System Use: output from an IS as described in terms of actual or self-reported use (Petter & McLean, 2009).

Technology Barrier: inadequate hardware, software, and facilities, as well as lack of support services (Baltaci-Goktalay & Huguet, 2008); problems of connectivity, reliability, and the capability of hardware and software available in the OLE that may inhibit online instructors from teaching effectively (Menchaca & Bekele, 2008).

Technology Integration: the effective use of technology in education as an integral tool for the purpose of enhancing student achievement (Ross, Ertmer, & Johnson, 2001).

Technology Tool: "A tool could for instance be a button that enables the learner to access additional information. The learners have to take action; they have to click on the button before receiving additional information" (Clarebout & Elen, 2006, p. 390).

User Satisfaction: users' approval or positive attitude towards an information system (Wang & Wang, 2009).

Summary

Chapter 1 introduced the background to the study, identified the problem and described a measurable goal. The addressable research problem of this study was the unknown extent to which online instructors' E-Readiness in the OLE impacts system design, system delivery and system outcome. The main goal of this study was to explore technological barriers at the IS design and delivery stages that affect system outcome and determine whether correlations existed among selected online instructor E-Readiness factors and factors at the IS stages. In order to explain the relationship between dependent variables and independent variable, a proposed framework of three abovementioned factors and their effect on E-Readiness were presented. The main research questions of this study are: What is the e-learning systems success score at the Caribbean university, and what is the e-learning readiness score among online instructors in a Caribbean university system. Three other specific research questions addressed in this study were also presented in this chapter. In addition, the relevance and significance of this study were discussed as well as the barriers and issues that affect this research. Finally, the specific terms to be used in this study were defined.

Chapter 2

Review of the Literature

This chapter will explore literature specific to IS design, delivery, and outcome stages that affect online instructors and their E-Readiness for online teaching at higher educational institutions. First, literature on technological barriers to online instructors and E-Readiness will be reviewed followed by a literature review on Delone and McLean's (2003) IS system success model. Then, literature on the IS system stages namely, system design, system delivery and system outcome, along with their dimensions are reviewed and discussed.

Technology barriers to teaching in the OLE

Although higher education institutions need to provide support for online teachers to sustain and maintain successful online teaching experiences, barriers to online instructors' success in delivering online learning have been identified (American Association of State Colleges and Universities, 2006; Osika & Camin, 2002). These barriers have been categorized into (1) online instructors' compensation and time spent in the OLE (Bailey & Card, 2009; Maguire, 2005; Mahdizadeh, Biemans, & Mulder, 2008; Palmer & Holt, 2009), (2) organizational change to accept the technology in distance

education (American Association of State Colleges and Universities, 2006; Baltaci-Goktalay & Huguet, 2008; Ndubisi, 2006), and (3) technical expertise, support for online learners and teachers as well as any distance education infrastructure (Baltaci-Goktalay & Huguet, 2008; Conceicao, 2006; Menchaca & Bekele, 2008; Nicolle, 2005; Orr, 2008). This study will focus only on the technology aspect of those barriers as described above.

Lin (2007) described OLEs as 'interactive network systems consisting of various functions for supporting a virtual classroom to enhance teaching and learning activity quality' (p. 817). The application of technology in higher education institutions provides an effective online learning environment that removes time and space constraints. The instructor-learner process therefore results in increased student interaction, instructor communication, online community relations and enhanced global learners (Gulbahar, 2007; Whitehead, Jensen, & Boschee, 2003). Gulbahar suggested that the choice of appropriate technology gives instructors opportunities to change or adapt the course content in innovative ways, and more importantly, to integrate the technology with the instruction. However, the choice of technology and its subsequent effectiveness is dependent on the purpose of the online activity. According to Bostrom (2003) key technology tools are necessary to support the various levels of online interaction in the OLE. Most OLEs are identified by the use of Learning Management Software (LMS) to manage the interaction between the online learner and course resources where communication and collaboration tools support off-line and real-time activities. For example, technology tools for asynchronous communication in the OLE include shared spaces for group learning, discussion forums as well as group and individual email addresses, whereas technology tools in asynchronous (real-time) communication include

instant messaging (chat), audio or video conferencing, and virtual classrooms. Online course support technology tools include electronic libraries and other instructional support.

Mutula and van Brakel (2006) stressed the importance of connecting users to a relevant information source so that the user could access the information required for knowledge and thus satisfy a need. The researchers suggested that information may be more critical and more costly to business information systems and not the technology tools which are eventually disposable, and that institutions should be investing more in the quality of information. Klobas and McGill (2010) stated that the online instructor's level of involvement in the OLE, such as the importance of the course and the personal relevance of the course to the instructor impacts the success of the OLE.

Allen and Seaman (2008) summarized dependence of online education on technology by categorizing the percentage of course content that is delivered online. When the level of face-to-face communication is minimal or non-existent in online courses, the importance of technology as the medium for online instructors to deliver their courses is paramount (Yang & Cornelious, 2005). This provides a challenge for online instructors since they need to use the technology properly to effectively serve its educational purpose. Online instructors can become frustrated with their reliance on the technology, including being required to work with versions of a CMS that are upgraded in rapid succession and incorporating various technology tools into their online teaching and learning strategies.

Baltaci-Gokktalay and Huguet (2008) reported that a major transformation currently facing educational institutions is the integration of online technology in higher

education. As a result, many online instructors face pressures by administration, online learners and even colleagues to integrate various technology tools in their online teaching. Studies have reported barriers to online instructors' successful integration of technology in their online teaching. These barriers include inadequate hardware, software, and facilities, as well as lack of support services (Baltaci-Goktalay & Huguet, 2008; Del Favero & Hinson, 2007; Fulford, Mail-Anakalea, & Boulay, 2008; Keengwe, 2007). Menchaca and Bekele (2008) also noted that problems of connectivity, reliability, and the capability of hardware and software available in the OLE may inhibit online instructors from teaching effectively. Allen and Seaman (2008) reported faculty issues as major barriers affecting the acceptance of online learning. These issues include online instructor acceptance of the OLE as a valid learning medium, technical expertise, and support as well as dependence on a reliable infrastructure (Conceicao, 2006; Orr, 2008). Supporting the online learner creates changing roles for the online instructor, administration and the inherent support infrastructure by forcing them to provide technology which should function in a seamless manner (Scarafiotti & Cleveland-Innes, 2006).

Panda and Mishra (2007) documented several barriers to online instructor adoption of online teaching in distance education, and highlighted instructor-related issues as one of the main factors to potentially influence online instructor satisfaction in the online environment. These issues included challenges with technology in the OLE such as lack of expertise in its use and well as inadequate time for learning the technology or improving proficiency skills in using the various technology tools necessary for online instruction (Del Favero & Hinson, 2007; Yengin, Karahoca, &

Karahoca, 2011). Yengin et al. (2011) listed fear of the technology, lack of understanding of OLE, and resistance to change as the negative factors influencing online instructor satisfaction in the OLE. Panda and Mishra (2007) also reported that discomfort between online instructors and their use of technology with OLEs was due to inefficient or ineffective integration of technology tools within the OLE. Research has shown that few online instructors have effectively or efficiently integrated technology tools in their teaching, it is important to understand how they adapt to online technologies, since some may cope easily and naturally, while others may encounter barriers (Zayim, Yildirim, & Saka, 2006). Menchaca and Bekele (2008) reported that extensive use and appreciation of many technology tools was integral to a successful OLE, and concluded that multiple technology tools interacting in various ways, appealed to the different learning styles of online learners and online. Online instructors should be aware of what tools are available and learn how they can enhance their course specifically *before* making them accessible for student use.

Although Moore, Fowler and Watson (2007) acknowledged the advances and improvements in online learning resulting from the use of new instructional technologies, they did note that too few online instructors have mastered the necessary skills and knowledge to successfully integrate technology into their daily teaching and learning. Additionally, a hesitant feeling about the technology was experienced by online teachers despite having online learning tools available, suggesting that they are among the few remaining stakeholders in education to experience the educational leap towards technology integration (Del Favero & Hinson, 2007). Sørebø et al. (2009) advised that continuous user training is important to e-learning technology, and suggested that early

training in the OLE may result in online instructors who are more satisfied and willing to use the technology. Online instructors resistance to teaching in the OLE also arise from lack of knowledge of the technology in the OLE, lack of technical skills, and negative attitudes towards using the technology in the OLE. Additionally, proper use of the technology in the OLE is affected by lack of training skills (Sadik, 2007). Orr (2008) suggested that as online instructors continue to teach and gain more online experience, their needs for technological support lessen. Orr also noted that online instructors new to the online environment site technological issues as their main concern in the OLE since success of any online course is dependent on the technology.

A study by Soule (2008) researched online instructors' differing levels of concern in the adoption of technology. These levels ranged from being comfortable using technology, to the extent of helping other online instructors use the technology, to developing an appreciation about the different technologies and how these technologies can affect their teaching in the OLE. The study also documented online instructors' apprehension towards technology including fear of failure with using the technology, fear about the time involved to learn and apply the technology tools, lack of administrative support, and the necessity for faculty training in using the technology. Wasilik and Bolliger (2009) noted that instructors enjoy teaching in the OLE based on perceived benefits to them and their students. They reported that increased instructor satisfaction in the OLE have higher levels of interaction with online learners than those instructors with decreased satisfaction. Levels of instructor satisfaction could significantly contribute to the success of distance education programs.

Definitions of instructor satisfaction have been described as a perception of being professionally effective or beneficial in the OLE (American Distance Education Consortium, n.d.), or experiencing positive, indifferent, or negative feelings toward e-learning while teaching in the OLE (Gall, et al., 2003). Freeze et al. (2010) noted that based on course requirements online users can be satisfied or dissatisfied with the OLE, while still maintaining acceptable levels of system usage. Sørebø, et al. (2003) propose that online instructors with valued interests in online teaching, will be satisfied with using the technology to enhance online learners' experiences in the OLE. Instructor satisfaction with the OLE is an important element in the evaluation of online courses since it influences the success of online learning programs (Wasilik & Bolliger, 2009). According to Hiltz, Kim, and Shea (2007) instructor satisfaction is a valid predictive measure of the probability that an instructor will be satisfied with the technology in the OLE. Orr (2008) described the concept of online learning as a traditional stool supported on three legs which represent the institution, students and faculty, and the dependence on each to form a stable structure. More so, Orr stated that the online instructor provides the strongest support of the three by strengthening the institutional and online learner 'legs' of the stool based on policies and practices for the OLE. Online instructors control and provide the curriculum content and therefore the successful online learning experience is contingent on effective interaction of the online instructor in the OLE.

E-readiness

E-readiness is defined on a global scale as 'a measure of the degree to which a county, nation, or economy may be ready, willing or prepared to obtain benefits which

arise from ICTs' (Dada, 2006, p. 1), or on an organizational scale as 'a measure to which an organization or business may be ready, prepared, or willing to obtain benefits which arise from the digital economy' (Mutula & van Brakel, 2006, p. 190). On an individual scale, Holsapple and Lee-Post (2006) characterized e-ready learners as those who have high scores in four readiness scales, namely academic, technical, lifestyle, and learning readiness. Penna and Stara (2008) quantified E-Readiness as a single numeric measure that explains the overall success of e-learning, where a low score signifies a technology deficiency that can be determined by corresponding low scores in one or more dimensions at the IS stages. Researchers have developed seven key components to describe overall e-learning readiness (Chapnick, 2000). These components were described by Karmaker and Wahid (2006) as:

- Business Readiness, which focuses on the link of organizational business priorities and characteristics to e-learning efforts,
- Technology Readiness, which analyses the technical infrastructure,
- Content Readiness, which reflects issues concerning the content of the material in the online environment, such as interactivity, reusability, and interoperability,
- Training Process Readiness, which refers to organizations' ability to organize, analyze, design, develop, implement and evaluate a training program.
- Culture Readiness, which determines an organization's perceptions and cultural constraints concerning e-Learning adoption and use,
- Human Resource Readiness, which refers to the receptivity and prerequisites of humans to learn successfully in an online environment, and

- Financial Readiness, which refers to the budget allocation and investment for establishing a robust OLE.

In the context of this study, the E-Readiness components investigated are human resource readiness which reflects online instructors' readiness to deliver e-learning courses and technical (infrastructure) readiness of the OLE. Mutula and van Brakel (2006) stated that knowing the E-Readiness score can help identify a country or institution's strengths and weaknesses so that it can develop policy decisions to position itself in the competitive global market, and apply its limited resources wisely. They further provide the link between E-Readiness and the IS success model by observing that a common factor in E-Readiness assessment tools was the inclusion of some measure of E-Readiness regarding the physical infrastructure (systems quality), user, training in the technology (system delivery), and information (Information Quality) (Mutula & van Brakel).

So and Swatman (2010) stated that this era is more globalized and knowledge-based, where knowledge is treated as a commodity that is supported by information and communication technologies (ICTs). Countries are forced into becoming information societies to make intense use of ICT resources. However, the significance of E-Readiness to the success of institutions and organizations also depends on high investment costs to support the use of ICT resources (Hanafizadeh, Hanafizadeh, & Khodabakhshi, 2009; Schreurs & Moreau, 2008). These factors may have caused a digital divide – a form of exclusion from access to knowledge regarding productivity, competitiveness, and collaboration of resources both within and among countries (Hanafizadeh, et al.). Some

measure of the current state of ICT development in a country is necessary to determine whether the shift from the digital divide is occurring and at what pace, and is important especially for developing countries such as the Caribbean where the digital divide is a factor in forging a global information society. Thus, E-Readiness could provide an understanding of the digital divide by explaining how academic institutions, private organizations, and other agencies compare among those with and without technology and can be used as a measure of inequality in a society that intensively uses ICTs.

Researchers have studied various E-Readiness factors that can be used to measure organizational readiness, resulting in the development of a number of instruments to assess e-learning readiness. Thirteen studies within the last decade described E-Readiness instruments providing a sufficient base for this dissertation. These studies also represented both developed and developing countries and described readiness factors to successfully develop and implement e-learning. Lou and Goulding (2010) identified and categorized a range of e-learning dimensions as potential key recommendations for being e-ready. These common E-Readiness indicators can be determined through the people, process, work environment and technology relationships. This combination represented common factors and enablers of E-Readiness in an organizational environment which suggested that competence in one indicator promotes improvement in other indicators (Lou & Goulding). Lou and Goulding described the E-Readiness indicators as follows:

1. **People** are the foundation of an organization since they add true value to organizational E-Readiness. This value can only be realized if people use the appropriate technology, and understand organizational processes and issues such as leadership, organizational culture, and change management. Table 1 summarizes the

e-learning readiness dimensions categorized by factors involving people in the organization.

2. **Process readiness** is an essential indicator of the functional efficiency of an organization, since processes are intertwined with people and technology to support the stability of an organization. Effective information and communication processes promote policies that support the organization, including business and information processes, information access and security and services and support. Table 2 summarizes the e-learning readiness dimensions categorized by the various processes.
3. **Technology readiness** is an important support for organizational readiness, and is necessary since it helps the business process, strengthen relationships among customers and develop new business models. Readiness factors for technology include communication infrastructure, reliability of information and communication technology and new technologies. Table 3 summarizes the e-learning readiness dimensions categorized by new and existing technology.
4. The **work environment** links people, business process, and technology elements, but may be impacted by factors such as culture, empowerment, and communication. Organizations should be ready to effectively incorporate technology enabled innovation into its work practices. Table 4 summarizes the e-learning readiness dimensions categorized by the work environment.

Table 1

Summary of Studies on E-readiness since 2000, Categorized by People in Organization

Study / E-readiness dimensions	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Smith (2005)	Dada (2006)	Mutula and van Brakel (2006)	Pillay, Irving and Tones (2007)	Sadik (2007)	Lou and Goulding (2010)	Darab and Montazer (2011)
Assessment										✓
Attitude							✓	✓		
Awareness					✓					
Change management									✓	
Commitment					✓					
Communication									✓	
Culture and Society									✓	
Experience								✓		
Human capital and skills / Human Resources	✓				✓	✓			✓	✓
Leadership and empowerment									✓	
Learner / Learner preferences		✓		✓			✓			

Table 1 (continued).

Summary of Studies on E-readiness since 2000, Categorized by People in Organization

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Smith (2005)	Dada (2006)	Mutula and van Brakel (2006)	Pillay, Irving and Tones (2007)	Sadik (2007)	Lou and Goulding (2010)	Darab and Montazer (2011)
Learning and further education									✓	
Organizational culture and society									✓	
Pedagogical competences								✓		
People		✓	✓							
Promotion and facilitation									✓	
Psychological	✓									
Self-development			✓	✓						
Sociological	✓									
Supervision										✓

Table 2

Summary of Studies on E-readiness since 2000, Categorized by Processes used in an Organization

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Dada (2006)	Karmakar and Wahid (2006)	Mutula and van Brakel (2006)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)	EIU and IBM (2010)	Lou and Goulding (2010)	Darab and Montazer (2011)
Basic enabling indicators							✓			
Business and information processes									✓	
Capability								✓		
Content	✓	✓			✓			✓		✓
Educational policy										✓
Enterprise						✓				
Governance				✓						
Information						✓				
Information access and connectivity									✓	
Innovation			✓							
Knowledge sharing and capture									✓	

Table 2 (Continued).

Summary of Studies on E-readiness since 2000, Categorized by Processes used in an Organization

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Dada (2006)	Karmakar and Wahid (2006)	Mutula and van Brakel (2006)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)	EIU and IBM (2010)	Lou and Goulding (2010)	Darab and Montazer (2011)
Laws and regulations										✓
Management		✓								✓
Networked economy									✓	
Policy and vision									✓	
Security										✓
Security and integrity									✓	
Services and support									✓	
Standards										✓
Support										✓
Training process					✓					
Web measure and services									✓	

Table 3

Summary of Studies on E-readiness since 2000, Categorized by Technology used in an Organization

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Dada (2006)	Mutula and van Brakel (2006)	Pillay, Irving and Tones (2007)	Sadik (2007)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)	EIU and IBM (2010)	Lou and Goulding (2010)	Darab and Montazer (2011)
Access and use of ICT by individuals								✓			
Communication network											✓
Computer self-efficacy						✓					
Connectivity									✓		
Equipment	✓										✓
Information infrastructure and management										✓	
Infrastructure and access								✓			
Interconnectability/ interoperability										✓	
New investments										✓	
New technologies										✓	

Table 3 (Continued).

Summary of Studies on E-readiness since 2000, Categorized by Technology used in an Organization

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Aydin and Tasci (2005)	Dada (2006)	Mutula and van Brakel (2006)	Pillay, Irving and Tones (2007)	Sadik (2007)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)	EIU and IBM (2010)	Lou and Goulding (2010)	Darab and Montazer (2011)
Reliability of ICT and communication infrastructure										✓	
Technical		✓									
Technological skills	✓					✓					
Technological competencies							✓				
Technology ICT and communication infrastructure										✓	
Technology			✓	✓	✓						
Technology and reach										✓	

Table 4

Summary of Studies on E-readiness since 2000, Categorized by Work Environment

Study / **E-readiness dimensions**	Chapnick (2000)	Kaur and Abas (2004)	Dada (2006)	Karmakar and Wahid (2006)	Mutula and van Brakel (2006)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)	EIU and IBM (2010)	Lou and Goulding (2010)	Darab and Montazer (2011)
Business			✓						
Communication								✓	
Culture		✓		✓			✓	✓	✓
e-business						✓			
e-education						✓			
e-government						✓			
Empowerment								✓	
Environmental	✓	✓			✓				
Financial	✓	✓		✓					✓
Leadership								✓	
Market Forces			✓						
Process vision development								✓	
Process-based team formation								✓	
Project management								✓	
Support Industries			✓						

In the context of this study, it is important for tertiary level institutions to determine whether their online instructors are e-ready for the challenge of shaping online educational experiences. IS literature has supported the 'user-process-technology' relationship as an enabler of E-Readiness, and thus encourages the integration between user and process through a flexible technology infrastructure (Centre for International Development, 2007; Lou & Goulding, 2010). Evaluation of factors affecting technology during the three IS stages will help to determine online instructors' overall success of e-learning, that is, their E-Readiness. However, there is a lack of research that evaluates online instructors' E-Readiness in the OLE (Adeyinka & Mutula, 2010).

Nine of the 11 identified studies from Table 3 that focused on technology E-Readiness tools were evaluated in an e-learning context. Holsapple and Lee-Post (2006) used a survey to measure E-Readiness using three dimensions namely, technical competence, lifestyle aptitude, and learning preference towards e-learning apart from online learners' academic preparedness, and also used a composite score to determine the level of E-Readiness. Darab and Montazer (2011) evaluated the degree of E-Readiness of Iranian higher education institutions. Thirteen E-Readiness models having 14 combined dimensions were compared, with key factors identified as technical infrastructure, content, policy, cultural, financial, standards, and human resource readiness. They observed that none of the models evaluated educational standards although 12 of the 13 models evaluated technological infrastructure readiness. Results of the study showed that Iranian universities were 28% e-ready, with deficits in all areas. The technical infrastructure readiness scored 48.5% with difficulties identified as the speed and hours of Internet access. Other studies have evaluated current E-Readiness tools to obtain a

combined score with the essential factors (Lou & Goulding, 2010; Mutula & van Brakel, 2006). Lou and Goulding (2010) evaluated the E-Readiness rankings based on initiation, development and practice of E-Readiness of eight countries and confirmed that the people-process-technology relationship are enablers of E-Readiness. Mutula and van Brakel noted that one of the key factors influencing the use of information is its accessibility through available technology and pointed out that high levels of E-Readiness can make information and knowledge available to individuals, thereby reducing the digital divide among institutions and users across the world. This suggests that the presence or absence of Information Quality may have some impact on subsequent IS system delivery and system outcome stages. These studies focused on E-Readiness of the online learner or the institution and not on the online instructors' E-Readiness.

Current literature presents a variety of E-Readiness tools that use a range of questions, statistics, verified benchmarking and historical analyses (Bridges.org, 2005). This has resulted in a plethora of derivations of E-Readiness surveys and a lack of standardization among them. A review of E-Readiness tools in 2003 that included 13 ready-to-use tools, five case studies and two surveys revealed that limitations such as over-simplification of the measurements to derive the indices, a lack of methodology on how the E-Readiness scores were derived, scant information on how the E-Readiness scores can be adjusted for contextual differences, and limitations in terms of flexibility and applicability of the scores (Lou & Goulding, 2010; Maugis, et al., 2003). Infinedo (2005) assessed the E-Readiness of nine African countries and concluded that E-Readiness tools mostly described the scores and identified problem areas, but they did not provide solutions for correcting any deficiencies. Picci (2006) added that E-Readiness

indexes have not assessed the affects of policies implemented or resulting organizational decisions, and that the indexes are only a measure of the enabling conditions. Dada (2006) also noted that some scores did not represent the actual E-Readiness situations, and reported that despite high levels of E-Readiness in Hong Kong, many organizations failed to adopt the benefits of available technology. Dada further stated that lack of IT infrastructure or user skill-set is apparent, and asked, 'How can developing countries focus on those factors that are important to them, and try and achieve developments at an incremental pace, even if the country as a whole is not deemed to be e-ready?' (p. 5).

