The Impact of System Quality in E-learning System

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Abstract

System quality (SQ) is a term to describe the quality of the content of information system. This study focused on the concept of system quality and discusses the main dimensions of system quality (Usability, Accessibility, Reliability, and Stability) and evaluates the impacts of these dimensions on the efficiency of e-learning system. The study found that Usability is the strongest dimension that affects system quality of e-learning. The study used survey method for data collection, questionnaires was distributed to students and teachers and analysed by using Statistical Package Social Sciences (SPSS) software. This paper concludes that efficiency of e-learning system could not be fulfilled without achieving high level of system quality that attracts learners to increase their usage of e-learning.

Keywords: E-learning System, System Quality SQ, Usability, Accessibility, Reliability, Stability

Introduction

With the latest development of technologies, many institutions are investing considerable resources in e-learning systems to support teaching. These systems facilitate educator-to-student communication, the ability to track students' progress, and the secure sharing of course contentonline. Furthermore, one of the emerging technologies in education is e-learning, which plays a significant in enhancing the educational means and increasing the degree of understanding. With the increased number of students in many developing countries, many higher-education institutions have introduced e-learning systems to replace the traditional educational methods and also saved cost and improved the degree of understanding of students, more over e-learning improve the delivery of course content and provide efficient and quick access to courses and subjects by both students and scholars (Al-Saif, 2005).

Nowadays quality is considered as a major issue for modern education in general, especially for e-learning the quality system could be a key success factor (Williams, 2002). Moreover, quality of e-learning system cannot be expressed and set by a simple definition without understanding the details, since the term quality is a very abstract notion and bear various dimension such as information quality, service quality, system quality.

This paper emphasize that efficiency of e-learning system could not be fulfilled without achieving high level of system quality that enhance student's awareness and understanding to attract them to the education courses. The specified background and the perception of e-learning users need to be taken into consideration when defining quality measures in e-learning. (Stracke, 2006). Many scholars have showed a wide interest in studying system quality and evaluating its impact on information systems in different types of businesses and organizations, including educational institutes.

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However taking into consideration that quality on the web for example is a complex concept to explain and measure because it is expected to be multidimensional in nature (Aladwani&Palvia, 2002), the same issue with information quality in e-learning, where the prime issue is to evaluate the quality of e-learning system as an information system, and therefore identifying the criteria by which the quality of this system is a reflection of the quality of information that provide for users (Buyukozkan, Ruan, & Feyzioglu, 2007). However, this paper will show that the criteria for measuring system quality are multidimensional.

Study Background

Software developers need to look beyond designing information system that has a good user interface, flexibility, integration, response time, sophistication, navigation and network speed (Lee et al. 2009). Moreover to their own discipline when designing and implementing learning software; they are in need to seek interdisciplinary exchange with authors, teachers, and learners. The question arises which characteristics are most important for good e-learning-environments and which providers offer the best performance at a reasonable price in a market that is continuously differentiating further. Learning, find themselves confronted with the continually progressing of the technological "delivery structure" of e-learning and are thus faced with an increasing learner orientation (Ehlers et al. 2004). This study will cover the context of system quality by analysing the main dimensions that affect the efficiency and performance of e-learning systems.

The Scope of the Study

This paper focuses on concepts of system quality in e-learning system and discusses the main dimensions of this concept and the effect of system quality on the efficiency of e-learning system. The study particularly identify the key dimensions for system quality from the users' perspective so that to build a quality framework to measure and cold be applied by e-learning developers based on the concept of quality of the content provided by e-learning systems developers.

The study attempt to answer what makes e-learning successful? This question arises at the beginning of a large number of debates on the subject of quality in e-learning, and assumes that system quality is a fundamental element of e-learning system and the base for designing any e-learning framework.

E-Learning

The term e-learning is used in literature and many commercial applications to explain the education fields, for example; web-based training courses, distributed learning, online learning, academic distance learning, virtual learning. Nowadays many well-known education institutes in Australia and United States provide e-learning for overseas students (Stracke, 2006).

