The Effect of Information Quality in E-Learning System

Majed Mustafa Suliman Oun Alla
Faculty Science and Technology
University Sains Islam Malaysia
JalanKlang Lama, 58200 Kuala Lumpur.

Dr. Qais Faryadi
Faculty Science and Technology
University Sains Islam Malaysia
JalanKlang Lama, 58200 Kuala Lumpur.

Abstract

Information quality (IQ) is a term to describe the quality of the content of information system. Information quality is the main factor that increases or decreases the efficiency of information systems including e-learning system because of certain factors that explained in this paper. The main point of this study is about the concept and the main dimensions of information quality (Accuracy, Relevancy, Accessibility, and Validity).It evaluates the impacts of these dimensions and the efficiency of e-learning system. The study found that Accuracy is the strongest dimension that affects the information quality of e-learning system followed by Accessibility, Validity, and Relevancy respectively.

Keywords:E-learning System, Information Quality IQ, Accuracy, Relevancy, Accessibility, Validity.

1. Introduction

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 an essential issue for good education in general, and for e-learning in particular the quality of information could be a key success factor of the system (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 system quality, service quality, and information quality.

This paper emphasize that efficiency of e-learning system could not be fulfilled without achieving high level of information quality that enhance student's awareness and understanding 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. It is also important to classify criteria to address quality with regard to information access and accuracy (Stracke, 2006).

Many scholars have showed a wide interest in studying information quality and evaluating its impact on information systems in different types of businesses and organizations, including educational institutes. 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 information quality are multidimensional such as speed of access to information, rich content, accuracy and clarity.

2. The Purpose of The Study

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

The study explainsthe successof e-learning.It arises at the beginning of a large number of debates on the subject of quality in e-learning, and assumes that information quality is a fundamental element of e-learning system and the base for designing any e-learning framework.

3. Study Background

Software developers need to look beyond designing information system that has a good user interface, system quality, and efficient usability of the system, there is another important dimension they should realize and implement, which is information quality IQ. 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 information quality by analysing the main dimensions of information quality that affect the efficiency and performance of e-learning systems.

4.E-Learning

The term of 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 has been a different system which applied. 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 waywas mainly via the internet (Gerhard &Mayr, 2002). Paulsen describes that 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 has been generally describedbut not discussed 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 blocks or 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). 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 but not transferring information to certain direction 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 quality of information provided by the e-learning system.

5. Information Quality in E-Learning System

Information quality (IQ) is a term to describe the quality of the content of information systems. It is often pragmatically defined as: "The fitness for use of the information provided." (Larry, 2009; Miller, 2010; Wang, 2007).

Although the evaluation of quality of e-learning system through measuring the level of quality of learning materials and subjects have become increasingly important, but the evaluation of information quality (IQ) in e-learning systems is the most important quality dimension of e-learning system. The criteria to evaluate information quality ine-learning systems are different from the evaluation of typical learning materials because the material and courses in e-learning is linked with other factors such as system usability and interface. Moreover, the specified context and the perspectives of the users need to be considered when defining quality in an e-learning context. It is also important to define appropriate criteria to describe quality (Stracke, 2006).

There are many criterias that can be used for evaluation of information quality system (Saleh, 2001;Macleod, 1998). (Bakri, 1997) refers IQ in information system to any comprehensive reports should include all associated aspects of accuracy and any information should be free of errors information as two standards for the quality of information, while Cronin & Taylor, (2005) emphasized that information quality standards should fulfil the objectives of e-learning system and satisfy user requirements to cover the whole courses required in a learning class and working properly without errors and to be easy for maintenance and development, provided that the educational benefit overcome the results of system existence cost.

In some studies, information quality has not been considered separately but as an integral part of user satisfaction (Bailey & Pearson, 1983) or user information satisfaction (Iivari, 1987). The measures that have been used for information quality are information accuracy (Bailey & Pearson 2008) information completeness, information relevance (King & Epstein, 2001) and information timeliness.

Although it is essential to set criteria and special standards for information quality for e-learning systems, this is a difficult and complex issue because there is no formal definition of information quality in general and for e-learning in particular. Literatures assumed that the standards of information quality in e-learning systems represent by the following:

1) Accuracy: correct information and data provided to the students and beneficiary from the e-learning system.
2) Renewal: the ability of updated literatures in a timely manner.
3) Integrity: the availability of sufficient information necessary for a specific purpose.
4) Briefly: summary of information in exception or activities planned as needed.
5) Availability of information: to be available and easily accessible by the user (student) or the administrator (teacher).

6. 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 the 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 information, which is considered as 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 are 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.

7. 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 on 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 information quality in particular.
- Part 3: Askparticipants to rank dimensions of information quality from the perspective of e-learning.

The study analysed the collected data from part 3 in the questionnaire using SPSS software package to identify impact of information quality dimensions on the efficiency of e-learning systems and to build the final quality conclusion and future framework.