To address this concern, the International Telecommunication Unit (International Telecommunication Unit - ITU, 2005) created a standard called the Digital Opportunity Index (DOI) based on agreed indicators from international contributors. The function of the DOI was to identify measures deemed important for measuring the information society, and use them for best practice benchmarking, but the ITU was uncertain about how well this tool would be accepted (Dada, 2006). Irrespective of the negative aspects of E-Readiness surveys and scores, they do provide a useful overview of IS success especially when analyzing the individuals using the technology and not the organization (Dada, 2006; Lou & Goulding, 2010). Table 5 summarizes the review of E-Readiness literature in an e-learning context.

Table 5

Summary of E-Readiness Studies Based on an E-Learning Context

Author(s)	Aydin and Tasci (2005)	Dada (2006)	Darab and Montazer (2011)	Hanafizadeh, Hahafizadeh, and Khodabakhshi (2009)
Purpose	To assess e-learning readiness in Turkey	To critically review E-Readiness concepts, focusing on developing countries	To assess capabilities of higher education systems to introduce and implement e-learning readiness programs	To define a measure that is a taxonomy of current widely diffused E-Readiness measurement instruments
Research context	Turkey	Tanzania and South Africa.	Iran	Global
Target Respondents	Policy makers	Enablers	Enablers	Policy makers and receivers
Methodology	Theoretical and survey	Theoretical and case study	Theoretical and survey	Theoretical
Sample	50 managers of companies	406 participants in 35 group support system meetings in Tanzania and South Africa.	E-Readiness factors compared: network, equipment, security, financial, human resources, support, laws, standard and information content	E-readiness studies
Instrument / Construct	An "e-Learning Readiness Survey" (e-LRS)	Case study	Comparative studies	Comparative studies
Main findings or contribution	Companies surveyed were ready for e-learning	Neither country was e-ready. Tanzania users were more satisfied but with lower levels of E-Readiness	Overall E-Readiness at Iranian university was 2.8 out of 10 which suggested serious deficits within the 9 E-Readiness factors	Categorization of E-Readiness measures that prevent repetitive research, and identify drawbacks in previous measures.

Table 5 (continued).

Summary of E-Readiness Studies Based on an E-Learning Context

Author(s)	Kaur and Abas (2004)	Lou and Goulding (2010)	Mutula and van Brakel (2006)	Pillay, Irving, and Tones (2007)	Sadik (2007)
Purpose	To assess e-learning readiness of Malaysian open university users	To investigate the E-Readiness of selected nations and organizations	To assess E-Readiness tools with respect to information access	To assess tertiary students' readiness for online learning	To determine the state of readiness of university faculty to implement e-learning strategies in their courses
Research context	Malaysia	UK, Ireland, France, Denmark, Finland, Sweden, USA, Singapore	South Africa	Australia	Egypt
Target Respondents	Enablers and receivers	Policy makers and enablers	Policy makers	Receivers	Enablers
Methodology	Survey	Theoretical	Theoretical	Survey	Theoretical and survey
Sample	35 tutors and 93 learners of Open University Malaysia	E-readiness ranking of UK, Ireland, France, Denmark, Finland, Sweden, ISA and Singapore	Evaluation of existing organizational, ICT, human resources, and external E-Readiness tools.	254 students in education courses at an Australian university	259 faculty members

Table 5 (continued).

Summary of E-Readiness Studies Based on an E-Learning Context

Author(s)	Kaur and Abas (2004)	Lou and Goulding (2010)	Mutula and van Brakel (2006)	Pillay, Irving, and Tones (2007)	Sadik (2007)
Instrument / Construct	60-item survey: learner, management, personnel, content, technical, ecological, cultural and financial readiness.	Comparative studies	Proposed model IUP= (A+B+C+D) where A= Information resources and activities, B= Information needs and uses, C= Physical, social and administrative variables, D= dynamics of (A+B+C)	20-item survey using a Likert-type scale called Tertiary students' readiness for online learning (TSROL)	66-item survey using a Likert-type scale
Main findings or contribution	Tutors and learners are moderately e-ready. Some individuals may need to be trained for the OLE before they are deemed e-ready.	People-process-technology relationship are enablers of E-Readiness	Development of a single E-Readiness tool that combines enterprise, human resources, information, ICT, and External environment readiness segments	TSROL could also be used to evaluate intervention courses by collecting pre- and post-test measures to determine shifts on any of the factors	Majority of respondents thought they had limited competence and little experience in e-learning.

Delone and McLean's IS success model

DeLone and McLean's (1992) IS success model was built on models developed by Shannon and Weaver (1949), then Mason (1978), and provides an important framework for predicting and explaining IS success through the development of a taxonomy of dimensions (DeLone & McLean, 1992; Floropoulos, Spathis, Halvatzis, & Tsipouridou, 2010). The model initially comprised six dimensions, namely System Quality, Information Quality, System Use, User Satisfaction, individual impact and organizational impact. Researchers agreed that the dimensions were interrelated and not independent, and suggested that (1) System Quality and Information Quality together or individually affect both System Use and User Satisfaction; (2) System Use positively or negatively affect the amount of User Satisfaction, with the converse also true; (3) System Use and User Satisfaction directly predict individual impact; and (4) individual performance affects organizational impact (Floropoulos, et al., 2010; Guimaraes, Armstrong, & Jones, 2009). An updated framework in 2003 addressed IS innovations to include web-based applications, resulting in the addition of a Service Quality dimension and a net benefit dimension to encompass the individual impact and organizational impact dimensions (DeLone & McLean, 2003). The updated six dimensions comprised Information Quality, System Quality, Service Quality, use/intention to use, User Satisfaction, and Net Benefits. Over 200 journal articles have either adopted or expanded the IS success model's multidimensional associations (Petter & McLean, 2009).

Success of OLEs has been evaluated and applied in many domains using constructs outlined by the DeLone and McLean's model (DeLone & McLean, 2004; Floropoulos, et al., 2010; Klobas & McGill, 2010). Although the model has rarely been

applied in the e-learning domain, researchers suggested that it provided useful measures for studying OLE success (Klobas & McGill, 2010; Tella, Mutula, Mutshewa, & Totolo, 2010). However, studies that did apply the model in an e-learning context focused on the online learner with fewer focusing on the instructor, such as Holsapple and Lee-Post (2006) who investigated e-learning system development using the model as a framework. Lin (2007) used the model to further understand factors that measure IS success in the OLE, and showed that the dimensions at the system design stage had a significant effect on System Use through User Satisfaction. Tella et al. (2010) adapted and extended the updated IS success model to evaluate course content management success, on the premise that teaching and learning quality regarding a course content management system should increase System Use and result in system success. Klobas and McGill (2010) also used the DeLone and McLean model to study the role of learner involvement in OLE success while Yengin, Karahoca, and Karahoca (2011) used the model to evaluate and categorize online instructor satisfaction.

Wang, Wang and Shee (2007) also applied the DeLone and McLean model to develop and validate an instrument to measure IS success in an OLE. They assessed the effectiveness of e-learning systems in an organizational context, by analyzing the employee from an e-learner viewpoint. Eom (2010) as well as Stapleton, McAllister, and Schwieger (2009) selected items from the Wang, et al. survey to examine the relationships among e-learning systems, university students' satisfaction and their perceived learning outcomes. These studies were based on online learners, a single university system, and did not evaluate any E-Readiness factors or use participants from the Caribbean region. The framework in this dissertation blended the DeLone and

McLean's IS success model and the conceptual E-Readiness model proposed by Holsapple and Lee-Post. Table 6 summarizes studies that have used DeLone and McLean IS success model in an e-learning context.

Table 6

Summary of Studies using Delone and McLean (2004) IS Success Model in an E-Learning Context

Study	**Methodology**	**Sample**	**Instrument / Construct**	**Main Findings or Contribution**
Eom (2010)	Theoretical and survey	809 mid western university students who completed least one online course	Seven questions from the survey developed by Wang, Wang and Shee (2007) using likert-type scale and six demographic questions	System quality and Information Quality significantly affect students' satisfaction. System use showed no effect on students' satisfaction.
Freeze, Alshare, Lane and Wen (2010)	Theoretical and survey	674 students at a Midwestern university enrolled in at least one online course	20-item survey using a likert type scale	User satisfaction compared to System Use had a stronger impact on system success.
Halonen, Acton, Golden, and Conboy (2009)	Descriptive case study and survey	25 online learners at a private institution offering post-secondary tuition	29-item survey using likert-type scale and three open-ended questions	Relationship among five measures was interpreted positively apart from Information Quality which was perceived as good.

Table 6 (continued).

Summary of Studies using Delone and McLean (2004) IS Success Model in an E-Learning Context

Study	**Methodology**	**Sample**	**Instrument / Construct**	**Main Findings or Contribution**
Holsapple and Lee-Post (2006)	Action research and survey	120 online learners over four action research cycles	36-item scale to assess e-learning systems success (ELSS) 21-item scale to measure online learners' E-Readiness	Critical factor of e-learning success is the online readiness of the e-learner.
Lin (2007)	Theoretical and survey	232 undergraduate online learners at a Taiwan university	25 items using a likert-type scale to assess system success	System quality, Information Quality and Service Quality had a significant effect on actual OLE use through User Satisfaction and use.
Stapleton, McAllister, & Schwieger (2009)	Case study	674 online learners at a Midwestern university	35-item survey using a likert type scale adapted from the Wang et al. survey	Further tested e-learning success model developed by Wang, Wang, and Shee (2005) using an OLE at a university
Tella, Mutula, Mutshewa, and Totolo (2010)	Theoretical, survey, and interviews	503 students and 20 lecturers at a university in Botswana using WebCT CMS	40-item survey using a likert type scale for students and four interview questions for lecturers	Some constructs needed attention to improve system success.

Table 6 (continued).

Summary of Studies using Delone and McLean (2004) IS Success Model in an E-Learning Context

Study	Methodology	Sample	Instrument / Construct	Main Findings or Contribution
Wang, Wang, and Shee (2007)	Theoretical and survey	206 employees from eight international and local organizations in Taiwan	34-item scale to assess e-learning systems success (ELSS)	Developed an instrument to test OLE success based on the model
Wang and Wang (2009)	Theoretical and survey	268 university instructors	49-item likert- type scale	System quality had no effect on System Use; Information Quality affected System Use.
Yengin, Karahoca, & Karahoca (2011)	Theoretical and survey	Literature research	Development of an E-learning Success Model for Instructors' Satisfaction model	Model used in understanding usability outcomes for e-learning designers, online instructors and policy makers

The following subsections use DeLone and McLean's (2004) constructs to show the results of studies that examined information systems success, highlighting those that use an OLE. The dimensions are defined and relationships among them as well as their measures are discussed.

System design stage

The model of this study suggested that investigation of technology barriers to online instructor E-Readiness at the systems design stage include System Quality (technical quality of the OLE), Information Quality (quality of information that may be obtained from the OLE), and Service Quality (quality of support and services that assist online users). With System Quality, technological capabilities comprising hardware, software and associated information suggest a symbiotic relationship where technology and online teaching depend on each other to be effective (Greenhalgh, Robert, Bate, Macfarlane, & Kyriakidou, 2005).

Studies using the D&M model have found that System Quality and Information Quality affect System Use and User Satisfaction, while other results have found high, low or non-significant correlations among the dimensions. For example, Floropoulos et al. (2010) investigated a Greek Taxation Information System and concluded that Information Quality exhibited a stronger effect over Service Quality as determinants of User Satisfaction. Klobas and McGill (2010) investigated the roles of instructor involvement in OLE success and showed that System Quality, Information Quality, and Service Quality all influenced User Satisfaction although they suggested that Service Quality may be more important to the overall success of the OLE at the institutional level and not the individual course level. Wang and Wang (2009) suggested that System Quality may be important during the initial stages of system implementation but may diminish thereafter. Petter and McLean (2009) conducted a meta-analysis of 52 studies that used the DeLone and McLean model at the individual level, and found a strong relationship between both System Quality and Information Quality with User Satisfaction, a moderate relationship

between both System Quality and Information Quality with System Use, and a weak relationship between System Use and User Satisfaction. Petter and McLean did not find significant relationships between Service Quality and User Satisfaction nor Service Quality and System Use. Other studies note that the Information Quality of online courses such as course objectives and course infrastructure affect satisfaction levels, System Use and learning outcomes (Eom, Ashill, & Wen, 2006). Halonen et al. (2009) noted that online learners sometime found it difficult to locate information in the OLE, although they thought the information was well organized and up-to-date. Wang and Liao (2008) also indicated that Information Quality had a more dominant influence on System Use, User Satisfaction, and perceived net benefit, than on System Quality and Service Quality. This suggests that more attention should be paid to Information Quality in an IS. The three dimensions of this stage, namely System Quality, Service Quality and Information Quality are further discussed in the following sections.

System quality

DeLone and McLean (1992) defined System Quality as 'measures of the information processing system itself' while Wu and Wang (2006), believed System Quality was dependent on its operational features. Maes and Poels (2006) suggested that System Quality can only be measured when a user interacts with a system to complete a specific task. In an e-learning context, System Quality is measured by availability of hardware to the user and the various software applications available for their use, which are supported by high quality Internet access (Guimaraes, et al., 2009; Halawi, McCarthy, & Aronson, 2008). IS literature has identified a core of measures for System Quality

which include accessibility, flexibility, response time, reliability, ease of use, good availability, user friendliness and accuracy (Floropoulos, et al., 2010; Halonen, et al., 2009; Laudon & Laudon, 2007; Ward, Ruddy, & Hill, 2009). Halawi et al (2008), and Guimaraes et al. (2009), stress the high quality aspect of OLEs in their list of characteristics which include availability, usability, awareness of user expectations, ease of learning, and response time. In contrast, Wang and Wang (2009) use factors such as the design of the user interface and the usefulness of the functions in the OLE to describe the measure of their survey.

Comparisons of measures used in this study were based on the qualitative study by DeLone and McLean (2003) whose model was initially developed as a 25-item survey to evaluate e-commerce success. Five measures for System Quality were developed, namely adaptability, availability, reliability, response time and usability. Holsapple and Lee-Post (2006) adapted the measures to better understand the opinions of online learners in their action research and used five of their 23 modified metrics to measure System Quality, while Lin (2007) also used the model to examine the determinants for successful use of online learning systems but measured System Quality using four of the 24 items in their survey. Lin's study used confirmatory factory analysis and all items had factor loadings higher than 0.7. Wang et al. (2007) developed and validated a survey based on Delone and McLean's model as well as IS literature to evaluate e-learning system success in an organizational context, and used seven items of a 34-item survey to measure System Quality. Wang et al. found a Cronbach's *alpha* of 0.8956 for the items. Halonen, Acton, Golden, and Conboy (2009) used the DeLone and McLean, Holsapple and Lee-Post and Wang et al. models to develop a descriptive tool in contributing to the evaluation of the

virtual environment. However, Halonen et al. used the 'good availability' measure from the DeLone and McLean model, the 'stable, easy-to-use and user friendly' measures from the Holsapple and Lee-Post survey, and the 'easy-to-use' item from the Wang et al. survey instrument to measure System Quality. Yengin et al. (2011) also used DeLone and McLean's and Holsapple and Lee-Post's models in their qualitative study to determine IS success metrics in an OLE and incorporated six items to measure System Quality. Eom (2010) conducted a path analysis to examine the relationships among the variables of the Delone and McLean model, and selected seven items from the 34-item Wang et al. survey to measure Service Quality. Only one of the seven items, namely, 'the system is user friendly', measured the System Quality construct. Freeze et al. (2010) tested the DeLone and McLean model using the model's success metrics but modified the five items for System Quality items from their adapted 20-item survey, producing a Cronbach's *alpha* of 0.91. Table 7 summarizes the measures of System Quality developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 7

Measures of System Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	**System Quality Metrics**
DeLone and McLean (2003)	1. Adaptability 2. Availability 3. Reliability 4. Response time 5. Usability

Table 7 (Continued)

Measures of System Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	System Quality Metrics
Freeze, Alshare, Lane and Wen (2010)	1. The system is always reliable 2. the system is user friendly 3. The system provides interaction between users and the system 4. The system has attractive features that appeal to users 5. The system provides high speed information access Cronbach's *Alpha* = 0.91
Eom (2010)	1. The system is user-friendly
Halonen, Acton, Golden, and Conboy (2009)	1. Good availability 2. Stable 3. Easy-to-use 4. User friendly
Holsapple and Lee-Post (2006)	1. Easy-to-use 2. User friendly 3. Stable 4. Secure 5. Fast
Lin (2007)	1. Operation of online learning system (OLS) is reliable 2. OLS allows information to be readily accessible to me 3. It takes too long for using OLS to respond to my requests 4. I find OLS easy to use
Wang, Wang and Shee (2007)	1. The e-learning system provides high availability 2. The e-learning system is easy to use 3. The e-learning system is user-friendly 4. The e-learning system provides interactive features between users and system 5. The e-learning system provides a personalized information presentation 6. The e-learning system has attractive features to appeal to the users 7. The e-learning system provides high-speed information access Cronbach's *Alpha* = 0. 8956
Yengin Karahoca, and Karahoca (2011)	1. Easy-to-use 2. User friendly 3. Stable 4. Secure 5. Fast 6. Responsive

Service quality

DeLone and McLean (2003) reported that common measures for constructs focus on tangible responses rather than the practical aspects of the system, and included the Service Quality construct with intended measures such as tangible, reliability, responsiveness, assurance and empathy. Petter and McLean (2009) also described Service Quality as the IS department's support to users and measures it by the organization's responsiveness, reliability, and empathy to the user. In an e-learning context, Service Quality is measured as those desirable characteristics of the OLE environment, as well as the interaction between online learners and instructors, using measures such as availability, responsiveness, fairness and understanding in the OLE (Halonen, et al., 2009; Holsapple & Lee-Post, 2006). Adeyinka and Mutula (2010) evaluated a course management system (CMS) in an educational setting and defined Service Quality as the overall support delivered by the CMS's service provider, or support provided to students in the CMS environment, irrespective of whether the support is delivered by the IS department, the CMS support personnel, or outsourced to an Internet service provider.

DeLone and McLean (2003) used three metrics for Service Quality namely, assurance, empathy, and responsiveness in evaluating e-commerce success. Holsapple and Lee-Post (2006) adapted the model to measure Service Quality in an e-learning context using two of 23 items in their survey, while Lin (2007) measured Service Quality through five of the 24 surveyed items to examine successful use of online learning systems. Lin used confirmatory factor analysis with all items having loadings higher than 0.7. Wang et al. (2007) evaluated e-learning system success in an organizational context, and used five items of a 34-item validated survey to measure Service Quality using a

modified Delone and McLean's model and IS literature. Wang et al. found a Cronbach's *alpha* of 0.8807 for the items. Halonen, Acton, Golden, and Conboy (2009) evaluated the virtual environment using the DeLone and McLean model and adapted models from both Holsapple and Lee-Post and Wang et al. However, Halonen et al. added their own 'understanding' measure and three measures, 'available, responsive and fair' from Holsapple and Lee-Post to measure Service Quality. Yengin et al. (2011) also used five measures derived from the modified DeLone and McLean and Holsapple and Lee-Post Service Quality constructs to create an e-learning success model for instructor's satisfaction. Table 8 summarizes the measures of Service Quality developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 8

Measures of Service Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	**Service Quality Metrics**
DeLone and McLean (2003)	1. IS has up-to-date hardware and software (tangible) 2. IS is dependable (reliable) 3. IS employees give prompt service to others (responsiveness) 4. IS employees have the knowledge to do their job well (assurance) 5. IS has users' best interests at heart (empathy)
Halonen, Acton, Golden, and Conboy (2009)	1. Available 2. Responsive 3. Fair 4. Understanding
Holsapple and Lee-Post (2006)	1. Responsive 2. Meeting my needs

Table 8 (Continued)

Measures of Service Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	Service Quality Metrics
Lin (2007)	1. Online Learning system (OLS) has visually appealing materials 2. The user interface of OLS has a well organized appearance 3. OLS provides the right solution to my request 4. OLS does not give me individual attention 5. OLS gives me prompt service
Wang, Wang and Shee (2007)	1. The e-learning system provides a proper level of on-line assistance and explanation 2. The e-learning system developers interact extensively with users during the development of the e-learning system 3. The IS department staff provides high availability for consultation 4. The IS department responds in a cooperative manner to your suggestion for future enhancements of e-learning system 5. The IS department provides satisfactory support to users using the e-learning system Cronbach's *alpha* = 0.8807
Yengin Karahoca, and Karahoca (2011)	1. Prompt 2. Responsive 3. Fair 4. Knowledgeable 5. Available

Information quality

Information quality is a key antecedent of information systems success, and has been extensively studied in recent decades due to the exponential growth in the quantity of and reliance on information by users and organizations (Bharosa, Appelman, van Zanten, & Zuurmond, 2009; DeLone & McLean, 1992). Information quality also described as knowledge quality (Wu & Wang, 2006), is defined by DeLone and McLean (1992) as 'the measure of information system output'. Bharosa et al. noted that researchers rarely define Information Quality, but instead provide a list of varying

dimensions that quality information should satisfy or are dependent on the context of use. Floropoulos (2010) supported the definition of Shannon and Weaver (1949), that Information Quality focuses on the 'interpretation of the meaning by the receiver, as compared with the intended meaning of the sender' (p. 50).

A range of characteristics describing Information Quality exists. Floropoulos (2010) measured it as the actual degree to which the information produced by the IS compares to the needs of the user, such as accuracy, reliability, completeness, relevance, preciseness, conciseness and currency. Chen (2010) referred to Information Quality as online instructors' perception of the characteristics of the information, such as its accuracy and reliability, and format of the information that is output. Another list suggests timeliness, accuracy, completeness and thoroughness (Bradley, Pridmore, Jeannie, Byrd, & Anthony, 2006) while completeness, timeliness, relevance, sufficiency, understandable, and up-to-date were provided by Wang et al. (2007).