During the last decade, e-learning was a different system that is applied nowadays. In general, most definitions for e-learning are used to explain the utilization of the technologies which can be used to deliver learning materials in an electronic format for seekers to information, the main way was mainly via the internet (Gerhard &Mayr, 2002). Paulsen more generally describes online learning as "the use of a computer network to present or distribute some educational content" (Paulsen, 2002). In another definition of e-learning systems as "those methods that use the internet as a delivery medium for distributing and deliver static learning resources and information.(Psaromiligkos & Retalis, 2003) and most of the files was instructional files that were accessed and downloaded through an interface into interactive content environment.

This study emphasizes that previous definitions of e-learning look at e-learning in general and not discuss deeply the main dimensions of successful e-learning system as a new way for conducting education.

In more detail, the study defines e-learning "a way to deliver educational courses in the form of informational blocksor course's objects and include synchronous or asynchronous interaction methods to deliver the information for the users.

There are two main types of e-learning: asynchronous and synchronous, depending on the interaction between learner (student) and system administrator (teacher). Synchronous e-learning environments require administrator (teacher), and learners or the online classmates to be online at the same time, where live interactions take place between them. However, the focus of our research will be on the case where students are logging into and using the system independently of other students and staff members. This fits firmly into the general definition of the asynchronous e-learning environment.

In this context, Doherty defined an Asynchronous Learning Network (ALN) as "a variety of e-learning systems which distribute learning courses (materials) in one direction and at a one time (Doherty, 1998). Another definition by Spencer & Hiltz (2001) express Asynchronous Learning Network ALN as "a place where learners (students) can interact with learning courses (materials) through the internet at different times and from different locations and not transferring information to on direction and at one time (Spencer & Hiltz, 2001).

The position adopted in this study is that e-learning deal with the technology used to distribute the learning course (materials). However, the quality of these courses (materials) and the interaction with learners depending on the system and information quality provided by the e-learning system.

System Quality in E-Learning System

System quality is a measure of an IS from the technical and design perspectives (Gable et al., 2008). Thus, perceived system quality can be defined as the users' evaluation of an IS from the technical and design perspectives. Perceived system quality has been operationalized in many different ways in the IS literature. For example, Bailey and Pearson (1983) used convenience of access, flexibility of the system, integration of the system, and response time. Belardo et al. (1982) used reliability, response time, ease of use, and ease of learning. Franz and Robey (1986) used perceived usefulness of the IS. Seddon (1997) used reliability, user interface consistency, ease of use, documentation quality and maintainability of program code. Depending on the target technologies, the variables related to system quality may vary (DeLone and McLean, 2004). In general, the manifest variables of perceived system quality in terms of a web-based system are access convenience, flexibility, integration, response time, sophistication, reliability, accessibility, stability, system speed, usability, ease of use, navigation and network speed (Lee et al., 2009).

The role of perceived system quality in the IS acceptance and success literature has been investigated extensively (e.g., Adeyinka and Mutula, 2010; DeLone and McLean, 2003; Halawi et al., 2008; Kamla, 2009; Seddon and Keiw, 1996; Wang and Wang, 2009; Wu and Wang, 2006). According to the IS success model, system quality is a critical success factor that influences user satisfaction and the intention to use (DeLone and McLean, 2003). Petter and McLean (2009) performed a meta-analysis of studies that have used the IS success model to investigate the strengths of different relationships in the model. They found both perceived system quality-user satisfaction and perceived system quality-intention to use relationships were strong. System quality has also been studied with regard to individuals' IS acceptance research. According to TAM, system quality can be viewed as an external variable that affects behavioural beliefs (Davis, 1989).