DeLone and McLean (2003) conducted a qualitative study and measured Information Quality in their 25-item survey to evaluate e-commerce success using five metrics, namely completeness, ease of understanding, personalization, relevance and security. Holsapple and Lee-Post's (2006) study focused on e-learning and adapted the model to include seven of 23 modified items to measure Information Quality. Lin (2007) also used the model to examine the determinants for successful use of online learning systems but measured Information Quality using five of their 24 modified items. Having developed and validated a survey based on Delone and McLean's model and IS literature to measure e-learning system success in an organizational context, Wang et al. (2007)

used six items of a 34 item-survey to measure User Satisfaction. Wang et al. found a Cronbach's *alpha* of 0.9102 for the items.

Halonen, Acton, Golden, and Conboy (2009) used the DeLone and McLean model and adapted models from both Holsapple and Lee-Post and Wang et al. to develop a descriptive tool in contributing to the evaluation of the virtual environment. In measuring the dimensions of Information Quality, Halonen et al. used one measure, 'essential' from the Delone and McLean survey, one measure, 'sufficient' from the Wang et al. survey and four measures, 'usefulness, well organized, clearly written, and up-to-date' from the Holsapple and Lee-Post survey.

Yengin et al. (2011) also used the modified DeLone and McLean and Holsapple and Lee-Post models to determine IS success metrics in an OLE selecting seven modified metrics to measure Information Quality. Eom (2010) examined the relationships among the variables of the Delone and McLean model, using a select seven items from the 34-item Wang et al survey. To measure Information Quality, Eom used one item, 'The system provides information that is exactly what you need', and the results showed that Information Quality affected User Satisfaction. Freeze et al. (2010) used five items of a modified 20-item survey instrument to measure Information Quality using survey instruments developed from the DeLone and McLean model. Table 9 summarizes the measures of Information Quality developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 9

Measures of Information Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	Information Quality Metrics
DeLone and McLean (2003)	1. Completeness 2. Ease of Understanding 3. Personalization 4. Relevance 5. Security
Eom (2010)	1. The system provides information that is exactly what you need
Freeze, Alshare, Lane and Wen (2010)	1. The system provides information that is exactly what you need 2. The system provides information that is relevant to learning 3. The system provides sufficient information 4. The system provides information that is easy to understand 5. The system provides up-to-date information Cronbach's *alpha* = 0.95
Halonen, Acton, Golden, and Conboy (2009)	1. Essential 2. Sufficient 3. Useful 4. Well organized 5. Clearly written 6. Up-to-date
Holsapple and Lee-Post (2006)	1. Well organized 2. Effectively presented 3. Of the right length 4. Clearly written 5. Useful 6. Up-to-date
Lin (2007)	1. The information provided by the Online Learning System (OLS) is accurate 2. OLS provides relevant information for my job 3. The information from OLS is up-to-date enough for my purpose 4. The information content in the OLS meets my needs 5. OLS provides me with a complete set of information

Table 9 (Continued).

Measures of Information Quality Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	Information Quality Metrics
Wang, Wang and Shee (2007)	1. The e-learning system provides information that is exactly what you need 2. The e-learning system provides information you need at the right time 3. The e-learning system provides information that is relevant to your job 4. The e-learning system provides sufficient information 5. The e-learning system provides information that is easy to understand 6. The e-learning system provides up-to-date information Cronbach's *alpha* = 0.9102
Yengin Karahoca, and Karahoca (2011)	1. Completeness 2. Well organized 3. Effectively presented 4. Of the right length 5. Clearly written 6. Useful 7. Up-to-date

System delivery stage

Barriers at the system delivery stage that will be investigated include *system use*, which is the extent to which system tools are used in the OLE, such as discussion boards, chat rooms, and e-mail, and online *instructor satisfaction* which gathers opinions of online teachers based on their experience in the OLE. User satisfaction in an OLE has been proposed as a replacement for systems use and resulting IS success (Gill, 2006). Although the DeLone and McLean model assumes that the user voluntarily uses the system, in the e-learning context System Use is mandatory both by online learners and instructors in an educational environment (Freeze, et al., 2010). Gill (2006) cautioned that in an OLE, measures of User Satisfaction should be based on learning outcomes since

System Use is mandatory. However, in this study, users are online instructors who voluntarily accept to teach in the OLE.

The link between System Use and User Satisfaction is described by Nicolle (2005) who studied the impact of online instructors' technology adoption in their online teaching. A connection was found between technology use and effective teaching that was vital in encouraging online instructors in their process of integrating technology in their online activities. As a result, if online instructors perceive technology as being positive in their online teaching, then they are likely to be motivated to use its various aspects in their teaching. Information quality has also been strongly linked with System Use in recent studies, since the quality of information is a strong factor in influencing users to have confidence in the IS (Klobas & McGill, 2010; Mutula & van Brakel, 2006).

Freeze et al. (2010) examined IS system success by testing the model using a convenience sample of 674 university students and reported that User Satisfaction was a stronger factor in IS system success than System Use. The researchers did report that System Use and User Satisfaction in an OLE may not necessarily be related based on the focus and differences of online instructors in their courses.

System use

System use is an often reported measure of an IS where its quality, nature and appropriateness are important outcomes and not simply time spent using the system (DeLone & McLean, 2004). Petter and McLean (2009) found that System Use could be interpreted as actual use, self reported use, depth of use, or importance of use, which address the construct from different points of view. Hence, it is theorized that the

inconsistency of the interpretations of System Use may prove difficult in understanding its relationships with the other constructs in the IS success model.

DeLone and McLean (2003) used four metrics for System Use namely, nature of use, navigation patterns, number of site visits and number of transactions executed in evaluating e-commerce success. Holsapple and Lee-Post (2006) adapted the model to measure System Use in an e-learning context using nine of 23 items in their survey, while Lin (2007) measured System Use through three of the 24 surveyed items to examine successful use of online learning systems. Wang et al. (2007) used three items of a 34-item validated survey to measure System Use using a modified Delone and McLean's model and IS literature to measure e-learning system success in an organizational context.

Halonen, Acton, Golden, and Conboy (2009) developed a descriptive tool to evaluate the virtual environment using the DeLone and McLean model and adapted models from both Holsapple and Lee-Post and Wang et al. Halonen et al used their own measures specific to their study to measure System Use. Eom (2010) selected seven items from the 34-item Wang et al survey, using only one item, 'I frequently use the system', to measure the System Use construct. Freeze et al. (2010) tested the model using survey instruments developed from DeLone and McLean's model where three items tested for System Use in the 20-item survey were used in the analysis. One item 'I only use the system when it is absolutely necessary for learning' was removed from the survey, as it did not load properly on its construct and had an unacceptable Cronbach *alpha* value. Yengin et al. (2011) used nine modified metrics for System Use from DeLone and McLean's and Holsapple and Lee-Post's survey instrument to address use of the various

technology tools in the OLE. Table 10 summarizes the measures of System Use developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 10

Measures of System Use Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	System Use Metrics
DeLone and McLean (2003)	1. Nature of use 2. Navigation patterns 3. Number of site visits 4. Number of transactions executed
Eom (2010)	1. I frequently use the system
Freeze, Alshare, Lane and Wen (2010)	1. I frequently use the system 2. I depend upon the system 3. I only use the system when it is absolutely necessary for learning * * Deleted from analysis Cronbach's *alpha* = 0.83
Halonen, Acton, Golden, and Conboy (2009)	1. Density of use 2. Timetable 3. Study material 4. Exercises 5. Guideline to accomplishing degree
Holsapple and Lee-Post (2006)	1. PowerPoint ® slides 2. Audio to accompany the slides 3. Script to accompany the slides 4. Discussion board questions 5. Case studies 6. Practice problems 7. Excel tutorials 8. Assignments helped understand the subject 9. Practice exam
Lin (2007)	1. I use the Online Learning System (OLS) to increase my sense of accomplishment 2. I use OLS to improve my status among my peers 3. I use OLS to increase my chances of obtaining networks

Table 10 (Continued).

Measures of System Use developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	System Use Metrics
Wang, Wang and Shee (2007)	1. The frequency of use with the e-learning system is high 2. The e-learning system usage is voluntary 3. You depend upon the e-learning system Cronbach's *alpha* = 0.8561
Yengin Karahoca, and Karahoca (2011)	1. PowerPoint ® slides 2. Audio to accompany the slides 3. Script to accompany the slides 4. Discussion board questions 5. Case studies 6. Practice problems 7. Excel tutorials 8. Assignments helped understand the subject 9. Practice exam

Online instructor satisfaction

Delone and McLean (1992, 2003) reported that User Satisfaction is a significant factor in IS system success. Adeyinka and Mutala (2010) evaluated IS success of a WebCT© course content management system and referred to student satisfaction in their study as 'the degree to which an individual user is satisfied with his or her overall use of the course content management system under consideration' (p. 1799), Freeze et al. (2010) defined e-learner satisfaction as 'a measure of the successful interaction between an information system and its users' (p. 174), while Petter and McLean (2009) defined the construct as 'approval or likeability of an IS and its output (p. 161).

Since online instructor satisfaction is considered to be one of the major contributors of quality in online learning and is instrumental to the success of online educational programs, measures of the levels of instructor satisfaction are also used to

assess overall program effectiveness (Menchaca & Bekele, 2008; Ozkan & Koseler, 2009). However, most measures were modified from validated scales where the users were learners or employees and not online instructors. DeLone and McLean (2003) initially developed a 25-item survey to evaluate e-commerce success and used three metrics for User Satisfaction, namely repeat purchases, repeat visits and user surveys. Holsapple and Lee-Post (2006) adapted the model to understand the opinions of students on e-learning using four from 23 modified metrics to measure User Satisfaction, while Lin (2007) also used the model to examine the determinants for successful use of online learning systems but measured User Satisfaction using three of the 24 modified metrics. Wang et al. (2007), developed and validated a survey based on Delone and McLean's model and IS literature to measure e-learning system success in an organizational context using four items of a 34-item survey for User Satisfaction. Halonen, Acton, Golden, and Conboy (2009) used the DeLone and McLean model and adapted models from both Holsapple and Lee-Post and Wang et al. to develop a descriptive tool in contributing to the evaluation of the virtual environment. Halonen et al. used only three measures from the Holsapple and Lee-Post survey, namely, 'overall satisfaction, enjoyable experience, and overall success'. Eom (2010) conducted a path analysis to examine the relationships among the variables of the Delone and McLean model, and selected seven items from the 34-item Wang et al. survey, using one item to measure the User Satisfaction construct. Freeze et al. (2010) tested the model using survey instruments developed from the DeLone and McLean model, where only two of the three items tested for User Satisfaction in the 20-item survey instrument were used in the analysis. Yengin et al. (2011) used measures from DeLone and McLean's as well as Holsapple and Lee-Post's

models to determine IS success metrics in an OLE and modified the metrics as 'overall satisfaction with the course, enjoyable learning experience, overall system success and recommending the course to others'. Table 11 summarizes the measures of User Satisfaction developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 11

Measures of User Satisfaction developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	User Satisfaction Metrics
DeLone and McLean (2003)	1. Repeat purchases 2. Repeat visits 3. User surveys
Eom (2010)	1. Overall, I am satisfied with the system
Freeze, Alshare, Lane and Wen (2010)	1. I do not have a positive attitude or evaluation about the way the system functions * (deleted from survey) 2. I think the system is helpful 3. Overall, I am satisfied with the system Cronbach's *alpha* = 0.92
Halonen, Acton, Golden, and Conboy (2009)	1. You are satisfied with the course 2. You enjoyed the learning experience 3. Overall, you believe the system is successful
Holsapple and Lee-Post (2006)	1. You are satisfied with the course 2. You enjoyed the learning experience 3. You believe the system is successful 4. You will recommend the course to others
Lin (2007)	1. I am pleased with the experience of using online learning systems 2. I am very satisfied with the information I receive from the online learning system 3. Overall, my interaction with the online learning system is very satisfying

Table 11 (Continued).

Measures of User Satisfaction developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	User Satisfaction Metrics
Wang, Wang and Shee (2007)	1. Most of the users bring a positive attitude or evaluation towards the e-learning system function 2. You think that the perceived utility about the e-learning system is high 3. You are satisfied with the e-learning system Cronbach's *alpha* = 0.9080
Yengin Karahoca, and Karahoca (2011)	1. Overall satisfaction 2. Enjoyable experience 3. Overall success 4. Recommend to others

System outcome stage

Although the earlier DeLone and McLean (1992) model assessed two system outcomes, namely individual and organizational, the updated 2003 model assessed only one system outcome called Net Benefits. Halonen et al. (2009) analyzed Net Benefits in the OLE from the point of view of the online learner in the entire program and not a single course, since they reported that online learners' most important benefit of the OLE was at the completion of their degrees. In this study, the system outcome stage has also captured the overall perceived benefits of online instructors' experience in the OLE such as issues of online instructor academic success in the OLE and technology dependence. DeLone and McLean reported that positive or negative Net Benefits of a system will influence or deter subsequent System Use and User Satisfaction but noted that researchers need to clearly and carefully define the context in which the Net Benefits are to be measured. Petter and McLean (2009) defined Net Benefits generally as the 'effect

of an IS on an individual, group, organization, industry, or society, etc., which is often measured in terms of organizational performance, perceived usefulness, and affect on work practices', (p. 161). Wu and Wang (2006) remarked that there is little consensus on how Net Benefits should be objectively measured apart from the perceptions of those who use the IS, and defined *perceived* Net Benefits as the 'degree to which a user believes that use of the system results in benefits to the user or the organization' (p. 731), and added that apart from the users' feelings other dimensions such as IS effectiveness should be captured. Adeyinka and Mutula (2010) also measured Net Benefits by how users perceived the value of the course content management system as well as the increased performance of individual online users' learning or teaching activities. Wang and Liao (2008) considered Net Benefits to be an important system success measure, and assessed the variable using a Likert-type scale by two items, 'the system makes my job easier', and 'the system saves me time', and found that System Use had the strongest and direct effect on perceived net benefit. The Wang and Liao study concluded that in an eGovernment context, perceived net benefit was a closer measure of system success than the other five success measures. Chen's (2010) study on employees' use of OLEs for training measured net benefit by three item measures, 'Overall, I can well complete the tasks that I am assigned', ' Overall, I feel satisfied with my job', and 'Overall, my job performance is good'. It was found that these systems increased job outcomes and employees naturally transfer knowledge gained from the system to their job.

DeLone and McLean (2003) developed a 25-item survey instrument for e-commerce system success in their qualitative study, where five metrics, namely cost savings, expanded markets, incremental additional sales, reduced search costs, and time

savings were used in defining the measures for the Net Benefits. Holsapple and Lee-Post (2006), interpreted DeLone and McLean's (2004) model for the Net Benefits dimension and categorized them into positive and negative aspects. The positive aspects in their action research were enhanced learning, being empowered and time savings, while the negative aspects were lack of contact, isolation, quality concerns, and technology dependence. Wang et al. (2007) developed and validated a survey based on Delone and McLean's model and IS literature to measure e-learning system success in an organizational context, and analysed 10 items of a 34-item survey for User Satisfaction. Halonen et al. (2009) measured net benefit in the OLE using positive aspects specific to their qualitative study and negative aspects drawn from the responses to the qualitative aspect of the survey. Eom (2010) conducted a path analysis to examine the relationships among the variables of the Delone and McLean model, and selected seven items from the 34-item Wang et al. survey, using one item, 'I feel that online learning is equal to the quality of traditional classroom learning', to measure the User Satisfaction construct. Freeze et al. (2010) tested the model using survey instruments developed from the DeLone and McLean model. Four items were used as measures for e-learning system success in the 20-item survey instrument, with a Cronbach *alpha* of 0.92. Yengin et al. (2011) conducted a qualitative study and used measures from DeLone and McLean's as well as Holsapple and Lee-Post's models to determine IS success metrics in an OLE. Four metrics from each study were used to measure positive and negative aspects of e-learning system success. Table 12 summarizes the measures of Net Benefits from system outcomes developed by Delone and McLean, Holsapple and Lee-Post, as well as Wang et al.

Table 12

Measures of System Outcome Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	System Outcome Metrics
DeLone and McLean (2003)	1. Cost benefits 2. Expanded markets 3. Incremental additional sales 4. Reduced search costs 5. Time savings
Eom (2010)	1. I feel that online learning is equal to the quality of traditional classroom learning
Freeze, Alshare, Lane and Wen (2010)	1. The system has a positive impact on my learning 2. Overall, the performance of the system is good 3. Overall, the system is successful 4. The system is an important and valuable aid to me in the performance of my class work
Halonen, Acton, Golden, and Conboy (2009)	Positive aspects 1. Benefits to studies 2. Benefits to accomplishing degree Negative aspects 1. Use of time 2. Self guidance
Holsapple and Lee-Post (2006)	Positive aspects 1. Enhanced learning 2. Empowered 3. Time savings 4. Academic success Negative aspects 1. Lack of contact 2. Isolation 3. Quality concerns 4. Technology dependence

Table 12 (Continued).

Measures of System Outcome Developed by DeLone and McLean (2003), Holsapple and Lee-Post (2006), and Wang et al. (2007)

Study	System Outcome Metrics
Wang, Wang and Shee (2007)	1. The e-learning system helps you improve your job performance 2. The e-learning system helps you think through problems 3. The e-learning system helps the organization enhance competitiveness or create strategic advantages 4. The e-learning system helps the organization to respond more quickly to change 5. The e-learning system helps the organization provide better products or services to customers 6. The e-learning system helps the organization provide new products or services to customers 7. The e-learning system helps the organization save cost 8. The e-learning system helps the organization to speed up transactions or shorten product cycles 9. The e-learning system helps the organization increase return on investment 10. The e-learning system helps the organization to achieve its goal
Yengin Karahoca, and Karahoca (2011)	Positive aspects 1. Enhanced learning 2. Empowered 3. Time savings 4. Academic success Negative aspects 1. Lack of contact 2. Isolation 3. Quality concerns 4. Technology dependence

Summary

This chapter analyzed and reviewed the literature on the main topics of the study. First, technology barriers to online instructors in the OLE, as well as E-Readiness and its application in an educational environment were reviewed. Then literature related to the

DeLone and McLean IS success model that was applied to e-learning users in higher level institutions was reviewed. Literature on the three IS stages systems design, systems delivery and system outcome were individually analyzed and relationships among them and their dimensions were discussed.

Chapter 3

Methodology

Research design

The quantitative research study used two existing survey instruments to support the study of technology barriers to instructor E-Readiness in the OLE. Survey methodology is commonly used in IS research because of its high level of external validity (Palvia, et al., 2004). This methodology was used to understand the various perceptions of online instructor E-Readiness at the three IS success stages. The seven variables under investigation are System Quality, Service Quality, Information Quality, System Use, User Satisfaction, Net Benefits, and E-Readiness. This chapter described the study sample and demographic factors in the study population.

Sample and participants

The sample for this study was online instructors hired to teach online learners at an English-speaking Caribbean university system. The university system supports the tertiary educational needs of approximately 40,000 students from 16 Caribbean countries with three campuses each located in a different Caribbean country as shown in Figure 4. A fourth campus, called the Open Campus (OC) caters specifically to online teaching and learning across the countries with blended and fully online teaching and learning services

are offered through 42 virtual and physical site locations. This research focused on assessing the E-Readiness of online instructors at the system design, system delivery and system outcome stages of the OC.

Figure 4. The 16 Caribbean countries affiliated with the Caribbean university system, with the campus territories denoted by 'C'

Online instructor sample

In 2008, the online campus of the university upgraded to the Blackboard CMS, configured it to meet the unique needs of the university's OLE, and renamed it *The Learning Exchange*. A self-study five-unit online orientation course called an "Introduction to The Learning Exchange" was then made available on the CMS for all online users to learn about the basics of the customized interface. All potential online instructors are also required to complete a four-week mandatory online training course in 'Facilitating and Managing Online Instruction' (MFOI) prior to being hired as online

instructors of their respective courses. This course is intended to train instructors on how to effectively manage and facilitate an online course. Only those who had successfully completed the course are given continuing contracts to teach online courses. The Learning Exchange also has a standard format for all courses which comprises electronic drop boxes for assignments, specific locations in the CMS for posting and viewing grades, weekly topics, and for online learners to post to each unit's discussion forums. There is no formal hardware training.

Sample size

The decision to use online instructors is based on the ability to obtain their active email addresses and also to acquire a sample size that is sufficient for the number of variable tested. Of 152 courses that are offered by the OC, 144 are online and managed by full- and part-time online instructors. Courses are offered at least once in a three-semester academic year. The recommended minimum for the target sample according to Gall et al. (2003), is calculated at 15 participants for each of the seven variables used in this study or 105 instructors. Each course is coordinated by one course coordinator and a minimum of ten e-tutors providing a sufficient sample of about 1500 available instructors for the study.

Survey instruments and measures

One survey instrument including a demographic section was used in this study: (a) an e-learning systems success (ELSS) section (Wang, et al., 2007), and (b) an E-Readiness section (Holsapple & Lee-Post, 2006). The ELSS survey is included in

Appendix E and the E-Readiness and demographic survey is included in Appendix F. Each of the survey instruments is described in the following sections.

ELSS instrument

This 36-item instrument was developed by Wang et al. (2007) to validate the IS system success measurement model of e-learning systems success after reviewing literature based on terms such as IS success (i.e., IS performance, e-learner satisfaction, user performance, end-user computing satisfaction, System Use, IS Service Quality, and organizational benefits). Forty-six items that represented the six ELSS dimensions were initially analyzed by four university professors, three professionals, and five IS managers that resulted in the elimination of 15 redundant items and the addition of three new items, leaving the 34 items used in the instrument. The final 34-item instrument was developed using a five-point Likert-type scale, with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*" and is considered to comprise a complete scale for the ELSS measurement with two additional items, *perceived overall performance* and *perceived overall success* comprising global measures of the OLE.

The dependent variables system design, system delivery and system outcome will be determined by six dimensions that are captured from the ELSS survey. The system design section comprises three parts measuring System Quality, Service Quality and Information Quality. System quality used a Likert-type scale, with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*" to obtain responses from seven items that asked respondents whether the e-learning system is always available, easy-to-use, user-friendly, provides interactive features between users and the system, has attractive

features to appeal to the users, and is fast in responding to users' requests. Service quality was measured using three items which asked respondents whether the e-learning system provided a proper level of on-line assistance and explanation, are available in case of a technical problem, and respond in a cooperative manner. The Service Quality variable used a Likert-type scale, with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*". Information quality was measured from the responses to seven items which asked whether the e-learning system provided information that is exactly what the user needs, provides information that is sufficient, easy to understand, up-to-date, well-organized, for the user at the right time, and relevant to the user's online job. This variable was also measured using a Likert-type scale, with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*".