The Concept of Quality in E-Learning System

Quality can be viewed and considered from different aspects. In this context the SunTrust Equitable report (Humphreys, &Ruttenbur, 2000) illustrates what they perceive to be the value chain in e-learning in the form of a pyramid. Content is the most critical factor of e-learning as it forms the base of the value pyramid.

In fact, to be able to use the internet as a tool to improve learning, the content should not distract learners, but increase their interest for learning. Learning tools and enablers are also important in the learning procedure. In reality, providers of learning platforms and knowledge management systems are key factors in the successful delivery of content, also the providers need a good infrastructure to deliver learning content. The efficiency of e-learning system is represented in three fundamental dimensions: quality, technology, access. However, the focus in this study will be on the quality of system, which is considered an essential element for education in general and not only in online and electronic education. Moreover, quality is an important term with wide expressions that cannot be expressed and set by a simple definition, because quality is a very conceptual notion.

It is important to acknowledge that quality of a learning process is not something that is delivered to a learner by an e-learning provider but rather constitutes a process of co-production between the learner and the learning-environment. That means that the product/ outcome of an educational process is not exclusively a result of the production process of an educational institution. Quality therefore has to do with empowering and enabling the learner. It has to be defined at the final position of the provision of the learning-services: the learner. The article describes learners preferences in e-learning based on empirical results of today's largest survey in this field (Ehlers, 2002). It thus facilitates the construction of learner oriented services portfolios in e-learning.The results of these studies provide empirical evidence that an effective e-learning system depends on system quality.

Research Methodology

This evaluation of information technology in e-learning system was a cross-section survey performed on a sample selected from a population of students and teachers involved in academic work using e-learning or online learning methods in a regular basis. Participant was exclusively learners and teachers. The questionnaire was distributed to the participants via e-mail because of fast response and low cost, and need for short time to collect information and data. The study used software application in Surveymethods.com and utilized an online survey, deploy the questionnaire via e-mail, and collect data and make analysis to the collected data from the participants through its graphical chartsand professional based analysis modules. The questionnaire was divided to three parts:

- Part 1: A brief profile and demographic data of participants.
- Part 2: Addresses the user's perception and attitude of e- learning systems and system quality in particular.
- Part 3: Askparticipants to rank dimensions of system quality from the perspective of e-learning.

The study analysed the collected data from part 3 in the questionnaire using Statistical Package for the Social Sciences (SPSS)software package to identify impact of system quality dimensions on the efficiency of e-learning systems and to build the final quality conclusion and future framework.

The Research Hypothesis

The study attempt to verify the following two hypotheses:

- **H1:** There is a positive relationship between usability, accessibility, reliability, and stability with system quality in e-learning system.
- **H2:** There is a statistical relationship between system quality and the efficiency of e-learning system

The Study Framework

The study assumes that system quality affect the efficiency of e-learning systems through four dimensions (Usability, Accessibility, Reliability, and Stability), and therefore the study evaluated each dimensions from the perspective of learners and teachers. The relationships between the study variables are shown in Figure-1 below:
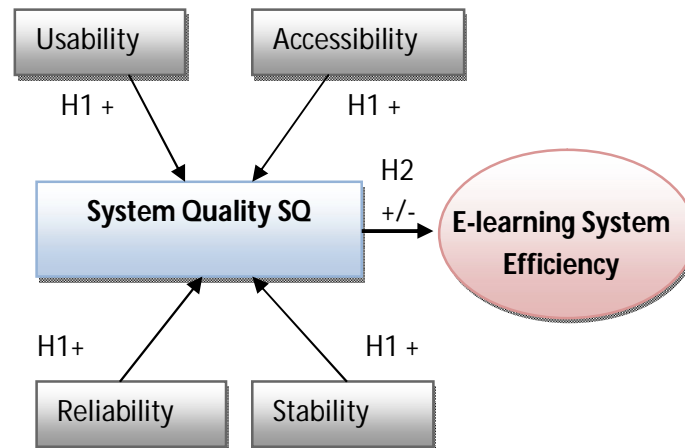
Figure 1: The relationship between study variables

Result and Discussion

First, we conducted a frequency analysis for each dimension to check for major errors and possible missing values. The results obtained for the analysis of variables frequency in each of the four dimension (Usability, Accessibility, Reliability, and Stability) show that the data is valid and reliable for analysis. The values of Cronbach's alpha for the four quality dimensions gave an acceptable reliability value with 0.712, 0.785, 0.691, and 0.705 and for Usability, Accessibility, Reliability, and Stability.

The following analysis shows the perspective of participant of learners and teachers on each quality dimension.

a. Usability

Usability is the ease of use of any system. In particular, the usability in e-learning system   is the presentation of information and choices in a clear and concise way, a lack of ambiguity and the placement of important items in appropriate areas. Another big concern for usability is that the website is appropriate for all ages and genders (Nielsen, 2003).

The study measured the impact of Usabilityof system quality on e-learning systems, the result showed that among the 179 participants; (99participants agree, 34participantsstrongly agree, 21participantsneutral, 11participants disagree, 14participants strongly disagree), The overall percentage of participants as follow;(55% agree, 19% strongly agree, 12% neutral, 6% disagree, 8% strongly disagree) as shown in Fig-2 below.
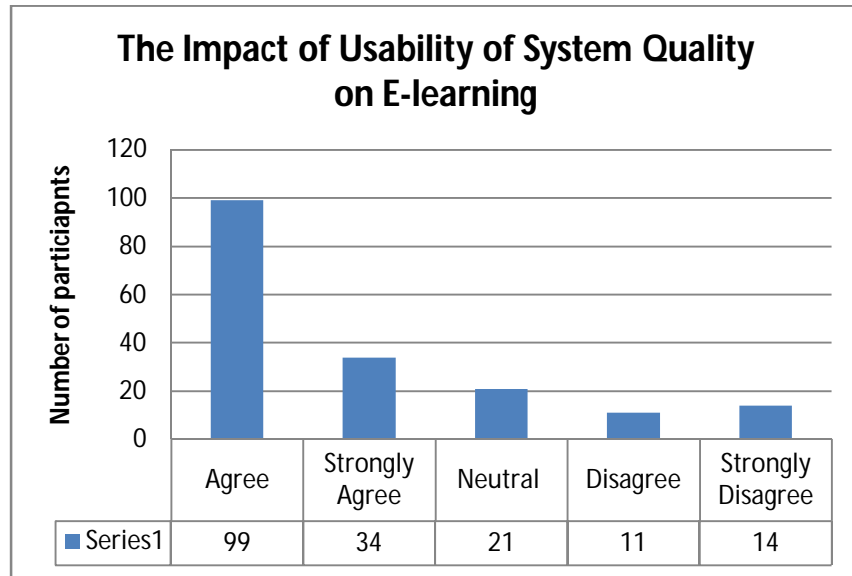
The Impact of Usability of System Quality on E-learning

	Agree	Strongly Agree	Neutral	Disagree	Strongly Disagree
Series1	99	34	21	11	14

Figure 2: Usability

The result shows that the majority of participants agreed that the usability in e-learning system is very important to increase the level of usage of e-learning. The mean value equal to 2.1 and standard deviation 0.33, which means most learners prefer clearer usability from the online courses provided by e-learning system.