The system delivery section comprised two parts measuring System Use and User Satisfaction. The System Use dimension applied a Likert-type scale, with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*" to obtain responses from three items that measure dimensions such as whether the frequency of use with the e-learning system is high, the e-learning system usage is voluntary, and whether the use depends on the e-learning system. The User Satisfaction dimension obtained responses from three items that ask whether the user was pleased with the e-learning system experience, the success of the e-learning system, and whether the user is satisfied with the e-learning system. A Likert-type scale with ranges from "1=*strongly-disagree*" to "5=*strongly-agree*" was used to capture the responses for this variable.

The system outcome section measured Net Benefits and comprised eight items and using a Likert-type scale with ranges from "1=*strongly-disagree*" to "5=*strongly*

agree". The items asked whether the e-learning system helped the user enhance his or her teaching skills, saved time, contributed to academic success, makes the user feel isolated, lacked contact with others, or made the user dependent on the technology.

E-readiness instrument

This 23-item self-reporting instrument was designed by the University of Kentucky Distance Learning Technology Center to capture the level of online users interest towards e-learning by categorizing users who indicated considerable readiness for the OLE compared to those who were unprepared. The instrument comprised four sections, technical competence (technical literacy, and type of computer used in the OLE), lifestyle aptitude (communication patterns and online habits), learning preference toward the OLE (learning styles and values), and academic preparedness (course load, status, and prior online experience). The survey instrument included a five-point Likert-type scale ranging from 1 indicating *least agreement* to 5 indicating *greatest agreement* to measure responses to each item.

Part One of the instrument comprised a demographic section assessed the online instructor's academic preparedness. It comprised eight items that captured the gender, age range, length of time as an online instructor and training experience in the OLE. These items were measured using a nominal scale. Online instructors were asked to indicate their age from a list of ranges such as 29 and under, 30–39, 40-49, 50-59, 60-69, and 70 and over. Participants were also asked whether they had completed their formal training with the university, and these responses were dichotomously scored as 'yes' or 'no'. They will be asked to indicate their job position as course coordinator, teaching

assistant or e-tutor, and to indicate the main campus with which they are contracted. This was useful in determining the spread of online instructors as well as the effects of training by the university.

Part Two of the survey instrument comprised 11 items and assessed the online instructors' technical readiness for distance teaching based on their computer knowledge and technical literacy. This section included questions that ask respondents whether they know how to use Microsoft Office tools, access the online campus' help desk, access to a printer, access to the Internet, access to a dedicated network connection, and access to software applications that are specific to the OLE. Responses to each item were measured using a five-point Likert-type scale ranging from 1 indicating *least agreement* to 5 indicating *greatest agreement.*

Part Three of the survey comprised five items and will assess online instructors' readiness for distance learning based on their assessment of their lifestyle. Respondents were asked whether they have a place at home or at work that can be used for extended periods to dedicate to their online learners, whether they have uninterrupted time that they can dedicate to their online learners, whether they routinely communicate with other online users using electronic technologies such as e-mail, text messaging and voice mail, whether they have persons or resources nearby who can assist with any technical problems, and their value and need for flexibility which the online environment affords. Responses to each item were measured using a five-point Likert-type scale ranging from 1 indicating *least agreement* to 5 indicating *greatest agreement.*

Part Four of the survey comprised six items and assessed online instructors' readiness for distance learning based on their assessment of their own learning

preference. Respondents were asked about their eagerness to learn and use new technologies such as new software application, whether they are a self-motivated and independent learner, their preference for a tradition classroom setting compared to an online environment for teaching, their comfort level regarding received written feedback or verbal feedback, as well as their comfort level regarding communicating effectively and comfortably in writing. Responses to each item were measured using a five-point Likert-type scale ranging from 1 indicating *least agreement* to 5 indicating *greatest agreement.*

Validity and Reliability

Validity

Content validity tests the extent to which a scale measures represents every single element of a construct (Leedy & Ormrod, 2005). For the ELSS instrument, Wang et al. (2007) documented rigorous procedures to ensure that it met the requirements of strong content validity. Holsapple and Lee-Post (2006) noted that content validity was assessed through mapping all items to the six success dimensions. An acceptable criterion-related validity for the 34-item ELSS instrument was 0.828 and a significant level of 0.000, while being within the benchmark for discriminant validity. Wang et al recommended the ELSS instrument as a tool for measuring the e-learning system success dimensions and 'as a basis for explaining, justifying, and comparing differences among the results" (p. 1803).

Reliability

According to Wang et al. (2007) the 34-item ELSS instrument was noted to have a reliability (Cronbach's *alpha*) of 0.9668 which surpasses the minimum recommended standard of 0.70. The reliabilities of the six factors were determined as 0.8956 (System Quality), 0.9102 (Information Quality), 0.8807 (Service Quality), 0.8561 (System Use), 0.9080 (User Satisfaction), and 0.9505 (Net Benefits). Also, after factor analysis, a six-factor, 34-item instrument was achieved, where the six factors were matched and interpreted as those in the model for IS system success explaining 72.56% of the variance in the data set of 206 responses used in their study. The discriminant validity of the instrument was also supported since no cross-loading items were found and the significant loading of all 34 items on the single factor indicated uni-dimensionality.

Pre-analysis Data Screening

This study attempted to determine the relationship among the online instructor E-Readiness measure and factors at the design and delivery stages that affect system outcomes and will capture data from a survey instrument. Since the survey instruments were developed mainly for online learners, the survey items were examined by a group of university professors for relevance to the sample population (online instructors), and any items were re-worded for clarity and conciseness. Prior to being used with the study sample the items were tested with a small group of online instructors from the target population. This is recommended by several authors who stated that the pilot study should help to identify and modify any problem items before the main data collection is conducted (Gall, et al., 2003; Gay & Airasian, 2000; Leedy & Ormrod, 2005). Since the

items targeted online instructors and not online learners, the pilot group comprised experienced online instructors. The group comprised a Programme Coordinator with the Open Campus who overseas the online instructors and their technical issues during the semester, two online instructors with expertise in online instruction, and an editor of an international journal of education and development using information and communication technology with special interest in online instruction. The experts were asked to review the questionnaire to determine whether the items were phrased correctly, were clear and concise, to suggest or re-word statements to relate to the online instructor and not online learners, whether the items correctly focused on the dimensions to be examined, and whether additional questions should be included. They were also asked, and also whether they had problems accessing the survey online or completing it online, along with comments or suggestions concerning the survey. Members of the panel of experts made several recommendations, and the instrument was revised based on their comments.

Prior to gathering any contact information and administering the survey, the researcher complied with NSU's human subject's research requirement and obtained approval from the Institutional Review Board (IRB) and the Office of Academic Programming and Delivery at the Caribbean university (Appendices A and B). The survey instrument was then converted to a web-based version. The online course list was submitted to the university's online administration officer to request permission to notify e-tutors about the web-based survey. Web-based surveys allow participants to respond privately without apprehension about having their responses shared with others. In addition, web-based survey instruments are tested to eliminate any submission errors and

will also ensure that data loss is non-existent during data collection. Survey Gizmo© software was used to create and publish the online surveys.

Since each online instructor had an official university email address, the online campus personnel were asked to administer the survey first using a prepared mass mail message to the selected population. This message informing them of the study and survey was posted in the 'Teachers' Forum' of the selected courses as is the procedure by the administration for notifying online instructors of any tasks. These posts are also automatically forwarded to all online instructors' email. The email message contained a link to the Web-based version which providing instructions and the purpose of the study. They were asked to read the study information before participating, which informed them that their participation in the survey was completely voluntary and anonymous. Completing the survey was considered as evidence of their informed consent to participate. Also, the survey instrument setting was set to allow only one response per participant to ensure data integrity by eliminating the chance of duplication in data submission (Levy, 2006). The survey period was four- to six-weeks duration. To increase response rate, follow-up posts to each course's Teachers' Forum were sent to participants after the initial message.

Data Analysis

Statistical analyses were used for all analyses. Descriptive statistics were used to summarize and describe the demographic data collected from the participants. The first research question, "What is the e-learning systems success score of the OLE at this university?" was measured using two criterion items in the ELSS survey. These items

namely, “As a whole, the performance of the e-learning system is good”, and “As a whole, the e-learning system is successful” was also used to analyze the criterion-related validity of the instrument. This research question was analyzed by calculating the aggregate of the ratings on these two items and will be expressed as a percentage of the highest rating possible for that dimension. Wang et al. (2007) stated that a rating of four or higher on a five-point Likert-scale for each item will indicate an acceptable level of e-learning system success. The second research question, “What is the e-learning readiness score of online instructors in a Caribbean university system?” was analyzed by calculating the aggregate of each of the ratings on the readiness items comprising technical competence, lifestyle aptitude, and learning preference towards e-learning. The ratings of the items were combined to form a single measure for E-Readiness and expressed as a percentage of the highest rating possible for that dimension. According to Holsapple and Lee-Post (2006) an instructor is considered to be e-ready if a response is made on all three readiness measures comprising at least a four on a five-point Likert-type scale that ranges from 1 indicating *least agreement* to 5 indicating *greatest agreement*.

Data analysis for the remaining research questions included appropriate descriptive and inferential techniques. As noted above, this study investigated the relationship among online instructor E-Readiness and the variables in the DeLone and McLean (2004) framework namely, System Quality, Service Quality, and Information Quality at the System Design stage, System Use and User Satisfaction at the System Delivery Stage, and Net Benefits at the System Outcome stage. To this end, this study used linear regression and multiple linear regression for the remaining research questions.

Linear Regression

Linear regression analysis was conducted for research question three, namely, 'Is there a positive relationship between E-Readiness and system design (i.e., System Quality, Service Quality, and Information Quality)?' According to Hoffman (2004), linear regression is used to assess the association between an independent variable and a single dependent variable through a number of tests. For this study, the tests used were:

- an *F* test, to calculate whether the independent variables predicted the dependent variable (Tabachnick & Fidell, 2006),
- R-squared (coefficient of determination), calculated the amount of variance contributed by the independent variable (Hair, Black, Babin, & Anderson, 2010), and
- A *t* test to assess the statistical significance between the independent variables and the dependent variable (Hair, et al., 2010).

Homoscedasticity, normality, and linearity (the assumptions for a linear regression) were also evaluated through the use of scatter plots (Stevens, 2002; Tabachnick & Fidell, 2006). Homoscedasticity confirms that the scores are normally spread around the regression line, normality shows whether the scores are normally distributed, and linearity determines whether that the relationship between the criterion variable and predictor variable is a straight line (Tabachnick & Fidell, 2006).

Multiple Linear Regression

Multiple linear regression was used to test research questions four and five: 'Is there a positive relationship between E-Readiness and System Delivery (i.e., System Use,

User Satisfaction)?', and 'Is there a positive relationship between E-Readiness and System Outcome (i.e., Net Benefits)?' Multiple linear regression analysis examines the relationship between a set of independent variables and a single dependent variable (Hair, et al., 2010). Standard multiple linear regression using the ENTER method was used to insert all the independent (predictor) variables into the model at one time to assess how much they added to the value of the prediction of dependent (criterion) variable (Tabachnick & Fidell, 2006). As stated for linear regression, *F* tests, coefficients of determination, beta coefficients, and *t* tests were also used to evaluate the results.

Homoscedasticity, normality, and linearity were again evaluated by inspection of the scatter plots. In addition, multicollinearity was used to detect moderate to high intercorrelations among the predictors, when several cognitive measures are used as predictors. The presence of multicollinearity is detected by examining the variance inflation factor (VIF) for each predictor variable. Multicollinearity is present if the VIF is 10 or more (Stevens, 2002).

Resources Used

The sample for this study included full- and part-time online instructors contracted from the three main campuses at a Caribbean university. In order to complete the survey, the researcher liaised with the following personnel at that institution:

1. Programme Coordinator of Undergraduate Programmes who coordinate the online instructors and grants permission to contact the online instructors,
2. Course Delivery Assistants at the three campus sites who confirm contracts of online instructors,

3. Online instructors who comprise course coordinators and e-tutors,

4. The departments and personnel responsible for IRB approval,

5. The e-learning systems support specialists

The Web-based survey was conducted using the electronic survey questionnaire software included as part of the course management software available to online instructors. The data was extracted and analyzed for all statistical techniques using the Statistical Package for the Social Science (SPSS) version 17.0. The online library resources provided by Nova Southeastern University online library were used for keyword searches and the literature review.

Summary

In this study, a Web-based survey using a multi-item, Likert-type scale was developed from previously validated survey instruments. The survey was piloted for verification and validation purposes using a sample of the target population. The target population of this study was online instructors at the online campus of a Caribbean university with the sample comprising online instructors accessing the OLE from 42 sites located in 16 Caribbean countries.

Linear regression and multiple linear regression were the two data analysis techniques used to assess the data collected from the survey. Linear regression was used for research question three to assess the relationship between the independent variable E-Readiness and each of the dependent variable at the system design stage. Multiple linear regression was used to examine research question four, the relationships between the

independent variables at the system design stage including E-Readiness, and the dependent variables at the system delivery stage. Multiple linear regression was also used to examine research question five, the relationships and the independent variables at the system delivery stage including E-Readiness, and the dependent variable at the system outcome stage. This chapter concluded with a description of resources that were needed to conduct this study.

Chapter 4

Results

This chapter presents the results of the study that explored the effect of online instructor E-Readiness on six dimensions (System Quality, Information Quality, Service Quality, System Use, User Satisfaction, and Net Benefits) during three IS stages. The chapter first presents the results of data collection and analysis of the survey instrument using a pilot sample. Then the pre-analysis data screening is presented followed by demographic results of the study based on the online instructors' responses about perceived technology barriers and their E-Readiness in the OLE. The results of the research questions and online instructor technology issues are also presented following by a summary of the chapter.

Data Collection and Analysis

Data Collection

The online survey instrument (Appendices D and E) was piloted during August 2011 using a group of instructors from the same environment where the study was conducted. The piloting was done in two phases. To establish content validity, the first phase involved the services of three professors with expertise in online learning at the

Caribbean university. They were invited to review the survey and identify typographical errors, grammatical errors, and suitability of survey items for the online learning context especially for online instructors. The professors provided very informative suggestions concerning the language use for Caribbean instructors, and the rewording of some of the survey items to the target respondents. All suggestions were taken and led to the improvement of the survey items. It was recommended that item SU2 ("I use the Learning Exchange when absolutely necessary") in the System Use dimension be removed since it is a requirement for all online instructors to use the OLE. This is in keeping with Freeze et al. (2010) who also deleted this item from analysis. Overall, the evaluators felt that the instrument was valid for the research questions. In the second phase, a survey instrument (Appendices D and E) was created using SurveyGizmo™, and a pilot test was then conducted. Twenty-three university instructors were chosen not only for their expertise in their online instruction using with face-to-face students, but more importantly because they represented the targeted respondents of the study. A total of 11 instructors completed the pilot survey. The internal consistency of the instrument was tested using Cronbach's *alpha*. According to Sekaran (2003), "Cronbach's *alpha* is a reliability coefficient that indicates how well the items in a set are positively correlated to one another. Cronbach's *alpha* is computed in terms of the average intercorrelations among the items measuring the concept" (p. 307). Guidelines stating *alpha* coefficients of .70 or over are considered acceptable, coefficients between .6 and .7 are moderately acceptable, while coefficients of .6 and below are considered unacceptable (George & Mallery, 2003). The results of the internal consistency test showed that the Net Benefits dimension had a negative *alpha* coefficient. To ensure that all scales were keyed in the

same direction, the items were reviewed (Levy, 2006). Four items, namely NB5, NB6, NB7, and NB8 were reverse-scored and the reliability analysis was repeated. The reliabilities of the six factors were determined as 0.9392 (System Quality), 0.9097 (Information Quality), 0.8120 (Service Quality), 0.6829 (System Use), 0.8448 (User Satisfaction), and 0.8466 (Net Benefits).

The online survey instrument was then launched using SurveyGizmo™. A message containing consent information and a link to the survey to allow direct input from the participants was distributed by university administrative personnel to the Teacher Forum of each of the 53 courses offered in the current semester. This web-based application was suitable as it reliably reported any partial responses, consistency of a response set, outliers, and extreme cases. Additionally, the software allowed for required responses to every survey item, which removed the need to check for missing data. From August 31, 2011 to October 22, 2011, the online service collected 114 responses. Messages were posted at intervals when responses decreased to remind instructors to complete the survey, with a thank-you message at the end of the data collection period.

Pre-Analysis Data Screening

According to Levy (2006) pre-analysis data screening is useful in maintaining the accuracy of the data, determining the consistency of the responses, checking for missing data, and screening for cases with patterns of scores that are irregular, extreme, or have multivariate outliers. In this study, the survey data was exported to the SPSS 19 statistical package for analysis, and screened for accuracy, consistency of a response set, outliers, and extreme cases. No extreme cases or outliers existed in the data set. All responses

were scrutinized from participants who answered seemingly without thoughtful attention to the survey question. One record that had the same responses for over 70% of the items was eliminated from the analysis. As a result, the final data set contained 113 survey responses.

The survey included 48 items from seven dimensions (System Quality, Information Quality, Service Quality, System Use, User Satisfaction, Net Benefits, and E-Readiness). System quality comprised items SQ1 through SQ7; Information Quality comprised items IQ1 through IQ7; Service Quality comprised items SV1 and SV3; User Satisfaction comprised items US1 and US2; System Use included items SU1 through SU3; Net Benefits included items NB1 through NB8; and E-Readiness included items TR1 through TR7, LR1 through LR5, and LP1 through LP6. The reliability coefficients of the three IS system stages, their dimensions and E-Readiness are presented in table 13:

Table 13

Cronbach's alpha Reliability Analyses for the IS System Stages and Dimensions

IS Stage		**Reliability**	**Total Number of Items**	**Number of Items**
System Design		.721	13	
- System Quality	(SQ)	.716		7
- Information Quality	(IQ)	.887		7
- Service Quality	(SV)	.789		3
System Delivery		.607	5	
- User Satisfaction	(US)	.721		3
- System Use	(SU)	.922		2

Table 13 (Cont'd)

Cronbach's alpha Reliability Analyses for the IS System Stages and E-Readiness

IS Stage	Reliability	Total Number of Items	Number of Items
System Outcome		8	
- Net Benefits (NB)	.722		8
E-Readiness	.909	18	
- Technical Readiness (TR)	.923		7
- Lifestyle Readiness (LR)	.714		5
- Learning Readiness (LP)	.745		6

Note. Number of responses = 113

Online Instructor Demographics

Three hundred and ninety-six online instructors were contracted for the semester-one courses comprising 53 course coordinators and 343 e-tutors. A total of 113 useable responses from online instructors were used in the analysis yielding a 28.5% response rate. Survey respondents were asked to respond to questions focusing on age range, instructor level, number of years contracted with the online campus, department contracted with, and completed training in the OLE.

The median age range was 40-49 years comprising 32.7% of the respondents; 68.9% were female, 74.5% of those who responded were contracted as e-tutors, and 43.4% contracted for four to six years. The majority of online instructors (56.6%) were contracted to teach online courses in the social sciences with another 27.4% teaching courses in humanities. The remaining 16% were contracted to teach online courses in computer science, medical sciences, education and agriculture. Only 10% of the online instructors did not complete the mandatory six-week training course for online instructors

while 23% did not complete an online self-assessed introduction to the OLE. Of the online instructors who responded to the survey, 63.7% were located in the countries of the three main campuses. The demographic features of the online instructors are presented in table 14.

Table 14

Demographic Features of Online Instructors (N=113)

	Demographics	Frequency	Percentage
Gender	Male	35	31.0%
	Female	78	69.0%
Age Range	29 or under	11	9.7%
	30 – 39	33	29.2%
	40 – 49	37	32.7%
	50 – 59	23	20.4%
	60 – 69	7	6.2%
	70 or over	2	1.8%
Job Title	Coordinator	27	23.9%
	E-Tutor	86	76.1%
Years with OLE	Under one year	24	21.2%
	1 to 3 years	32	28.3%
	4 to 6 years	48	42.5%
	7 or more years	9	7.9%
Residence	Campus Territory	72	63.7%
	Non-Campus Territories	26	23.0%
	Outside of Caribbean	15	13.3%
Completed six-week online training course?	Yes	101	89.4%
	No	12	10.6%
Completed self-evaluating Introduction to the OLE?	Yes	87	77.0%
	No	26	23..0%

Note. N = Number of survey responses

Data Analysis

The standard deviations and means for each of the seven dimensions were calculated. The Likert-type scales used in the survey instrument comprised '1 = strongly disagree, 2 = disagree, 3 = neither disagree nor agree, 4 = agree, and 5 = strongly agree'. All dimensions had high mean scores. Table 15 presents the overall ranges, means and standard deviations of the dimensions.

Table 15

Ranges, Means, and Standard Deviations of the Dimensions at the IS System Stages

IS Stage		Range	Mean	SD
System Design				
- System Quality	SQ)	2.43 – 5.00	3.85	0.47
- Information Quality	(IQ)	2.00 – 5.00	3.79	0.61
- Service Quality	(SV)	1.33 – 5.00	3.90	0.70
System Delivery				
- User Satisfaction	(US)	1.67 – 5.00	4.08	0.66
- System Use	(SU)	2.00 – 5.00	4.10	0.77
System Outcome				
- Net Benefits	(NB)	2.63 – 5.00	3.65	0.52
E-Readiness		3.22 – 5.00	4.53	0.38
- Technical Readiness	(TR)	3.42 – 5.00	4.63	0.45
- Lifestyle Readiness	(LR)	3.00 – 5.00	4.44	0.49
- Learning Readiness	(LP)	2.83 – 5.00	4.41	0.47

Note. Number of survey responses=113

The highest mean scores were shown on System Use and E-Readiness, which suggested that online instructors tend to agree with items in those dimensions. The mean scores on System Use ranged from a minimum of 2.00 to a maximum of 5.00 (M = 4.10,

SD = 0.77); the mean scores on E-Readiness ranged from a minimum of 3.22 to a maximum of 5.00 (*M* = 4.53, *SD* = 0.38). The lowest mean score was shown on Net Benefits which ranged from a minimum of 2.63 to a maximum of 5.00 (*M* = 3.65, *SD* = 0.52). The following sections present the results:

System Quality

The overall mean score for System Quality ranged from a minimum of 2.43 to a maximum of 5.00 (*M* = 3.85, *SD* = 0.47). The highest mean score was 4.09 for item SQ1, ("The e-learning system is always available"). The lowest mean score of 3.66 was shown on item SQ7 ("The Learning Exchange is fast in responding to my requests"). The means and standard deviations for the seven dimensions are presented in Table 16.

Table 16

Means and Standard Deviations for System Quality (SQ)

	Item	Mean	*SD*
The Learning Exchange:			
SQ1	is always available	4.09	.82
SQ2	is easy to use	3.88	.76
SQ3	is user-friendly	3.83	.75
SQ4	is secure	3.83	.77
SQ5	has attractive features that appeal to me	3.73	.82
SQ6	allows information to be readily accessible to me	3.91	.76
SQ7	is fast in responding to my requests	3.66	.77
	Overall mean	3.85	.47

Note. *SD* = Standard Deviation; Number of survey responses = 113

Information Quality

The overall mean score for Information Quality ranged from a minimum of 2.00 to a maximum of 5.00 (*M* = 3.79, *SD* = 0.61). The highest mean score was 4.05 for item IQ3, ("The Learning Exchange provides information that is relevant to my job"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 3.60 was shown on item IQ1 ("The Learning Exchange provides information that is exactly what I need"). The means and standard deviations for the Information Quality items are presented in Table 17.

Table 17

Means and Standard Deviations for Information Quality (IQ)

	Item	Mean	*SD*
The Learning Exchange provides information that is:			
IQ1	exactly what I need	3.60	.76
IQ2	needed at the right time	3.68	.75
IQ3	relevant to my teaching	4.05	.71
IQ4	sufficient	3.74	.90
IQ5	easy to understand	3.86	.74
IQ6	up-to-date	3.79	.76
IQ7	well-organized	3.90	.76
	Overall mean	3.79	.61

Note. *SD* = Standard Deviation; Number of survey responses = 113.

Service Quality

The overall mean score for Service Quality ranged from a minimum of 1.33 to a maximum of 5.00 (*M* = 3.90, *SD* = 0.70). The highest mean score was 4.05 for item SV3,

("The Learning Exchange support specialists respond in a cooperative manner"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 3.79 was shown on item SV1 ("The Learning Exchange provides adequate on-line assistance and explanation"). The means and standard deviations for the Service Quality items are presented in Table 18.

Table 18

Means and Standard Deviations for Service Quality (SQ)

	Item	Mean	*SD*
SV1	The Learning Exchange provides adequate on-line assistance and explanation	3.79	.77
SV2	The e-learning support specialists are available in case I have a technical problem	3.85	.93
SV3	The e-learning support specialists respond in a cooperative manner	4.05	.80
	Overall Mean	3.90	.70

Note. *SD* = Standard Deviation; Number of survey responses = 113

System Use

The overall mean score for System Use ranged from a minimum of 2.00 to a maximum of 5.00 ($M = 4.10$, $SD = 0.77$). The highest mean score was 4.38 for item SU1, ("I frequently use the Learning Exchange"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 3.82 was shown on item SU3 ("I depend on the Learning Exchange"). This suggested that online instructors seemed in agreement with this item. The means and standard deviations for the System Use items are presented in Table 19.

Table 19

Means and Standard Deviations for System Use (SU))

	Item	Mean	*SD*
SU1	I frequently use the Learning Exchange	4.38	.760
SU2	I use the Learning Exchange when absolutely necessary *	--	--
SU3	I depend on the Learning Exchange	3.82	.966
	Overall Mean	4.10	.768

Note. *SD* = Standard Deviation; Number of survey responses = 113; *Item SU2 was deleted from the survey.

User Satisfaction

The overall mean score for User Satisfaction ranged from a minimum of 1.67 to a maximum of 5.00 (*M* = 4.08, *SD* = 0.66). The highest mean score was 4.12 for item US1, ("I am pleased with the experience of using The Learning Exchange"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 4.04 was shown on item US3 ("Overall, I am satisfied with The Learning Exchange"). This suggested that online instructors seemed in agreement with this item. The means and standard deviations for the User Satisfaction items are presented in Table 20.

Table 20

Means and Standard Deviations for User Satisfaction (US)

	Item	Mean	*SD*
US1	I am pleased with the experience of using the Learning Exchange	4.11	.73
US2	I think the Learning Exchange is successful	4.07	.66
US3	Overall, I am satisfied with the Learning Exchange	4.05	.74
	Overall Mean	4.08	.66

Note. *SD* = Standard Deviation; Number of survey responses = 113.

Net Benefits

The overall mean score for Net Benefits ranged from a minimum of 2.63 to a maximum of 5.00 (*M* = 3.65, *SD* = 0.52). The highest mean score was 4.03 for item NB1, ("The Learning Exchange enhances my teaching skills"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 3.01 was shown on item NB8 ("The Learning Exchange makes me dependent on the technology"). This suggested that online instructors seemed neutral with this item. The means and standard deviations for the Net Benefit items are presented in Table 21.

Table 21

Means and Standard Deviations for Net Benefits (NB)

Item		Mean	*SD*
The Learning Exchange:			
NB1	Enhances my teaching skills	4.03	.77
NB2	Empowers me	4.00	.74
NB3	Saves time	3.87	.91
NB4	Contributes to my academic success	3.72	.73
NB5	Makes me feel isolated	3.73	.91
NB6	Lacks contact with others	3.66	1.00
NB7	Has quality concerns	3.19	.95
NB8	Makes me dependent on the technology	3.00	1.10
	Overall Mean	3.65	.52

Note. *SD* = Standard Deviation; Number of survey responses = 113.

E-Readiness

The overall mean score for E-Readiness ranged from a minimum of 3.22 to a maximum of 5.00 (*M* =4.53, *SD* = .38). The E-Readiness dimension comprised three sub-scales, namely Technical Readiness, Lifestyle Readiness and Learning Readiness. The

means and standard deviations for each sub-scale are presented. The overall mean score for Technical Readiness (TR) ranged from a minimum of 3.42 to a maximum of 5.00 (*M* = 4.63, *SD* = 0.45. The highest mean score was 4.73 for items TR6 ("I have access to the Internet for substantial periods of time, perhaps 45 minutes or so, at least 3 times a week") and TR7 ("I have access to a dedicated network connection or have an Internet Service Provider"). This suggested that online instructors seemed to agree with these two items. The lowest mean score of 4.17 was shown on item TR1 ("I know how to access the Open Campus Help Desk"). The means and standard deviations for the Technical Readiness items are presented in Table 22.

Table 22

Means and Standard Deviations for Technical Readiness (TR)

	Technical Readiness	**Mean**	***SD***
TR1	I know how to access the Open Campus Help Desk	4.17	.82
TR2	My computer setup is sufficient for online learning.	4.58	.56
TR3	I have access to software such as Word Processor, Spreadsheet, Presentation, Real Player, or Browser	4.72	.57
TR4	I have access to a printer	4.62	.65
TR5	I receive emails sent to my Open Campus email address even though it may not be my primary account	4.54	.82
TR6	I have access to the Internet for substantial periods of time, perhaps 45 minutes or so, at least 3 times a week.	4.73	.54
TR7	I have access to a dedicated network connection or have a Internet Service Provider/ISP	4.73	.54
	Overall Mean	4.63	.45

Note. *SD* = Standard Deviation; Number of survey responses = 113.

The overall mean score for Lifestyle Readiness ranged from a minimum of 3.00 to a maximum of 5.00 (M = 4.44, SD = 0.488). The highest mean score was 4.65 for item LR3, ("I routinely communicate with persons by using electronic technologies such as e-mail, text messaging and voice mail"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 4.22 was shown on item LR4 ("I have persons and/or resources nearby who will assist me with any technical problems I might have with my software applications as well as my computer hardware"). This suggested that online instructors seemed to agree with this item. The means and standard deviations for the Net Benefit items are presented in Table 23.

Table 23

Means and Standard Deviations for Lifestyle Readiness (LR)

	Lifestyle Readiness	**Mean**	***SD***
LR1	I have a private place in my home or at work and that I can use for extended periods	4.64	.572
LR2	I have adequate time that will be uninterrupted in which I can work on my online courses	4.43	.717
LR3	I routinely communicate with persons by using electronic technologies such as e-mail, text messaging and voice mail.	4.65	.535
LR4	I have persons and/or resources nearby who will assist me with any technical problems I might have with my software applications as well as my computer hardware.	4.22	.895
LR5	I value and/or need flexibility. For e.g., it is not convenient for me to come to campus two to three times a week to attend a traditional class.	4.24	1.00
	Overall Mean	4.33	.488

Note. SD = Standard Deviation; Number of survey responses = 113.

The overall mean score for Learning Readiness ranged from a minimum of 2.83 to a maximum of 5.00 (M = 4.41, SD = 0.473). The highest mean score was 4.68 for item LP2, ("I am a self-motivated, independent learner"). This suggested that online instructors seemed to agree with this item. The lowest mean score of 4.02 was shown on item LP5 ("I am proactive with tasks; tending to complete them well in advance of deadlines"). This suggested that online instructors seemed to agree with this item. The means and standard deviations for the Net Benefit items are presented in Table 24.

Table 24

Cronbach's Alpha Reliability Analyses for Learning Readiness (LP)

	Learning Readiness	**Mean**	***SD***
LP1	When I am asked to use technologies that are new to me such as a fax machine, voice mail or a new piece of software, I am eager to try them.	4.51	.636
LP2	I am a self-motivated, independent learner.	4.68	.594
LP3	It is not necessary that I be in a traditional classroom environment in order to teach	4.65	.517
LP4	I am comfortable providing *written* feedback rather than giving immediate *verbal* feedback.	4.04	.915
LP5	I am proactive with tasks; tending to complete them well in advance of deadlines.	4.02	.926
LP6	I communicate effectively and comfortably in writing	4.58	.583
	Overall Mean	4.42	.473

Note. SD = Standard Deviation; Number of survey responses = 113

Correlation Analysis

Pearson's correlation analysis was used to examine the strength and direction of associations among the seven dimensions in the model, and the relationships were shown to be statistically significant at $p < .001$, positive, and varying in strength. Correlations between 0.8 and 1.0 were considered very strong; 0.6 and 0.8 were considered strong; 0.4 and 0.6 were considered moderate; 0.2 and 0.4 were considered weak; and 0.0 and 0.2 were considered very weak. The coefficients show that there are strong direct associations among the dimensions in the model. Table 25 presents the results of the complete correlation matrix among the variables.

Table 25

Pearson's Correlation Matrix of the Seven Dimensions in the Model

Dimension	SQ	IQ	SV	SU	US	NB	ER
SQ	1						
IQ	.646**	1					
SV	.410**	.423**	1				
SU	.292**	.338**	.282**	1			
US	.517**	.632**	.438**	.440**	1		
NB	.422**	.510**	.428**	.418**	.568**	1	
ER	.284**	.260**	.257**	.344**	.348**	.352**	1

**. Correlation is significant at the 0.01 level (2-tailed).
Notes: *SD* = Standard Deviation; SQ =Service Quality; IQ=Information Quality; SV=Service Quality; SU=System Use; US = User Satisfaction; NB = Net Benefits; ER = E-Readiness; Number of survey responses = 113.

In analyzing the results from Pearson's Correlation Matrix, a positive but weak relationship was found between E-Readiness and each of the dimensions at the System Design stage (i.e., System Quality, Service Quality, and Information Quality). However, a positive, strong relationship was found between System Quality and Information Quality. The relationships between E-Readiness, the dimensions at the System Design stage, and System Delivery (i.e., System Use, User Satisfaction) found:

- A positive but weak relationship between E-Readiness, System Quality, Service Quality, and Information Quality with System Use,
- A positive relationship of moderate strength was found between each of the System Quality and Service Quality dimensions with User Satisfaction, while
- A positive and strong relationship was found between Information Quality and User Satisfaction.

The relationship between E-Readiness, the dimensions at the System Delivery stage, and System Outcome (i.e., Net Benefits) was found to be:

- Positive but week between E-Readiness and Net Benefits, but
- Positive and of moderate strength between System Use and Net Benefits, and
- Positive and of moderate strength between User Satisfaction and Net Benefits.

Analysis of Research Questions

The following is an analysis of the results as applied to each of the research questions in this study. Aggregate ratings were used to determine the scores in research questions one and two. Regression analysis was used to analyze research questions three, four and five regarding the relationships of E-Readiness at the System Design, System Delivery and System Outcome stages.

Research Question 1

The first research question 'What is the e-learning systems success score at this university?" was examined by calculating the aggregate of the ratings on two criteria items. The score is expressed as a percentage of the highest rating possible for that dimension. Wang et al. (2007) stated that a rating of four or higher on a five-point Likert-scale for each item will indicate an acceptable level of e-learning system success. The score at this Caribbean university system was calculated as 4.07 of a possible 5 or 81.4% which indicates an acceptable level of e-learning system success at this Caribbean university system.

Research Question 2

The second research question "What is the e-learning readiness score of online instructors in this university system?" was determined by calculating the aggregate of each of the ratings on the readiness items comprising the dimensions technical competence (TR), lifestyle aptitude (LR), and learning preference (LP) towards e-learning. The ratings of the items were combined to form a single measure for E-Readiness and expressed as a percentage of the highest rating possible for that dimension. According to Holsapple and Lee-Post (2006), an instructor is considered to be e-ready if a response is made on all three readiness measures comprising at least a four on a five-point scale. The E-Readiness scores were TR = 4.63, LR = 4.44, and LP = 4.41. The aggregate E-Readiness score of online instructors was calculated as 4.53 out of a possible 5, or 90.6%.

Research Question 3

The third research question was, 'Is there a positive relationship between E-Readiness and System Design (i.e., System Quality, Service Quality, and Information Quality)?'

According to the proposed framework, since System Quality, Service Quality and Information Quality were the dimensions at the System Design stage, they were each used as the dependent variable. In the first instance, regression analysis was performed using System Quality as the dependent variable while E-Readiness was the independent variable. The linear regression model was statistically significant, $F(1, 111) = 9.774$, $p < .01$, $R^2 = .081$. E-Readiness ($\beta = .284$, $p<.01$), was determined to be a predictor of System Quality, $t = 3.126$, suggesting that, as E-Readiness increased by one unit of agreement, System Quality increased by 0.28 units of agreement. E-readiness accounted for 8.1% of the variance in System Quality. The results of the linear regression with E-Readiness predicting System Quality are presented in Table 26.

Table 26

Linear Regression with E-Readiness Predicting System Quality

Variable	B	SE	β	t	p
E-Readiness	.352	.113	.284	3.126	.002

Note. $F(1, 111) = 9.774$, $p < .01$, $R^2 = .081$

Next, to examine whether there a positive relationship between E-Readiness and Service Quality, a regression analysis was again performed using Service Quality as the

dependent variable and E-Readiness as the independent variable. The linear regression model was statistically significant, $F(1,111) = 7.839$, $p < .006$, $R^2 = .066$. E-Readiness ($\beta = .257$, $p<.01$), was determined to be a significant and positive predictor of Service Quality ($t = 2.80$), suggesting that, as E-Readiness increased by one unit of agreement, Service Quality increased by 0.26 units of agreement. E-readiness accounted for 6.6% of the variance in Service Quality. The results of the linear regression with E-Readiness predicting Service Quality are presented in Table 27.

Table 27

Linear Regression with E-Readiness Predicting Service Quality

Variable	B	SE	β	t	p
E-Readiness	.471	.168	.257	2.800	.006

Note. $F(1,111) = 7.839$, $p < .006$, $R^2 = .066$

To examine whether there a positive relationship between E-Readiness and Information Quality, regression analysis was performed. Using Information Quality as the dependent variable and E-Readiness as the independent variable, the linear regression model was found to be statistically significant, $F(1, 111) = 8.409$, $p < .01$, $R^2 = .068$. E-Readiness ($\beta = .260$, $p<.01$), was determined to be a significant predictor of Information Quality, $t = 2.837$, suggesting that, as E-Readiness increased by one unit of agreement, Information Quality increased by 0.26 units of agreement. E-readiness accounted for 6.8% of the variance in Information Quality. The results of the linear regression with E-Readiness predicting Information Quality are presented in Table 28.

Table 28

Linear Regression with E-Readiness Predicting Information Quality

Variable	B	SE	β	t	p
E-Readiness	.415	.146	.260	2.837	.005

Note. $F(1, 111) = 8.409$, $p < .01$, $R^2 = .068$

Research Question 4

The fourth research question was, 'Is there a positive relationship between the E-Readiness and System Delivery (i.e., System Use, User Satisfaction)?'

Multiple regression analysis using the Enter method was performed. First, the assumptions of linearity, homoscedasticity, and normality were assessed. Linearity was assessed with scatter plots of each subscale by System Outcome and the assumption was met. Homoscedasticity was assessed with a residuals plot, and the assumption was met. The absence of multicollinearity was assessed through examination of the VIFs for each independent variable. VIF values greater than 10.0 suggest the presence of multicollinearity (Stevens, 2002). All of the VIF values were below 2.0, and the assumption was met.

According to the proposed framework, E-Readiness was included with the dimensions at the System Design stage. Since System Use and User Satisfaction are the dimensions at the System Delivery stage, both dimensions were used in turn as the dependent variable. In the first instance, System Use was the dependent variable while E-Readiness, System Quality, Service Quality, and Information Quality were the

independent variables. The coefficient of determination (R^2) was calculated as .198. The overall model explained 19.8% of the variance in System Use, which was revealed to be statistically significant, $F(4,108) = 6.685$, $p<0.001$. An inspection of individual predictors revealed that E-Readiness ($\beta = .251$, $p<.005$) was a significant and positive predictor of System Use. Higher levels of E-Readiness are associated with higher levels of System Use. However, System Quality ($p=.68$), Service Quality ($p=.24$) and Information Quality ($p=.09$) were not significant predictors of System Use. The results of the multiple linear regression with E-Readiness, System Quality, Service Quality, and Information Quality Predicting System Use are presented in Table 29.

Table 29

Multiple Linear Regression of E-Readiness, System Quality, Service Quality, and Information Quality Predicting System Use

Variable	**B**	**SE**	β	***t***	***p***
E-Readiness	.503	.183	.251	2.75	.007
System Quality	.077	.188	.048	.411	.682
Information Quality	.243	.146	.193	1.66	.099
Service Quality	.127	.107	.116	1.19	.238

Note. $F(4, 108) = 6.685$, $p < .001$, $R^2 = 0.198$

Multiple regression analysis using the Enter method was again performed with User Satisfaction as the dependent variable while E-Readiness, System Quality, Service Quality, and Information Quality were the independent variables. The coefficient of determination (R^2) was calculated as .469. The overall model explained 46.9% of the

variance in User Satisfaction, which was revealed to be statistically significant, $F(4,108) = 23.805$, $p<0.001$. An inspection of individual predictors revealed that E-Readiness ($\beta = .157$, $p<.05$), Information Quality ($\beta = .448$, $p<.001$), and Service Quality ($\beta = .160$, $p<.05$) were significant and positive predictors of User Satisfaction. Higher levels of E-Readiness, Information Quality and Service Quality are associated with higher levels of User Satisfaction. However, System Quality was not a significant predictor of User Satisfaction ($\beta = .117$, $p=.22$). The results of the multiple linear regression with E-Readiness, System Quality, Service Quality, and Information Quality Predicting User Satisfaction are presented in Table 30.

Table 30

Multiple Linear Regression of E-Readiness, System Quality, Service Quality, and Information Quality Predicting User Satisfaction

Variable	**B**	**SE**	β	***t***	***p***
E-Readiness	.273	.129	.157	2.12	.036
System Quality	.164	.132	.117	1.24	.219
Information Quality	.486	.103	.448	4.73	.000
Service Quality	.151	.075	.160	2.01	.047

Note. $F(4, 108) = 23.805$, $p < .001$, $R^2 = 0.469$

Research Question 5

The fifth research question was, 'Is there a positive relationship between E-Readiness, and System Outcome (i.e., Net Benefits)?'

Multiple regression using the Enter method was performed. Net Benefits was the dependent variable while E-Readiness, System Use, and User Satisfaction were the independent variables at the System Delivery stage. The coefficient of determination (R^2) was calculated as .373. The overall model of three variables explained 37.3% of the variance in Net Benefits, which was statistically significant ($F(3,109) = 21.614$, $p<0.001$). An inspection of individual predictors revealed that System Use ($\beta = .175$, $p<.05$) and User Satisfaction ($\beta = .443$, $p<.001$) were significant and positive predictors of Net Benefits. Higher levels of User Satisfaction and System User are associated with higher levels of Net Benefits. However, E-Readiness was not a significant predictor of Net Benefits ($\beta = .137$, $p>.05$). The results of the multiple linear regression with E-Readiness, System Use, and User Satisfaction predicting System Use are presented in Table 31.

Table 31

Multiple Linear Regression of E-Readiness, System Use, and User Satisfaction Predicting Net Benefits

Variable	**B**	**SE**	β	***t***	***p***
E-Readiness	.187	.113	.137	1.65	.102
User Satisfaction	.349	.068	.443	5.10	.000
System Use	.119	.059	.175	2.02	.046

Note. $F(3, 109) = 21.614$, $p < .001$, $R^2 = 0.373$.

Multiple linear regression

The overarching research question was, 'Are there relationships among the six success dimensions and with online instructor E-Readiness in a large Caribbean university system?' In order to further understand the relative strength of the contribution of the six dimensions (System Quality, Service Quality, Information Quality, System Use, User Satisfaction, and E-Readiness) in predicting system outcome, multiple linear regression was applied. Using System Outcome as the dependent variable and System Quality, Service Quality, Information Quality, System Use, User Satisfaction, and E-Readiness as the independent variables, the multiple linear regression model was found to be statistically significant, $F(6, 106) = 12.921$, $p < .001$, $R^2 = .422$, indicating that the model of six dimensions effectively predicted system outcome. The combination of predictors accounted for 42% of the variance in system outcome. Of the six predictors in the model, User Satisfaction ($\beta = .270$, $p<.05$) provided the largest unique contribution when the other predictors in the model were held constant, $t = 2.59$, suggesting that, as User Satisfaction increased by one unit of agreement, Net Benefits increased by 0.27 units. The other predictors in the model (System Quality, Service Quality, Information Quality, System Use, and E-Readiness) were not statistically significant and did not provide a significant unique contribution toward Net Benefits. Therefore no positive relationship exists among System Quality, Service Quality, Information Quality, System Use, E-Readiness and Net Benefits. The results of the multiple linear regression with System Quality, Service Quality, Information Quality, System Use, and E-Readiness predicting Net Benefits are presented in Table 32.