b. Reliability

Learners will not trust any e-learning system if it does not have a clear quality control policy and surprisingly few do. Moreover, poor quality research is subject to bias and, in some cases , this has led to ineffective or harmful interventions. Web sites don't just have to ensure that they are reliable, they have to show how they produce their content so that users can develop a sense of trust in them (Purcell et al. 2002).The study measured the impact of reliability of system quality on e-learning systems. The result showed that among the 179 participants; (84 participants agree, 79 participants strongly agree, 5 participants neutral, 4 participants disagree, 7 participants strongly disagree), The overall percentage of participants as follow;(47% agree, 44% strongly agree, 3% neutral, 2% disagree, 4% strongly disagree) as shown in Fig-2 below
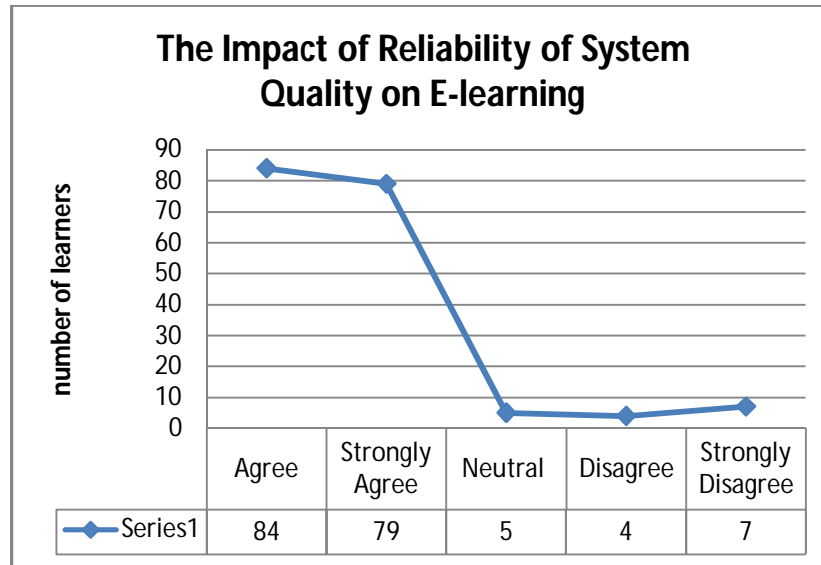
The Impact of Reliability of System Quality on E-learning

	Agree	Strongly Agree	Neutral	Disagree	Strongly Disagree
Series1	84	79	5	4	7

number of learners

Figure 3: Reliability

This result shows the significance difference between the participants, and that 91% of participants who either agree or strongly agree. The mean value equal to 1.8 and standard deviation 0.23 approve this result and increase the reliability of hypothesis H1, which states that information reliability has a positive relationship with information quality in e-learning system.

c. Accessibility

Accessibility means that people with disabilities can use the Web or any system. More specifically,   accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Web accessibility also benefits others, including older people with changing abilities due to aging (Paciello et al. 2000). This study attempts to address the impact of accessibility on system quality and examine the accessibility dimension. Over the last number of years, access methods to information systems have also evolved and many studies showed the importance of accessibility on system quality and enhancing the perception and acceptance of the learners. This has resulted in a diverse number of architectures accessing multiple information systems. Providing efficient learning systems require effective way to access for information. Therefore this study concluded that accessibility is an influence on system quality.

The study measured the impact of accessibility on system quality according to the opinion of students and teachers participated in the survey. The result showed 51% agree, 24% strongly agree, 0% neutral, 13% disagree, 12% strongly disagree) as shown in Fig-4 below
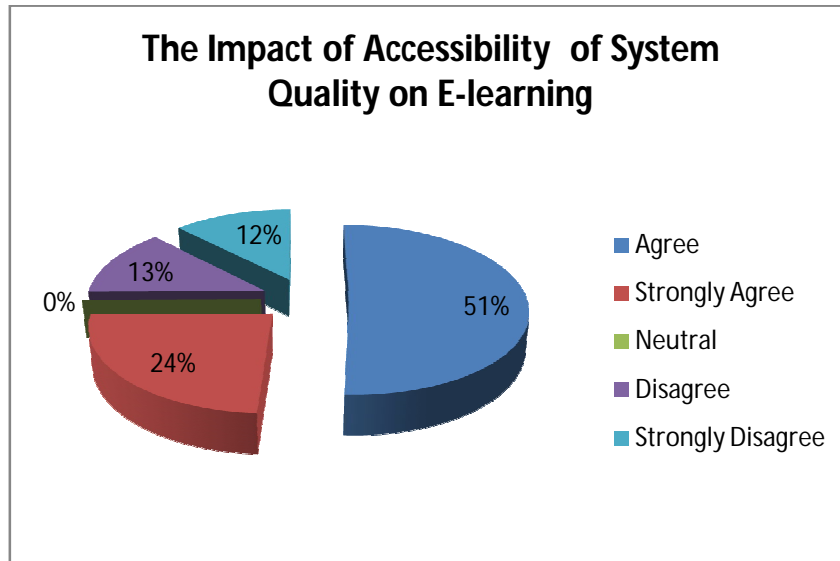
Figure 4: Accessibility