Table 32

Multiple Linear Regression of Six Dimensions Predicting Net Benefits

Variable	B	SE	β	*t*	*p*
System Quality	.035	.110	.031	.31	.754
Information Quality	.150	.094	.175	1.60	.113
Service Quality	.113	.064	.152	1.77	.079
System Use	.101	.058	.149	1.75	.083
User Satisfaction	.213	.082	.270	2.59	.011
E-Readiness	.154	.111	.113	1.38	.169

Note. $F(6, 106) = 12.921$, $p < .001$, $R^2 = 0.422$.

Technology barriers

The only open-ended question in the survey asked online instructors to comment on any technology barriers experienced in the OLE. Thirty-eight online instructors made 30 points regarding technology issues. Twenty (67%) documented issues such as the inability to track students' posts in a particular forum, inability to access technology tools such as activate the chat option, increase the default 500kb file size limit for uploading documents; inability to successfully create or conduct an Elluminate Live(R) session. These issues relate to a lack of online instructor e-readiness as documented by Penna and Stara (2008).

The 20 (67%) online instructors also noted concerns that the current OLE was not as intuitive as previous versions regarding uploading student grades; broken links from

important tabs such as the Participants and Grades tabs, and insufficient time to learn about updated changes in the OLE. Five (17%) online instructors documented their frustration about technical support including lack of support after 4:00 p.m. during the week; delayed feedback when emailing the technical support team, lack of continued support for instructors who are not technologically savvy, and evidence of inadequate testing of the updated OLE prior to its deployment for September 2011. This represents Service Quality issues as demonstrated by Petter and McLean (2009) which should be addressed so that online instructors can carry out their tasks efficiently and be more satisfied in the OLE. The results of the study supported these concerns by showing that Service Quality ($\beta = .160$, $p<.05$) was a significant and positive predictor of User Satisfaction.

Five (17%) online instructors noted hardware issues including connectivity issues at work and home resulting in the inability to maintain contact with online learners. These hardware issues represent System Quality issues as demonstrated by Guimaraes, et al (2009) and Halawi, et al. (2008). The overall technology barriers documented were attributed to issues at the System Design stage which can impact System Use and User Satisfaction at the System Delivery stage and subsequently Net Benefits at the System Outcome stage.

Summary

The results of the statistical analyses used to address the research questions in the study were presented in this chapter. A review the survey was first conducted with professors associated with the OLE to identify typographical errors, grammatical errors

and suitability of survey items for the online learning context especially for online instructors. Then a pilot test was used to examine the internal consistency of the survey instrument. After the data for the survey was captured, pre-analysis data screening was performed before conducting statistical analyses to test for data accuracy and missing data. The survey instrument was then evaluated for reliability and validity.

Cronbach's *alpha* reliability tests were performed for each survey dimension (System Quality, Service Quality, Information Quality, System Use, User Satisfaction, E-Readiness and Net Benefits) to ensure that the survey items were internally consistent with each other. The results indicated that the dimensions demonstrated acceptable to excellent reliability. The means and standard deviations for the seven subscales were also calculated. The highest mean scores were shown on System Use and E-Readiness which suggested that online instructors tended to agree with items in those dimensions. Lower mean scores were shown on Information Quality and Net Benefits which also suggested that participants tended to agree with items in those dimensions.

Research questions 1 and 2 were determined by calculating the aggregate scores of the items in the dimension. It was found that the e-learning systems success score at the Caribbean university system was 4.07 out of a possible 5, or 81.4%. The e-learning readiness score of online instructors at the Caribbean university system were calculated at 4.53 out of a possible 5, or 90.6%. Linear regression was used to answer research questions three through five. The significant findings relative to the research questions on the influence of E-Readiness on the six dimensions (System Quality, Service Quality, Information Quality, System Use, User Satisfaction, E-Readiness, and Net Benefits) were presented.

Using regression analysis, E-Readiness was determined to be a significant predictor of all six success dimensions. E-readiness had the strongest effect on System Quality ($\beta = .284$, $p<.01$) at the system design stage. E-Readiness ($\beta = .251$, $p<.005$) was a significant and positive predictor of System Use at the System Delivery stage. E-Readiness ($\beta = .157$, $p<.05$), Information Quality ($\beta = .448$, $p<.001$), and Service Quality ($\beta = .160$, $p<.05$) were also significant and positive predictors of User Satisfaction at the System Delivery stage. System Use ($\beta = .175$, $p<.05$) and User Satisfaction ($\beta = .443$, $p<.001$) were significant and positive predictors of Net Benefits at the System Outcome stage.

The research question, 'Are there relationships among the six success dimensions and with online instructor E-Readiness in a large Caribbean university system?' was also addressed. Regression analysis was also used to determine the relative strength of the contribution of the seven dimensions of the framework. The combination of predictors accounted for 42.2% of the variance in Net Benefits. Of the six predictors in the model, only User Satisfaction ($\beta = .270$, $p<.05$) provided the largest unique contribution when the other predictors in the model were held constant. The other predictors in the model (System Quality, Service Quality, Information Quality, System Use, and E-Readiness) were not statistically significant and thus did not provide a significant unique contribution toward Net Benefits.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

This chapter presents the summary of the study of the inter-relationships among the dimensions of the IS Success Model and E-Readiness. It is divided into four sections. The first section summarizes and interprets the results. The second section discusses the limitations of the research. The third section provides recommendations for future research based on the results of the study.

Conclusions

This study examined whether there were relationships among the six success dimensions and with online instructor E-Readiness in a large Caribbean university system. It explored technological barriers at the IS design and delivery stages that affect Net Benefits at the system outcome stage and whether there were correlations among online instructor E-Readiness and factors at the IS stages. To accomplish this, the study proposed a modified framework from the IS Success Model to determine whether there is a relationship between those success measures and online instructor E-Readiness in a Caribbean university system. The measures were System Quality, Service Quality, and

Information Quality from the system design stage; System Use and instructor satisfaction from the system delivery stage, and Net Benefits from the system outcome stage.

To study the various perceptions of online instructor E-Readiness at the three IS stages, a survey instrument comprising an e-learning systems success (ELSS) section (Wang, et al., 2007), and an E-Readiness section (Holsapple & Lee-Post, 2006) was administered to online instructors at a Caribbean university. The survey instrument was delivered via a Web-based survey provider, and apart from data on demographics, responses to all items were based on a five-point Likert scale. One hundred and thirteen online instructors responded to the survey, yielding a response rate of 28.5%.

The first research question was, 'What is the e-learning systems success score at this university?' This score had not been previously determined in the context of online learning. The results indicated that this Caribbean university system had a score of 4.07 of a possible 5 or 81.4% which indicates an acceptable level of e-learning system success. The results validated research by Wang et al. (2007) who stated that a rating of four or higher on a five-point Likert-scale will indicate an acceptable level of e-learning system success.

The second research question was, 'What is the e-learning readiness score of online instructors in this university system?' This score had also not been previously determined in the context of online learning. The results indicated that the E-Readiness score of online instructors was 4.53 out of a possible 5, or 90.6. This overall E-Readiness score comprised a technical readiness score or 4.63, a lifestyle readiness score of 4.44 and a learning readiness score of 4.42, each out of a maximum score of 5. The results validated research by Holsapple and Lee-Post (2006) who considered online instructors

to be e-ready if a response is made on all three readiness dimensions comprised at least a four on a five-point scale.

The third research question was, 'Is there a positive relationship between E-Readiness and system design (i.e., System Quality, Service Quality, and Information Quality)?' The E-Readiness dimension had not been previously applied to the E-Learning Success Model. The findings of the linear regression analysis indicated that the E-readiness had an effect on System Quality ($\beta = .284$, $p<.01$), Service Quality ($\beta = .257$, $p<.01$), and Information Quality ($\beta = .260$, $p<.01$), at the system design stage. E-readiness accounted for 8.1% of the variance in System Quality, 6.6% of the variance in Service Quality and 6.8% of the variance in Information Quality. Wang and Wang (2009), suggested that System Quality may be important during the initial stages of system implementation but may diminish thereafter. This supports the need to further investigate the impact of online instructor E-Readiness at the system design stage that may present barriers to high System Quality, Service Quality and Information Quality.

The fourth research question was, 'Is there a positive relationship between E-Readiness and system delivery (i.e., System Use, User Satisfaction)? The E-Readiness dimension had also not been previously applied to the E-Learning Success Model. The findings of the linear regression analysis indicated E-Readiness ($\beta = .251$, $p<.005$) was a significant and positive predictor of System Use at the System Delivery stage. However, System Quality ($\beta = .048$, $p>.05$), Information Quality ($\beta = .193$, $p>.05$), Service Quality ($\beta = .116$, $p>.05$) were not significant predictors of System Use. The dimensions accounted for 19.8% of the variance in System Use. The result that Information Quality was not a significant predictor or System Use is contrary to recent studies that reported a

strong link between the two dimension suggesting that the quality of information is a strong factor in influencing users to have confidence in the IS (Klobas & McGill, 2010; Mutula & van Brakel, 2006). This result, along with the finding of E-Readiness as a significant and positive predictor of System Use suggests that more research is necessary on the effect of E-Readiness and Information Quality regarding online instructor use of the OLE.

The results of the linear regression analysis also indicated that E-Readiness (β = .157, p<.05), Information Quality (β = .448, p<.001), and Service Quality (β = .160, p<.05) were significant and positive predictors of User Satisfaction at the System Delivery stage. The dimensions accounted for 46.9% of the variance in User Satisfaction. The findings validated results of Lin (2007) who found that Service Quality and Information Quality had a significant effect on actual OLE use through User Satisfaction. The strongest relationship was found in Information Quality which accounted for 44.8% of the variance in User Satisfaction. These findings also confirm the research by Petter and McLean (2009) and Eom (2010) who used the DeLone and McLean model at the individual level and found a relationship between Information Quality with User Satisfaction. These results also support research by Wang and Liao (2008) who indicated that Information Quality had a more dominant influence on User Satisfaction than System Quality and Service Quality . This suggests that more attention should be paid to Information Quality in an IS.

The fifth research question was ‘Is there a positive relationship between E-Readiness and system outcome (i.e., Net Benefits)?’ Again, the E-Readiness dimension had not been previously applied to the E-Learning Success Model. The findings of the

linear regression analysis indicated that the System Use (β = .175, p<.05) and User Satisfaction (β = .443, p<.001) were significant and positive predictors of Net Benefits at the System Outcome stage. However, E-Readiness was not a significant predictor of Net Benefits (β = .137, p >.05). The findings of the linear regression analysis also indicated that the system delivery stage also predicted the system outcome stage. User Satisfaction accounted for 44.3% of the variance in Net Benefits and System Use accounted for 17.4% of the variance in Net Benefits. This supports the findings of Freeze et al. (2010) who examined IS system success and reported that User Satisfaction was a stronger factor in IS system success than System Use.

The overarching research question was 'Are there relationships among the IS system success dimensions and with online instructor E-Readiness in a large Caribbean university system?' The inclusion of the E-Readiness dimension had not been previously applied to the E-Learning Success Model. The finding of the multiple linear regression indicated that the combination of predictors accounted for 42.2% of the variance in Net Benefits. Of the six predictors in the model, User Satisfaction provided the largest unique contribution when the other predictors in the model were held constant. The other predictors in the model (System Quality, Service Quality, Information Quality, System Use, and E-Readiness) were not statistically significant and thus did not provide a significant unique contribution toward Net Benefits. This supports the need to further investigate the impact of online instructor E-Readiness as an additional dimension in the IS Success Model that may affect the system design, system delivery and system outcome stages.

Implications

A theoretical model for online instructor E-Readiness towards technology in the OLE was developed. The E-Readiness dimension was included in the framework of System Quality, Service Quality, Information Quality, System Use, User Satisfaction dimensions to test their relationship with Net Benefits. Therefore, the main contributions that this study adds to the literature within the information system field are (a) the development and empirical validation of a theoretical model that predicts positive variance in online instructors' Net Benefits in the OLE, and (b) identification of factors that affect online instructors in the OLE.

The results suggest that E-Readiness had the strongest relationship with System Quality ($\beta = .284$, $p<.01$) in the System Design stage. At the system delivery stage, E-Readiness accounted for the highest variance with System Use (25.1%), compared to 15.7% of the variance with User Satisfaction. Information Quality accounted for the highest variance (44.8%) with User Satisfaction. Delone and McLean (1992, 2003) reported that User Satisfaction is a significant factor in IS system success. Further research involving E-Readiness, Information Quality and User Satisfaction is warranted. User Satisfaction accounted for 44.3% of the variance with Net Benefits. According to Wang and Liao (2008), Net Benefits is a closer measure of system success than the other dimensions. It is also important to minimize technology barriers that may impact online instructors' satisfaction at the system outcome stage.

The results also showed that Information Quality at the System Delivery stage had the strongest relationship. Information Quality had 44.8% of the variance in User Satisfaction at the System Delivery stage, compared to E-Readiness (15.7%), System

Quality (11.7%) and Service quality (16.0%). User Satisfaction also had the strongest relationship at the System Outcome stage with 44.3% of the variance in Net Benefits, compared to E-Readiness (13.7%) and System Use (17.5%). Likewise, the results of multiple linear regression showed that of the six predictors in the model, User Satisfaction provided the largest unique contribution when the other predictors in the model were held constant. User Satisfaction accounted for 27% of the variance predicting Net Benefits. This supports the research of DeLone and McLean (1992, 2003) that User Satisfaction is a significant factor in IS system success. The results also validated other studies that reported User Satisfaction as instrumental to the success of online educational programs, in that measures of the levels of instructor satisfaction can be used to assess overall program effectiveness (Menchaca & Bekele, 2008; Ozkan & Koseler, 2009). The results suggest that universities and other tertiary level institutions using the OLE should identify and address any technology barriers among online instructors. This would ensure that any negative perceptions about the OLE do not translate into unsatisfied online instructors, resulting in minimal System Use. Continued training in the OLE as the opportunity warrants should be an important consideration.

The conclusions of this study should assist in the understanding of the technology barriers that universities engaged in online teaching will need to address when implementing plans that require their online instructors to incorporate various technology tools in their courses. This research also offers guidance to universities and other tertiary level institutions that plan to offer online courses. The study suggests areas to maximize the online instructor's acceptance and minimize their reluctance to embrace the technology tools, resulting in success in the implementation of online courses.

Furthermore, the results showed that User Satisfaction at the System Delivery stage is a key dimension as it is affected by the system design stage, and significantly affects the system outcome stage.

Limitations

This research contained several potential limitations. First, the study was restricted to online instructors contracted to teach in Caribbean territories. Hence, the generalizability of this study may be limited only to similar types of universities with campuses located in different islands. Additional studies of online instructors employed at other universities within the Caribbean may need to be conducted for results that can be generalized to other online tertiary level institutions. Secondly, the voluntary nature of responding to the web-based survey may not represent the full spectrum of online instructors who have issues with the technology and the results of the study may not be generalized to the population of online instructors. Also, not all instructors who completed the survey may be representative of each territory or site.

Lack of random sampling may impact the study's generalization as the sample was selected from those online instructors who were teaching during the semester that the data was captured. Although it saved time and money, the survey was delivered online and several issues may have arisen in relation to survey completion. Those online instructors who have insecurities about the technology may have been hesitant to access or complete the online survey. This could have resulted in an unbalanced number of instructors who were competent compared to those who were insecure with the technology in participating in the survey. Also, online instructors' individual responses to

the survey may have been influenced as they would have been aware of their participation in a research study relating to being truthful about their perceived technology barriers at their university rather than merely giving information that they thought that the researcher expected or wanted to receive. This needs to be taken into consideration, although there was no way to control for it. Results of online instructors' self-reporting of their perceived technical readiness may also be affected because of people's tendency to judge their own computer competence higher or lower than it actually is. The reliability of the data captured also depended on the online instructors responding truthfully to the survey items rather than providing responses that they thought the researcher may expect or want to obtain. This limitation needs to be considered although there is no way to control for it.

Finally, the survey was conducted two weeks after the launch of an updated version of the OLE. Therefore, online instructors were at that time becoming familiar with the environment and its teething problems. This could account for a skewed perception of the OLE as some online instructors may have been resistant to the upgraded version. It may also have impacted on the lack of survey responses since online instructors may have been focusing on becoming familiar with the new OLE.

Recommendations

The results of this study can be applied to areas of future research. Firstly, investigating the views of other participants of the OLE, such as technical support specialists who maintain the course site would be useful. Also members of the academic programming and delivery division who need to be using the OLE to interact with online

instructors, online learners and other colleagues across the campuses could offer insight into their own technical challenges with the OLE. Additional research into technical barriers to online instructor E-Readiness in the OLE could be pursued. While the results of multiple linear regression analysis showed that E-Readiness did not provide a significant contribution to Net Benefits, linear regression analysis did. Linear regression showed that E-Readiness accounted for 10.7% of the variance in system design, 16.6%, of the variance in system delivery, and 12.4% of the variance in system outcome. Research further exploring the impact of E-Readiness on the three stages could show whether the results of the linear regression in this study were an anomaly or confirm the existence of a relationship between E-Readiness and system delivery. The online instructors could also be surveyed at the end of the academic year, after the implementation of the updated OLE has been in use over three semesters and the results compared for significant differences.

Another possibility for future research would be incorporating E-Readiness into a different IS model that does not include User Satisfaction. Multiple linear regression analysis showed that, among the independent variables included in the proposed model in this study, User Satisfaction had a high influence on Net Benefits. Additional research could show whether the impact of E-Readiness in the present study's multiple linear regression analysis was overshadowed by the strong contribution of User Satisfaction on Net Benefits at the System Outcome stage.

A further recommendation would be to conduct a qualitative study which would use interviews to gain an understanding of the degree to which online instructors are satisfied with the technology and associated tools in the OLE. Data gathered to support

the findings of the research questions could then be obtained through a sample of online instructors to learn about their perceptions of technology barriers that prevent their satisfaction in the OLE. According to Creswell (2005), qualitative research analyzes the viewpoints of the participants into themes that address the study outcomes. Therefore, online instructors' perceptions of issues about their satisfaction or dissatisfaction based on identified technological barriers to successful online learning could be captured and analyzed.

The incorporation of demographics in the analysis would also be useful to determine if any characteristics of the online instructors were impacting E-Readiness or any dimensions at the three stages. Finally, since regression analysis was used to examine the strength of the relationships among the dimensions, future research could test the model using path analysis. Path analysis allows further validation of the model generated by path analysis in order to identify the indirect effects of the variables in the model. Therefore, a goodness of fit can be determined to indicate how the model fits the data collected (Hair, et al., 2010).

Summary

This study focused on investigating the extent to which online instructors' E-Readiness in the OLE at a Caribbean university system impacts the system design, system delivery and system outcome stages using the DeLone and McLean (1992, 2003), IS Success Model. According to Parthasarathy and Smith (2009), online education is a key indicator of an institution's willingness and ability to adapt to changing educational delivery methods. Results have suggested that experienced instructors view online learning as effective based on online learners' prior experience with technologies

(Clarebout & Elen, 2006; Shih, et al., 2006; Yan, 2006). Studies have addressed the significance of E-Readiness as a key component in various sectors including the design of online learning programs (Holsapple & Lee-Post, 2006; So & Swatman, 2010). However, these studies have focused on online learners and not online instructors. Panda and Mistra (2007), reviewed literature on instructors' attitudes towards OLEs and concluded that many studies focused more on barriers and motivators to OLEs from instructors' opinions and perceptions, rather than the technology used in the OLE.

The overarching research question was 'Are there relationships among the six success dimensions and with online instructor E-Readiness in a large Caribbean university system?' Five additional research questions which mapped the IS success dimensions in the OLE (DeLone & McLean, 2004; Holsapple & Lee-Post, 2006) and evaluated online instructors' E-Readiness score in a Caribbean university system (Holsapple & Lee-Post, 2006) were:

1. What is the e-learning systems success score at this university?
2. What is the e-learning readiness score among online instructors in a Caribbean university system?
3. Is there a positive relationship between E-Readiness and System Design (i.e., System Quality, Service Quality, and Information Quality)?
4. Is there a positive relationship between E-Readiness and System Delivery (i.e., System Use, User Satisfaction)?
5. Is there a positive relationship between E-Readiness and System Outcome (i.e., Net Benefits)?

Online instructors at a Caribbean university system were used in this research study. A Web-based survey using a multi-item, Likert-type scale was developed from previously validated survey instruments. The survey comprised 48 items from (a) an e-learning systems success (ELSS) section (Wang, et al., 2007), and (b) E-Readiness and demographic sections (Holsapple & Lee-Post, 2006). The dependent variables, system design, system delivery and system outcome was determined by six dimensions are captured from the ELSS survey. The System Design section comprised three parts measuring System Quality, Service Quality and Information Quality. System quality comprised items SQ1 through SQ7, Information Quality comprised items IQ1 through IQ7, and Service Quality comprised SV1 and SV3. The system delivery section comprised two parts measuring System Use and User Satisfaction. System use included items SU1 through SU3, and User Satisfaction comprised items US1 and US2. The system outcome section measured Net Benefits and comprised eight items, NB1 through NB8. E-readiness included items TR1 through TR7, LR1 through LR5, and LP1 through LP6.

Prior to analyzing the research questions, a review the survey was conducted with professors associated with the OLE, followed by a pilot test to examine the internal consistency of the survey instrument. The survey was then distributed to 396 online instructors, 114 of whom responded, yielding a response rate of 28.5%. Pre-analysis data screening was performed before conducting statistical analyses to test for data accuracy and missing data. Research questions one and two were determined by calculating the aggregate scores of the items in the dimension. Linear regression was used to answer research question three, and multiple linear regression was used to answer research

questions four and five and the overall research question. Using regression analysis, E-Readiness was determined to be a significant predictor of all six success dimensions. E-readiness had a stronger effect on System Quality in the system design stage, User Satisfaction at the system delivery stage, with the strongest effect on Net Benefits at the system outcome stage. Information quality had the strongest effect on User Satisfaction at the system delivery stage. User satisfaction had the strongest effect on Net Benefits at the system outcome stage. The results of the multiple linear regression analysis showed that all six dimensions together accounted for 42.2% of the variance in Net Benefits. Of the six predictors in the model, User Satisfaction provided the largest unique contribution when the other predictors in the model were held constant. The other predictors in the model (System Quality, Service Quality, Information Quality, System Use, and E-Readiness) were not statistically significant and did not provide a significant unique contribution toward Net Benefits. A summary of the five research questions is as follows:

1. What is the e-learning systems success score at this university? The score was 4.07 out of a possible 5, or 81.4%.
2. What is the e-learning readiness score among online instructors in a Caribbean university system? The readiness score was 4.53 out of a possible 5, or 90.6%.
3. Is there a positive relationship between E-Readiness and System Design (i.e., System Quality, Service Quality, and Information Quality)? Yes, there were positive and significant relationships found between E-Readiness and System Design. The most significant relationship was found between E-Readiness and System Quality.