It is clear that the majority of participants confirmed that they need for accessible information and easy to reach for the course they need when using the e-learning system, this opinion is shared with the operator of e-learning systems, who emphasized on the importance of easy access to the required course and needing for short time to locate the information they need, and this issue has a positive impression on the learners.

d. Stability

Stability on e-learning is the state or quality of being stable, unchanged, Reliability, dependability and Consistency of information. With the prevalence of the Internet and WWW, web sites are now providing important services to potentially worldwide users. However, the shortened development cycles and constant evolution make it more difficult to assure their quality and reliability (Offutt, 2002). The competition introduced by the open Internet environment and the broader user population, also demand an urgent solution to the web quality and reliability problem. The result shows that 49% agree, 31% strongly agree, 7% neutral, 8% disagree, 5% strongly disagree) as shown in Fig-5 below
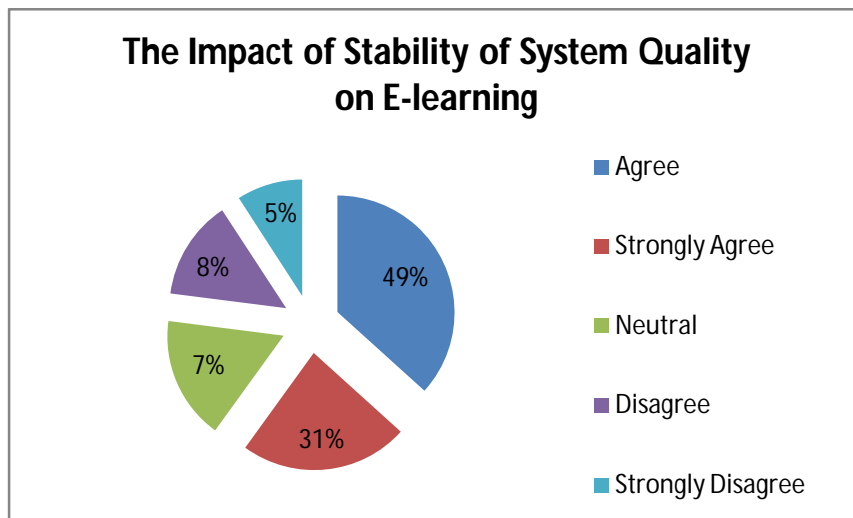

Figure 5: Stability

The participants confirmed that stability is highly important to consider the information they receive from the e-learning system is reliable. Information provided by e-learning system must be updated and the system need for frequent update to all saved courses and literatures with mostly updated in order to ensure high quality of information at any time.

Conclusion and Future Work

This paper emphasize that efficiency of e-learning system could not be fulfilled without achieving high level of system quality that attract learners to increase their usage of e-learning system. The study concluded that system quality is the main factor that increase or decrease the efficiency of e-learning system and therefore e-learning systems developers should take consideration on the dimensions of system quality (Usability, Accessibility, Reliability, and Stability).The us ability factor was found as the strongest dimension that affect the system quality

The study recommends that future studies should conduct further evaluation to other dimensions such as objectivity, completeness, and consistency, also examine the relationship between system interface and information quality.

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