4. Is there a positive relationship between E-Readiness and System Delivery (i.e., System Use, User Satisfaction)? Yes, there were positive and significant relationships found between E-Readiness and System Delivery. The most significant relationship with was found between E-Readiness and System Use only. Information Quality was found to have a stronger relationship with User Satisfaction than with System Use or with E-Readiness.
5. Is there a positive relationship between E-Readiness and System Outcome (i.e., Net Benefits)? No, E-Readiness was not a significant predictor of Net Benefits.

Following the linear regression and multiple linear regression analysis, results of the research questions were compared with the literature on E-Readiness and IS system success for analysis. The researcher then presented the implications of the study, and discussed how the model can be used for future research. The limitations of the study were presented and suggestions for future research that could contribute to the body of knowledge on the topic of technology barriers to online instructor E-Readiness in the OLE were made.

Appendix A

IRB Approval Letter

NOVA SOUTHEASTERN UNIVERSITY
Office of Grants and Contracts
Institutional Review Board

MEMORANDUM

To: Glenda Gay

From: Ling Wang, Ph.D.
Institutional Review Board

Date: July 18, 2011

Re: *A Study of Technological Barriers to Instructor E-Readiness in an Online Environment*

IRB Approval Number: wang07151102

I have reviewed the above-referenced research protocol at the center level. Based on the information provided, I have determined that this study is exempt from further IRB review. You may proceed with your study as described to the IRB. As principal investigator, you must adhere to the following requirements:

1) CONSENT: If recruitment procedures include consent forms these must be obtained in such a manner that they are clearly understood by the subjects and the process affords subjects the opportunity to ask questions, obtain detailed answers from those directly involved in the research, and have sufficient time to consider their participation after they have been provided this information. The subjects must be given a copy of the signed consent document, and a copy must be placed in a secure file separate from de-identified participant information. Record of informed consent must be retained for a minimum of three years from the conclusion of the study.

2) ADVERSE REACTIONS: The principal investigator is required to notify the IRB chair and me (954-262-5369 and 954-262-2020 respectively) of any adverse reactions or unanticipated events that may develop as a result of this study. Reactions or events may include, but are not limited to, injury, depression as a result of participation in the study, life-threatening situation, death, or loss of confidentiality/anonymity of subject. Approval may be withdrawn if the problem is serious.

3) AMENDMENTS: Any changes in the study (e.g., procedures, number or types of subjects, consent forms, investigators, etc.) must be approved by the IRB prior to implementation. Please be advised that changes in a study may require further review depending on the nature of the change. Please contact me with any questions regarding amendments or changes to your study.

The NSU IRB is in compliance with the requirements for the protection of human subjects prescribed in Part 46 of Title 45 of the Code of Federal Regulations (45 CFR 46) revised June 18, 1991.

Cc: Protocol File

3301 College Avenue • Fort Lauderdale, FL 33314-7796 • (954) 262-5369
Fax: (954) 262-3977 • Email: *inga@nsu.nova.edu* • Web site: www.nova.edu/cwis/ogc

Appendix B

Approval to use E-Readiness Survey Instrument

Date: Thu, 06 Jan 2011 13:08:18 -0500 [01/06/11 13:08:18 EDT]
From: "Lee-Post, Anita" <dsianita@email.uky.edu>
To: "gayglend@nova.edu" <gayglend@nova.edu>
Subject: RE: Request for information from article

Hi, Gay:
For sure - we are delighted that you found our research useful. Use the surveys in ways you see fit.
Thanks, Anita.

-----Original Message-----
From: Glenda Gay [mailto:gayglend@nova.edu]
Sent: Tuesday, December 28, 2010 8:42 PM
To: Holsapple, Clyde W
Subject: Request for information from article

Dear Professor Holsapple,

I am a doctoral student of Information Systems at Nova Southeastern University in Florida, and am working on my dissertation which involves technological barriers to online instructor E-Readiness.

After reading your article 'Defining, Assessing, and Promoting e-Learning Success: An Information Systems Perspective' (2006), I note that you have used an E-Readiness questionnaire designed by the University of Kentucky Distance Learning Technology Center. I am investigating the E-Readiness of online instructors and their satisfaction and am considering the four readiness measures that you explained in your article.

I would like to know if you could grant permission for me to have access to this and others surveys in your article to see if it is suitable for the E-Readiness aspect of my dissertation. Of course, I would cite their sources and acknowledge you and Professor Lee-Post should I use any of the surveys.

My advisor is Dr. Laurie Dringus at NSU (laurie@nova.edu).

Thank you so much, and best wishes for 2011!
regards,
Glenda Gay (Mrs.)
NSU DISS Information Systems

Appendix C

Request for Permission to Gather Data

Glenda Gay <glenda.gay@dec.uwi.edu>

Dissertation Request

Vivienne Roberts <vivienne.roberts@open.uwi.edu> **Fri, Jun 24, 2011 at 12:49 PM**

To: Glenda Gay <glenda.gay@open.uwi.edu>

Glenda,
This seems to me to be a useful and appropriate study and one which will provide relevant data for the Open Campus. I am forwarding your request to Dr Gary Hepburn, Director of Academic Programming and Delivery.
Best regards.
Vivienne

On Fri, Jun 24, 2011 at 12:44 PM, Glenda Gay <glenda.gay@open.uwi.edu> wrote:
Good Afternoon Prof. Roberts:

I am writing to request permission to survey online coordinators and e-tutors of the Open Campus to gather data for my dissertation in Information Systems.

I am currently a lecturer in the Management Studies Department at Cave Hill, Course Coordinator with the Open Campus, and a Master Tutor for the Managing and Facilitating Online Instruction course (MFOI). I am also a registered doctoral student at Nova Southeastern University (NSU) in Florida completing my dissertation entitled 'A Study of Technological Barriers to Instructor E-Readiness in an Online Environment'.

As a coordinator with an Information Technology and Information Systems background, I am pleased with the improvement in training online instructors for the online environment through the MFOI training course. A critical factor of e-learning success is the e-learning readiness of the online user. However, there is a scarcity of studies on online instructors' e-learning readiness (E-Readiness) in an online learning environment. In supporting our university, my study proposes to evaluate whether there are correlations among online instructor E-Readiness dimensions and factors at the design and delivery stages that affect system outcomes. The DeLone and McLean model will be used as a framework for my research to test six dimensions (System Quality, Information Quality, Service Quality, System Use, User Satisfaction and Net Benefits) with instructor E-Readiness. It is hoped that the findings will offer additional guidance to administrators when addressing policies that pertain to improving the online teaching experience and quality of teaching in the online environment.

I propose to survey the coordinators and e-tutors using a questionnaire placed in the Teacher

Forum of the various courses in the Learning Exchange by a technical support specialist. This will assure the anonymous collection of data and will be similar to the Lessons Learned survey for the students. The survey which is attached for your perusal, was modified from Holsapple and Lee-Post (2006) and Wang, Wang, and Shee (2007), whose references are below.

I have completed training courses in accordance with the Institutional Review Board (IRB) of UWI and NSU, for research with human subjects, and have also attached them for your perusal. I am quite willing to provide any additional information in support of my request, which I hope will be granted.

Many thanks for considering my request and enjoy your weekend!
regards,
Glenda

--

Glenda Gay (Mrs.)
Course Coordinator: MGMT2006 - Management Information Systems I
University of the West Indies - Cave Hill and Open Campus
Telephone: (246) 417-4301 (direct)
Telephone: (246) 417-4547 (Department of Management Studies)
Email: glenda.gay@open.uwi.edu
Email: glenda.gay@cavehill.uwi.edu
Skype id: glenda.gay

References:

Holsapple, C. W., & Lee-Post, A. (2006). Defining, assessing, and promoting e-learning success: An information systems perspective. *Decision Sciences Journal of Innovative Education, 4*(1), 67-85.

Wang, Y.-S., Wang, H.-Y., & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in Human Behavior, 23*(4), 1792-1808.

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Professor Vivienne Roberts
Deputy Principal
University of the West Indies
Open Campus
P.O. Box 1341, Bridgetown BB11000
Tel: 246-417-4746
Fax: 246-424-0722

OPEN CAMPUS
WEB APPLICATIONS

Glenda Gay <glenda.gay@dec.uwi.edu>

Dissertation Request

gary.hepburn@dec.uwi.edu <gary.hepburn@dec.uwi.edu> **Mon, Jun 27, 2011 at 9:12 PM**

Reply-To: gary.hepburn@dec.uwi.edu
To: Glenda Gay <glenda.gay@open.uwi.edu>

Hello Glenda,
The letter looks fine. Please go forward with your plans and let me know what I can do to help.

Good luck with the research. I hope that we may find a time to discuss your findings in the future.

Regards,
Gary Hepburn

Sent from my BlackBerry® wireless device available from bmobile.

From: Glenda Gay <glenda.gay@open.uwi.edu>
Date: Mon, 27 Jun 2011 20:36:47 -0400
To: <gary.hepburn@dec.uwi.edu>
Subject: Re: Dissertation Request

Hello Dr. Hepburn,

Please find the consent letter that was submitted to my supervisor for comments. I welcome any feedback!

I have created anonymous surveys in the Learning Exchange for my students and was therefore considering one option of requesting permission to have Louis Boxill or Kevin open this survey for access in the Teacher Forum of each course to maximize (hopefully) responses. Otherwise, I would use another application such as Survey Monkey to link to the survey.

Thanks for your speedy response, and I appreciate your positive feedback!

Best regards,

Glenda

On Mon, Jun 27, 2011 at 6:02 PM, <gary.hepburn@dec.uwi.edu> wrote:

Hello Glenda.

I did receive your information from Professor Roberts and am fully supportive of you completing this research on OC courses. The one thing I would like to review before you do so is your invitation letter for subjects as well as any forms or materials relating to informed consent. Other than that I believe we are good to go.

Regards
Gary Hepburn

Sent from my BlackBerry® wireless device available from bmobile.

From: Glenda Gay <glenda.gay@open.uwi.edu>
Date: Mon, 27 Jun 2011 17:13:00 -0400
To: Gary Hepburn<gary.hepburn@dec.uwi.edu>
Subject: Dissertation Request

Dear Dr. Hepburn,

Prof Roberts indicated that she forwarded a request to you on Friday, so I would like to introduce myself and re-send my request for your approval which is forwarded below.

I am currently preparing my documentation to submit for approval prior to gathering data and therefore correspondence from the Open Campus is a requirement in this process.

I hope my request meets with your approval. I am quite willing to provide any other information that may be necessary.

Best regards,
Glenda Gay

---------- Forwarded message ----------
From: **Glenda Gay** <glenda.gay@open.uwi.edu>
Date: Fri, Jun 24, 2011 at 12:44 PM
Subject: Dissertation Request
To: Vivienne Roberts <vivienne.roberts@dec.uwi.edu>

Good Afternoon Prof. Roberts:

I am writing to request permission to survey online coordinators and e-tutors of the Open Campus to gather data for my dissertation in Information Systems.

I am currently a lecturer in the Management Studies Department at Cave Hill, Course Coordinator with the Open Campus, and a Master Tutor for the Managing and Facilitating Online Instruction course (MFOI). I am also a registered doctoral student at Nova Southeastern University (NSU) in Florida completing my dissertation entitled 'A Study of Technological Barriers to Instructor E-Readiness in an Online Environment'.

As a coordinator with an Information Technology and Information Systems background, I am

pleased with the improvement in training online instructors for the online environment through the MFOI training course. A critical factor of e-learning success is the e-learning readiness of the online user. However, there is a scarcity of studies on online instructors' e-learning readiness (E-Readiness) in an online learning environment. In supporting our university, my study proposes to evaluate whether there are correlations among online instructor E-Readiness dimensions and factors at the design and delivery stages that affect system outcomes. The DeLone and McLean model will be used as a framework for my research to test six dimensions (System Quality, Information Quality, Service Quality, System Use, User Satisfaction and Net Benefits) with instructor E-Readiness. It is hoped that the findings will offer additional guidance to administrators when addressing policies that pertain to improving the online teaching experience and quality of teaching in the online environment.

I propose to survey the coordinators and e-tutors using a questionnaire placed in the Teacher Forum of the various courses in the Learning Exchange by a technical support specialist. This will assure the anonymous collection of data and will be similar to the Lessons Learned survey for the students. The survey which is attached for your perusal, was modified from Holsapple and Lee-Post (2006) and Wang, Wang, and Shee (2007), whose references are below.

I have completed training courses in accordance with the Institutional Review Board (IRB) of UWI and NSU, for research with human subjects, and have also attached them for your perusal. I am quite willing to provide any additional information in support of my request, which I hope will be granted.

Many thanks for considering my request and enjoy your weekend!
regards,
Glenda
--

Glenda Gay (Mrs.)
Course Coordinator: MGMT2006 - Management Information Systems I
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Telephone: (246) 417-4301 (direct)
Telephone: (246) 417-4547 (Department of Management Studies)
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References:

Holsapple, C. W., & Lee-Post, A. (2006). Defining, assessing, and promoting e-learning success: An information systems perspective. *Decision Sciences Journal of Innovative Education, 4*(1), 67-85.

Wang, Y.-S., Wang, H.-Y., & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in Human Behavior, 23*(4), 1792-1808.

Appendix D

Consent Information

Dear Colleague,

Please accept this invitation to participate in a research study about technological barriers to instructor E-Readiness in the online learning environment such as the Learning Exchange. This study is being conducted by Glenda Gay (doctoral candidate) and involves completing an online questionnaire. Participation in this study is entirely voluntary and should take approximately 15 minutes of your time.

The survey questions are about your level of agreement towards your readiness for the technology of the e-learning system. Therefore, there is no right or wrong answer. Your complete survey will be compiled in aggregate format. Presentations or publications of the study will be based on grouped data and will not reveal your identity.

There are no risks or benefits for your participation, however, the knowledge gained from your participation may help the university gain a better understanding about online instructors' E-Readiness as well as those technology issues that affect online instructors' when using the course management systems such as Moodle (also known as the Learning Exchange). The findings will contribute to the broader research on successful use of technology as a teaching resource in the online environment.

Your participation in this study is extremely important. I would appreciate you taking the time (approximately 10-15 minutes) to complete and submit this online survey by <given date>. By completing the questionnaire you are voluntarily agreeing to participate in the survey. Please feel free to contact me by e-mail, phone, or email to my office address listed below should you have any further questions.

Please click on this link to go to the survey: <provide link>

Sincerely,
Glenda Gay
Lecturer - Department of Management Studies
Phone: (246) 417-4301 (office)
Phone: (246) 244-5860 (mobile)
E-mail: Glenda.gay@.....edu

Appendix E

ELSS Survey Instrument

Adopted from Wang, Wang, & Shee (2007)

The following is a list of statements related to various aspects of the Online Learning Environment (The Learning Exchange). Please read each item and rate yourself according to each of the following statements, from: (5) 'Strongly Agree' to (1) 'Strongly Disagree'.

	System quality	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	The e-learning system:					
SQ1	is always available	☐1	☐2	☐3	☐4	☐5
SQ2	is easy to use	☐1	☐2	☐3	☐4	☐5
SQ3	is user-friendly	☐1	☐2	☐3	☐4	☐5
SQ4	is secure	☐1	☐2	☐3	☐4	☐5
SQ5	has attractive features that appeal to me	☐1	☐2	☐3	☐4	☐5
SQ6	Allows information to be readily accessible to me	☐1	☐2	☐3	☐4	☐5
SQ7	Is fast in responding to my requests	☐1	☐2	☐3	☐4	☐5

	Information quality	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	The e-learning system provides information that is:					
IQ1	exactly what I need	☐1	☐2	☐3	☐4	☐5
IQ2	needed at the right time	☐1	☐2	☐3	☐4	☐5

		Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
IQ3	relevant to my job	☐1	☐2	☐3	☐4	☐5
IQ4	sufficient	☐1	☐2	☐3	☐4	☐5
IQ5	easy to understand	☐1	☐2	☐3	☐4	☐5
IQ6	up-to-date	☐1	☐2	☐3	☐4	☐5
IQ7	well-organized	☐1	☐2	☐3	☐4	☐5

	Service quality	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
SV1	The Learning Exchange provides adequate on-line assistance and explanation	☐1	☐2	☐3	☐4	☐5
SV2	The e-learning support specialists are available in case I have a technical problem	☐1	☐2	☐3	☐4	☐5
SV3	The e-learning support specialists respond in a cooperative manner	☐1	☐2	☐3	☐4	☐5

	System use	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
SU1	I frequently use the Learning Exchange	☐1	☐2	☐3	☐4	☐5
SU2*	I use the Learning Exchange when absolutely necessary	☐1	☐2	☐3	☐4	☐5
SU3	I depend on the Learning Exchange	☐1	☐2	☐3	☐4	☐5

* Removed from survey instrument

	User satisfaction	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
US1	I am pleased with the experience of using the Learning Exchange	☐1	☐2	☐3	☐4	☐5
US2	I think the Learning Exchange is successful	☐1	☐2	☐3	☐4	☐5
US3	Overall, I am satisfied with the Learning Exchange	☐1	☐2	☐3	☐4	☐5

	Net benefits	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
	The Learning Exchange:					
NB1	Enhances my teaching skills	☐1	☐2	☐3	☐4	☐5
NB2	Empowers me	☐1	☐2	☐3	☐4	☐5
NB3	Saves time	☐1	☐2	☐3	☐4	☐5
NB4	Contributes to my academic success	☐1	☐2	☐3	☐4	☐5
NB5	Makes me feel isolated	☐1	☐2	☐3	☐4	☐5
NB6	Lacks contact with others	☐1	☐2	☐3	☐4	☐5
NB7	Has quality concerns	☐1	☐2	☐3	☐4	☐5
NB8	Makes me dependent on the technology	☐1	☐2	☐3	☐4	☐5

	Criterion *As a whole* the Learning Exchange*:*	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
C1	Performs well	☐1	☐2	☐3	☐4	☐5
C2	Is successful	☐1	☐2	☐3	☐4	☐5

Appendix F

E-Readiness Survey Instrument

Survey adopted from Holsapple and Lee-Post (2006)

PART I. Online Instructors' Demographic Characteristics

Please tick (✓) the appropriate box for the following items

1.	Gender:	Male Female	☐1 ☐2
2.	Age (years):	29 or under 30-39 40-49 50-59 60-69 70 and Over	☐1 ☐2 ☐3 ☐4 ☐5 ☐6
3.	You are contracted by the Open Campus as a(n):	Coordinator Assistant E-tutor Other category	☐1 ☐2 ☐3 ☐4 (specify)
4.	Through which campus are you contracted to teach your online course(s)?	Cave Hill Mona St. Augustine	☐1 ☐2 ☐3
5.	Approximately how many years have you been teaching at the Open Campus? (online):	Under 1 year 1 – 3 years 4 - 6 years 7 – 10 years More than 10 years	☐1 ☐2 ☐3 ☐4 ☐5
6.	Your Faculty:	Computer Science Humanities Medical Sciences Social Sciences Other Faculty	☐1 ☐2 ☐3 ☐4 ☐5 (specify)
7.	Have you completed the. Managing and Facilitating Online Instruction (MFOI) course?	Yes No	☐1 ☐2
8.	Have you completed the online self-taught course 'Introduction to the Learning Exchange"?	Yes No	☐1 ☐2

PART II. Technical Readiness

These questions are designed to help you assess your readiness for distance teaching and learning, based on your assessment of your *computer setup and technical literacy*.

Please read each item and rate yourself according to each of the following statements, from: (5) 'Strongly Agree' to (1) 'Strongly Disagree'.

		Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
TR1	I know how to access the Open Campus Help Desk	☐1	☐2	☐3	☐4	☐5
TR2	My computer setup is sufficient for online learning.	☐1	☐2	☐3	☐4	☐5
TR3	I have access to the following pieces of software:					
	• Word Processor such as MS Word	☐1	☐2	☐3	☐4	☐5
	• Spreadsheet such as Excel	☐1	☐2	☐3	☐4	☐5
	• Presentation tool such as PowerPoint	☐1	☐2	☐3	☐4	☐5
	• Real Player or similar media player	☐1	☐2	☐3	☐4	☐5
	• Adobe Acrobat Reader	☐1	☐2	☐3	☐4	☐5
	• Browser such as Firefox, Internet Explorer or Google Chrome	☐1	☐2	☐3	☐4	☐5
TR4	I have access to a printer	☐1	☐2	☐3	☐4	☐5
TR5	I receive emails sent to my Open Campus email address even though it may not be my primary account	☐1	☐2	☐3	☐4	☐5
TR6	I have access to the Internet for substantial periods of time, perhaps 45 minutes or so, at least 3 times a week.	☐1	☐2	☐3	☐4	☐5
TR7	I have access to a dedicated network connection or have a Internet Service Provider/ISP	☐1	☐2	☐3	☐4	☐5

PART III. Lifestyle Readiness

These questions are designed to help you assess your readiness for distance teaching and learning, based on your assessment of your *lifestyle readiness*.

Please read each item and rate yourself according to each of the following statements, from: (5) 'Strongly Agree' to (1) 'Strongly Disagree'.

		Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
LR1	I have a private place in my home or at work and that I can use for extended periods	☐1	☐2	☐3	☐4	☐5
LR2	I have adequate time that will be uninterrupted in which I can work on my online courses	☐1	☐2	☐3	☐4	☐5
LR3	I routinely communicate with persons by using electronic technologies such as e-mail, text messaging and voice mail.	☐1	☐2	☐3	☐4	☐5
LR4	I have persons and/or resources nearby who will assist me with any technical problems I might have with my software applications as well as my computer hardware.	☐1	☐2	☐3	☐4	☐5
LR5	I value and/or need flexibility. For example, it is not convenient for me to come to campus two to three times a week to attend a traditional class.	☐1	☐2	☐3	☐4	☐5

PART IV. Learning Readiness

These questions are designed to help you assess your readiness for distance teaching and learning, based on your assessment of how you learn best.

Please read each item and rate yourself according to each of the following statements, from: (5) 'Strongly Agree' to (1) 'Strongly Disagree'.

		Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
LP1	When I am asked to use technologies that are new to me such as a fax machine, voice mail or a new piece of software, I am eager to try them.	☐1	☐2	☐3	☐4	☐5
LP2	I am a self-motivated, independent learner.	☐1	☐2	☐3	☐4	☐5
LP3	It is not necessary that I be in a traditional classroom environment in order to learn	☐1	☐2	☐3	☐4	☐5
LP4	I am comfortable waiting for *written* feedback rather than receiving immediate *verbal* feedback.	☐1	☐2	☐3	☐4	☐5
LP5	I am proactive with tasks; tending to complete them well in advance of deadlines.	☐1	☐2	☐3	☐4	☐5
LP6	I communicate effectively and comfortably in writing	☐1	☐2	☐3	☐4	☐5

References

Adeoye, B., & Wentling, R. M. (2007). The relationship between national culture and the usability of an e-learning system. *International Journal on E-Learning, 6*(1), 119-146.

Adeyinka, T., & Mutula, S. (2010). A proposed model for evaluating the success of WebCT course content management system. *Computers in Human Behavior, 26*(6), 1795–1805.

Allen, I. E., & Seaman, J. (2007). Online nation: Five years of growth in online learning Available from http://www.sloan-c.org/publications/survey/index.asp

Allen, I. E., & Seaman, J. (2008). Staying the course: Online education in the United States, 2008 Available from http://www.sloan-c.org/publications/survey/index.asp

American Association of State Colleges and Universities (2006). Addressing the needs of adult learners. *Policy Matters, 3*(2), 1-4. Retrieved from http://www.aascu.org/policy_matters/pdf/v3n2.pdf on August 22, 2010

American Distance Education Consortium (n.d.). Quality framework for online education. Retrieved from http://www.adec.edu/earnyu/SLOANC~41.html on June 4, 2010

Aydin, C. H., & Tasci, D. (2005). Measuring readiness for e-learning: Reflections from an emerging country. *Educational Technology and Society, 8*(4), 244-257.

Bailey, C. J., & Card, K. A. (2009). Effective pedagogical practices for online teaching: Perception of experienced instructors. *The Internet and Higher Education, 12*(3-4), 152-155.

Baltaci-Goktalay, S., & Huguet, M. P. (2008). *Faculty concerns about online technologies in a developing country.* Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008 (pp. 6308-6315). Vienna, Austria.

Bawane, J., & Spector, J. (2009). Prioritization of online instructor roles: implications for competency-based teacher education programs. *Distance Education, 30*(3), 383-397.

Bharosa, N., Appelman, J., van Zanten, B., & Zuurmond, A. (2009). *Identifying and confirming information and system quality requirements for multi-agency disaster management.* Proceedings of 6th International ISCRAM Conference (pp. 1-10). Gothenburg, Sweden.

Bostrom, R. (2003). E-learning: Facilitating learning through technology. *Proceedings of the 2003-Ninth Americas Conference on Information Systems*, 3159-3164. Retrieved from http://aisel.aisnet.org/amcis2003/419 on April 20, 2011

Bradley, R., Pridmore, V., Jeannie, L., Byrd, L., & Anthony, T. (2006). Information systems success in the context of cultural types: An empirical investigation. *Journal of Management Information Systems, 23*(2), 267-294.

Bridges.org (2005). E-ready for what? E-readiness in developing countries: Current status and prospects toward the millennium development goals. Retrieved from http://www.bridges.org on Feb 11, 2011

Centre for International Development (2007). *Readiness for the networked world. A guide for developing countries*. Boston MA: Harvard University.

Chapnick, S. (2000). Are you ready for e-learning? *Learning Circuits: ASTD's Online Magazine All About ELearning*. Retrieved from http://www.learningcircuits.org/2000/nov2000/Chapnick.htm on April 24, 2011

Chen, H.-J. (2010). Linking employees' e-learning system use to their overall job outcomes: An empirical study based on the IS success model. *Computers and Education, 55*(4), 1628-1639.

Chen, P.-S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of Web-based learning technology on college student engagement. *Computers & Education, 54*(4), 1222-1232.

Clarebout, G., & Elen, J. (2006). Tool use in computer-based learning environments: towards a research framework. *Computers in Human Behavior, 22*(3), 389-411.

Coates, H., James, R., & Baldwin, G. (2005). A critical examination of the effects of learning management systems on university teaching and learning. *Tertiary Education and Management, 11*, 19-36.

Conceicao, S. (2006). Faculty lived experiences in the online environment. *Adult Education Quarterly, 57*(1), 26-45.

Creswell, J. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson Prentice Hall.

Curran, C. (2008). Online learning and the university. In W. J. Bramble & S. Panda (Eds.), *Economics of distance and online learning: Theory, practice, and research* (pp. 26-41). New York: Routledge.

Dada, D. (2006). E-readiness for developing countries: Moving the focus from the environment to the users. *The Electronic Journal of Information Systems in Developing Countries, 27*(6), 1-14.

Darab, B., & Montazer, G. A. (2011). An eclectic model for assessing e-learning readiness in the Iranian universities. *Computers & Education, 56*(3), 900-910.

Del Favero, M., & Hinson, J. M. (2007). Evaluating instructor technology integration in community and technical colleges: A performance evaluation matrix. *Community College Journal of Research and Practice, 31*(5), 389-408.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60-95.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9-30.

DeLone, W. H., & McLean, E. R. (2004). Measuring e-commerce success: Applying the DeLone and McLean information systems success model. *International Journal of Electronic Commerce, 9*(1), 31-47.

Dringus, L. P., & Terrell, S. (1999). The framework for directed online learning environments. *The Internet and Higher Education, 2*(1), 55-67.

Economist Intelligence Unit Limited, & IBM (2010). Digital economy rankings 2010: Beyond e-readiness. 23 pages. Retrieved from http://www.eiu.com on Nov 28, 2010

Eom, S. (2010). *Relationships between e-learning systems and learning outcomes: A path analysis model*. Paper presented at the 10th IEEE International Conference on Advanced Learning Technologies.

Eom, S., Ashill, N., & Wen, J. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. *Decision Sciences Journal of Innovative Education, 4*(2), 102-115.

Fillion, G., Limayem, M., Lafarriere, T., & Mantha, R. (2009). Integrating ICT into higher education: Investigating onsite and online professors' points of view. *International Journal on E-Learning, 8*(1), 17-55.

Floropoulos, J., Spathis, C., Halvatzis, D., & Tsipouridou, M. (2010). Measuring the success of the Greek Taxation Information System. *International Journal of Information Management, 30*(1), 47-56.

Freeze, R. D., Alshare, K. A., Lane, P. L., & Wen, H. J. (2010). IS success model in e-Learning context based on students' perceptions. *Journal of Information Systems Education, 21*(2), 173-185.

Fulford, C., Mail-Anakalea, C., & Boulay, R. (2008). *Sabbaticals for technology integration*. Paper presented at the proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008.

Gall, M. D., Gall, J. P., & Borg, W. R. (2003). *Educational research: An introduction*. Boston: Allyn and Bacon.

Gasaymeh, A.-M. M. (2009). *A study of faculty attitudes toward Internet-based distance education: A survey of two Jordanian public universities.* Unpublished Dissertation, Ohio University, Ohio.

Gay, L. R., & Airasian, P. (2000). *Educational research: Competencies for analysis and application* (6th ed.). Upper Saddle River, New Jersey: Prentice Hall.

George, G., & Mallery, P. (2003). *SPSS for windows step by step: A simple guide and reference, 11.0*. Boston, MA: Allyn & Bacon.

Gill, G. (2006). Asynchronous discussion groups: A use-based taxonomy with examples. *Journal of Information Systems Education, 17*(4), 373-383.

Greenhalgh, T., Robert, G., Bate, P., Macfarlane, F., & Kyriakidou, O. (2005). *Diffusion of innovations in health sevice organizations* (1st. ed.). India: Blackwell Publishing Ltd.

Guimaraes, T., Armstrong, C. P., & Jones, B. M. (2009). A new approach to measuring information systems quality. *The Quality Management Journal, 16*(1), 42-55.

Gulbahar, Y. (2007). Technology planning: A roadmap to successful technology integration in schools. *Computers and Education, 49*(4), 943-956.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Halawi, L. A., McCarthy, R. V., & Aronson, J. E. (2008). An empirical investigation of knowledge management systems. *The Journal of Computer Information Systems, 48*(2), 121-136.

Halonen, R., Acton, T., Golden, W., & Conboy, K. (2009). *Delone & McLean success model as a descriptive tool in evaluating a virtual learning environment.* Proceedings of International Conference on Organizational Learning, Knowledge and Capabilities (OLKC) (pp. 1-16). Amsterdam, the Netherlands.

Hanafizadeh, P., Hanafizadeh, M. R., & Khodabakhshi, M. (2009). Taxonomy of e-readiness assessment measures. *International Journal of Information Management, 29*(3), 189-195.

Hiltz, S. R., Kim, E., & Shea, P. (2007). *Faculty motivators and de-motivators for teaching online: Results of focus group interviews at one university.* Proceedings of HICSS 2007 - 40th Hawaii International Conference on System Sciences 3 - 6 January, 2007 (pp. Waikoloa, Big Island, HI, USA.

Hoffman, J. P. (2004). *Generalized linear models: An applied approach*. New York, NY: Pearson Education.

Hogan, R. L., & McKnight, M. A. (2007). Exploring burnout among university online instructors: An initial investigation. *The Internet and Higher Education, 10*(2), 117-124.

Holsapple, C. W., & Lee-Post, A. (2006). Defining, assessing, and promoting e-learning success: An information systems perspective. *Decision Sciences Journal of Innovative Education, 4*(1), 67-85.

Infinedo, P. (2005). Measuring Africa's e-readiness in the global networked economy: A nine-country data analysis. *International Journal of Education and Development using ICT, 1*(1), 53-71.

International Telecommunication Union (2007). State of the world's children 2007 Retrieved November 6, 2007, from http://www.unicef.org/sowc07/docs/sowc07_table_5.pdf

International Telecommunication Unit - ITU (2005). Measuring digital opportunity, ITU/Korea WSIS thematic meeting on multi-stakeholder partnerships for bridging the digital divide. Retrieved from http://www.itu.int/itu-wsis/2005/DOI%20V2.pdf on May 3, 2011

Karmakar, C. K., & Wahid, C. M. M. (2006). Recommendations for Bangladesh towards e-Learning readiness. 97-102. Retrieved from http://www.codewitz.net/papers/MMT_97-102_Karmakar_Wahid%20.pdf on April 24, 2011

Kaur, K., & Abas, Z. W. (2004). An assessment of e-learning readiness at the open university Malaysia. *International Conference on Computers in Education*.

Keengwe, J. (2007). Faculty integration of technology into instruction and students' perception of computer technology to improve student learning. *Journal of Information Technology Education, 6*, 169-180.

Klobas, J., & McGill, T. (2010). The role of involvement in learning management system success. *Journal of Computing in Higher Education, 22*(2), 114-134.

Laudon, J. P., & Laudon, K. C. (2007). *Management information Systems: Managing the digital firm* (10th ed.). New Jersey: Prentice Hall.

Leedy, P. D., & Ormrod, J. E. (2005). *Practical research: Planning and design* (8th ed.). Upper Saddle River, NJ: Pearson.

Levy, Y. (2006). *Assessing the value of e-learning systems.* Hershey, PA: Information Science.

Lin, H.-F. (2007). Measuring online learning systems success: Applying the updated DeLone and McLean model. *CyberPsychology & Behavior, 10*(6), 817-820.

Lou, E. C. W., & Goulding, J. S. (2010). The pervasiveness of e-readiness in the global built environment arena. *Journal of Systems and Information Technology, 12*(3), 180-195.

Maes, A., & Poels, G. (2006). *Evaluating quality of conveptual models based on user perceptions*. Paper presented at the International Conference on Conceptual Modelling - ER 2006.

Maguire, L. L. (2005). Literature review - faculty participation in online distance education: Barriers and motivators. *Online Journal of Distance Learning Administration, 8*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring/81/Maquire81.htm on March 3, 2010

Mahdizadeh, H., Biemans, H., & Mulder, M. (2008). Determining factors of the use of e-learning environments by university teachers. *Computers and Education, 51*(1), 142-154.

Mason, R. O. (1978). Measuring information output: A communcation systesm approach. *Information and Management, 1*, 219-234.

Maugis, V., Choucri, N., Madnick, S., Siegal, M., Gillett, S., Haghseta, F., et al. (2003). Global ereadiness - for what? *E_Business: A Research and Education Initiative at the MIT Sloan School of Management*, Paper 177 on May 5, 2011

McGill, T. J., & Hobbs, V. J. (2008). How students and instructors using a virtual learning environment perceive the fit between technology and task. *Journal of Computer Assisted Learning, 24*(3), 191-202.

Menchaca, M. P., & Bekele, T. A. (2008). Learner and instructor identified success factors in distance education. *Distance Education, 29*(3), 231-252.

Moore, A. H., Fowler, S. B., & Watson, C. E. (2007). Active learning and technology: Designing change for faculty, students, and institutions. *Educause Review, 42*(5), 42-60.

Mutula, S. M., & van Brakel, P. (2006). An evaluation of e-readiness assessment tools with respect to information access: Towards an integrated information rich tool. *International Journal of Information Management, 26*(3), 212-223.

Ndubisi, N. O. (2006). Factors of online learning adoption: A comparative juxtaposition of the theory of planned behaviour and the technology acceptance model. *International Journal on E-Learning, 5*(4), 571-592.

Nicolle, P. S. (2005). *Technology adoption into teaching and learning by mainstream university faculty: A mixed methodology study revealing the "how, when, why, and why not"*. Louisiana State University.

Orr, R. L. (2008). *Faculty perceptions of institutional efforts at addressing barriers to faculty's success in delivering online learning.* Unpublished Dissertation, Western Carolina University, North Carolina.

Osika, E., & Camin, D. (2002). Concentric model for evaluating Internet-based distance lerning programs. *Proceedings of Annual Conference on Distance Teaching and Learning, 18*, 281-286.

Osika, E., Johnson, R. Y., & Buteau, R. (2009). Factors influencing faculty use of technology in online instruction: A case study. *Online Journal of Distance Learning Administration, 7*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring/71/Osika71.htm on March 2, 2010

Ozkan, S., & Koseler, R. (2009). Multi-dimensional students' evaluation of e-learning systems in the higher education context: An empirical investigation. *Computers & Education, 53*(4), 1285-1296.

Pagliari, L., Batts, D., & McFadden, C. (2009). Desired versus actual training for online instructors in community colleges. *Online Journal of Distance Learning*

Administration, 12(4). Retrieved from http://www.westga.edu/~distance/ojdla/winter124/pagliari124.html on August 24, 2010

Palmer, S., & Holt, D. (2009). Staff and student perceptions of an online learning environment: Differences and development. *Australasian Journal of Educational Technology, 25*(3), 366-381.

Palvia, P., Leary, T., Mao, E., Midha, P., Pinjani, P., & Salam, A. (2004). Research methodologies in MIS: An update. *Communications of the AIS, 14*(526-542).

Panda, S., & Mishra, S. (2007). E-learning in a mega open university: Faculty attitude, barriers and motivators. *Educational Media International, 44*(4), 323-338.

Parthasarathy, M., & Smith, M. A. (2009). Valuing the institution: An expanded list of factors influencing faculty adoption of online education. *Online Journal of Distance Learning Administration, 12*(2). Retrieved from http://www.westga.edu/~distance/ojdla/summer122/parthasarathy122.html on

Penna, M. P., & Stara, V. (2008). Approaches to e-learning quality assessment. Retrieved from http://isdm.univ-tln.fr/PDF/isdm32/isdm_pietronilla on October 12, 2010

Petter, S., & McLean, E. R. (2009). A meta-analytic assessment of the DeLone and McLean IS success model: An examination of IS success at the individual level. *Information & Management, 46*(3), 159-166.

Picci, L. (2006). The quantitative evaluation of the economic impact of e-government: A structural modeling approach. *Information Economics and Policy, 18*, 107-123.

Pillay, H., Irving, K., & Tones, M. (2007). Validation of the diagnostic tool for assessing tertiary students' readiness for online learning. *Higher Education Research and Development, 26*(2), 217-234.

Purnomo, S. H., & Lee, Y.-H. (2010). An assessment of readiness and barriers towards ICT program implementation: Perceptions of agricultural extension officers in Indonesia. *International Journal of Education and Development using ICT, 6*(3), 19-36.

Ross, E. M., Ertmer, P. A., & Johnson, T. R. (2001). *Technology integration and innovative teaching practices: A staff development model for facilitating change.* Proceedings of Annual Proceedings of Selected Research and Development and Practice Papers. National Convention of the Association for Educational Communication and Technology, (pp. Atlanta, GA.

Sadik, A. (2007). The readiness of faculty members to develop and implement E-Learning: The case of an Egyptian university. *International Journal of eLearning, 6*(3), 433-453.

Scarafiotti, C., & Cleveland-Innes, M. (2006). The times they are a-changing. *Journal of Asynchronous Learning Networks, 10*(2), 33-34.

Schreurs, J., & Moreau, R. (2008). *E-learning readiness in the health sector.* Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2008 (pp. 3162-3169). Las Vegas, Nevada, USA.

Sekaran, U. (2003). *Research methods for business: A skill building approach* (4th ed.). Hoboken, NJ: John WIley & Sons.

Seok, S. (2008). Teaching aspects of e-learning. *International Journal on E-Learning, 7*(4), 725-741.

Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana, Ill: University of Illionois Press.

Shih, P.-C., Muñoz, D., & Sánchez, F. (2006). The effect of previous experience with information and communication technologies on performance in a Web-based learning program. *Computers in Human Behavior, 22*(6), 962-970.

Simonson, M., Smaldine, S., Albright, M., & Zvacek, S. (2009). *Teaching and learning at a distance: Foundations of distance education* (4th ed.). Boston: Allyn & Bacon.

Sloan Consortium (2002). Quick quide: Pillar reference manual

So, T., & Swatman, P. (2010). *Assessing e-learning readiness of teachers and schools in Hong Kong*. Paper presented at the Global Learn Asia Pacific 2010. Retrieved December 6, 2010, from http://www.editlib.org/p/34497

Soule, L. C. (2008). The Fusion model of instructional design: A proposed model for faculty development programs in technology integration. Unpublished PhD Dissertation. Louisiana State University.

Stapleton, J., McAllister, C., & Schwieger, D. (2009). *Examination of e-learning success in the higher education environment: A case study*. Paper presented at the Fourth Midwest United States Association for Information Systems Conference. Retrieved May 16, 2011, from http://aisel.aisnet.org/mwais2009/26

Steel, C., & Levy, M. (2009). Creativity and constraint: Understanding teacher beliefs and the use of LMS technologies. *Same places, different spaces. Proceedings ascilite Auckland 2009*, 1013-1022.

Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computer and Education, 50*(4), 1183-1202.

Tabachnick, B. G., & Fidell, L. S. (2006). *Using multivariate statistics* (5th ed.). Boston, MA: Allyn & Bacon.

Tella, A., Mutula, S. M., Mutshewa, A., & Totolo, A. (2010). An evaluation of WebCT course content management system at the university of Botswana. *International Journal of E-Adoption, 2*(2), 48-78.

Ulmer, L. W., Watson, L. W., & Derby, D. (2007). Perceptions of higher education faculty members on the value of distance education. *The Quarterly Review of Distance Education, 8*(1), 59-70.

United Nations (2005). *Global e-government readiness report 2005. From e-government to e-inclusion*. New York, NY: Department of Economic and Social Affairs, Division for Public Administration and Development Management.

Venkatesh, V., Morris, M. G., Davis, B. G., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425-454.

Wan, Z., Wang, Y., & Haggerty, N. (2008). Why people benefit from e-learning differently: The effects of psychological processes on e-learning outcomes. *Information and Management, 45*(8), 513-521.

Wang, C. W., Lao, S. C., Fan, K. T., & Lin, P. C. (2009). A study of the relationships between the interaction and effectiveness in global virtual teams. *Journal of Information Management*, 1-24.

Wang, W.-T., & Wang, C.-C. (2009). An emperical study of instructor adoption of web-based learning systems. *Computer & Education, 53*, 761-774.

Wang, Y.-S., & Liao, Y.-W. (2008). Assessing eGovernment systems success: A validation of the DeLone and McLean model of information systems success. *Government Information Quarterly, 25*(4), 717-733.

Wang, Y.-S., Wang, H.-Y., & Shee, D. Y. (2007). Measuring e-learning systems success in an organizational context: Scale development and validation. *Computers in Human Behavior, 23*(4), 1792-1808.

Ward, D., Ruddy, D., & Hill, S. (2009). *Determining the influence of information quality and system quality on the success of a knowledge management system within a large multinational software organisation.* Proceedings of International Conference on Organizational Learning, Knowledge and Capabilities (OLKC) (pp. 1-16). Amsterdam, the Netherlands.

Wasilik, O., & Bolliger, D. U. (2009). Faculty satisfaction in the online environment: An institutional study. *The Internet and Higher Education, 12*(3-4), 173-178.

Whitehead, B. M., Jensen, D. F. N., & Boschee, F. (2003). *Planning for technology: A guide for school administrators, technology coordinators, and curricuum leaders*. USE: Corwin Press.

Wu, J. H., & Wang, Y. M. (2006). Measuring KMS success: A respecification of the Delone and McLean's model. *Information and Management, 43*(6), 728-739.

Yan, Z. (2006). Different experiences, different effects: a longitudinal study of learning a computer program in a network environment. *Computers in Human Behavior, 22*(3), 364-380.

Yang, Y., & Cornelious, L. F. (2005). Preparing instructors for quality online instruction. *Online Journal of Distance Learning Administration, 8*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring81/yang81.htm on August 14, 2010

Yengin, I., Karahoca, A., & Karahoca, D. (2011). E-learning success model for instructors' satisfactions in perspective of interaction and usability outcomes. *Procedia Computer Science, 3*, 1396-1403.

Zayim, N., Yildirim, S., & Saka, O. (2006). Technology adoption of medical faculty in teaching: Differentiating factors in adopter categories. *Educational Technology and Society, 9*(2), 213-222.

Zhang, K., & Hung, J.-L. (2009). E-Learning in supplemental educational systems in Taiwan: Present status and future challenges. *International Journal on E-Learning, 8*(4), 479-494.

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Certification of Authorship

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Certification of Authorship:	I hereby certify that I am the author of this document and that any assistance I received in its preparation is fully acknowledged and disclosed in the document. I have also cited all sources from which I obtained data, ideas, or words that are copied directly or paraphrased in the document. Sources are properly credited according to accepted standards for professional publications. I also certify that this paper was prepared by me for this purpose.

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