7.1 The Research Hypothesis

- **H1:** There is a positive relationship between Accuracy, Relevancy, Accessibility, and Validitywith information quality in e-learning system.
- **H2:** There is a statistical relationship between information quality and the efficiency of e-learning system

8. The Study Framework

The study assumes that information quality affect the efficiency of e-learning systems through four dimensions (Accuracy, Relevancy, Accessibility, and Validity), 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:

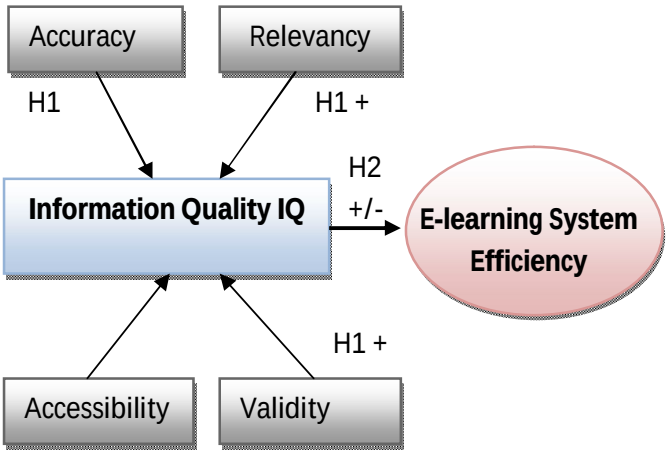

Figure1. The relationship between study variables

9. 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 ofvariables frequency in each of the four dimension (Accuracy, Relevancy, Accessibility, and Validity) show that the data is valid and reliable for analysis. The values of Cronbach's alpha for the four quality dimensions showed an acceptable reliability value with 0.612, 0.785, 0.691, and 0.711 for Accuracy, Relevancy, Accessibility, and Validityrespectively.

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

9.1 Accuracy

Accuracy is essential to teach the students and learners the right information without mistakes and errors. The data are deemed of high quality if they correctly represent the real-world construct to which they refer (Eckerson, 2002). The study measured the impact of Accuracy on the level of understanding of learners and students using 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 are as follow: (55% agree, 19% strongly agree, 12% neutral, 6% disagree, 8% strongly disagree) as shown in Figure-2 below.

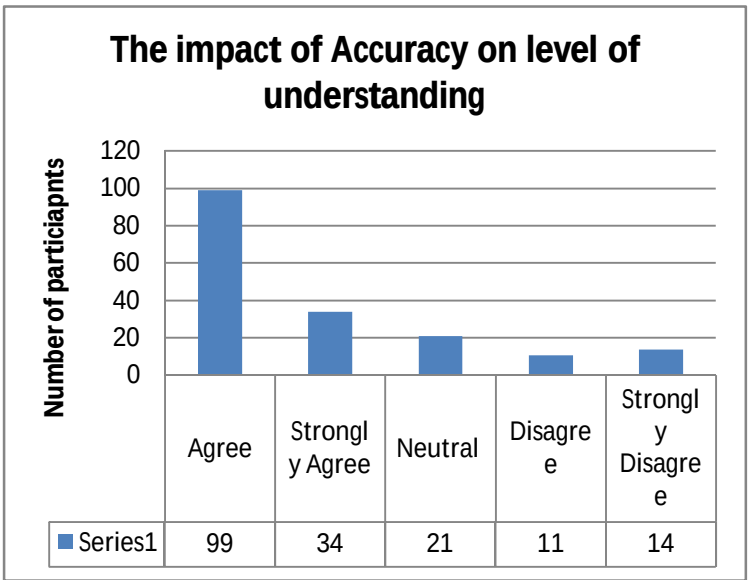

Figure.2 Information Accuracy

The result shows that the majority of participants agree that the accuracy of information is very important to increase the level of understanding of learners. The mean value equal to 2.1 and standard deviation 0.33, which means most learners prefer higher accuracy from the online courses provided by e-learning system. Data are of high quality "if they are fit for their intended uses in operations, decision making and planning" (J. M. Juran, 2004).

9.2 Relevancy

Relevancy of data denotes how well retrieved information or set of literatures documents meets the information needed by the learner. Relevance may include concerns such as timeliness, authority or novelty of the result (Dan Sperber, 2001).

The study measured the impact of relevancy on learners' perception about the quality of e-learning systems. The result showed that among the 179 participants; (84 participants agree, 79participants strongly agree, 5 participants neutral, 4 participants disagree, 7 participants strongly disagree), The overall percentage of participants are as follow:(47% agree, 44% strongly agree, 3% neutral, 2% disagree, 4% strongly disagree) as shown in Figure-3 below.

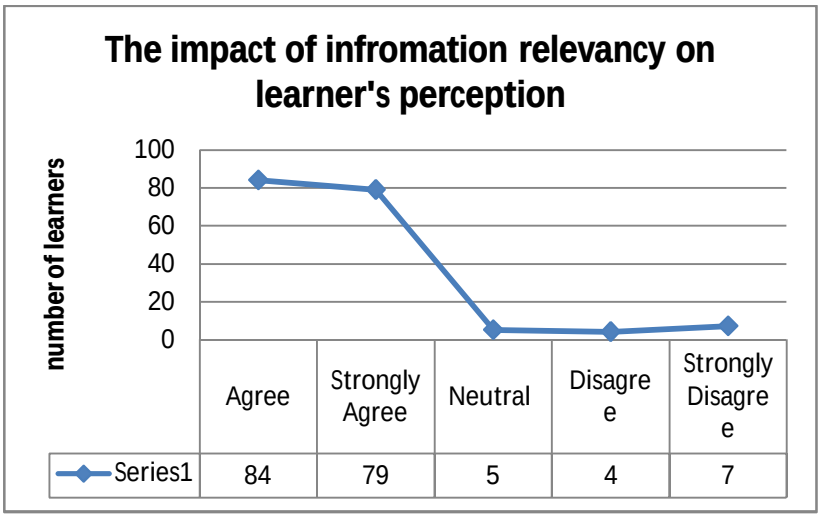

Figure3. Information Relevancy

This result shows the significance difference between the participants, as 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 relevancy has a positive relationship with information quality in e-learning system. Recently, Zhao and Callan (2010) showed a connection between the relevance information and the understanding mismatch problem in retrieval, which could lead to reduce data retrieval accuracy.

9.3 Accessibility

This study attempts to address the impact of accessibility on information 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 information 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 information quality.

The study measured the impact of accessibility on information 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 Figure-4 below.

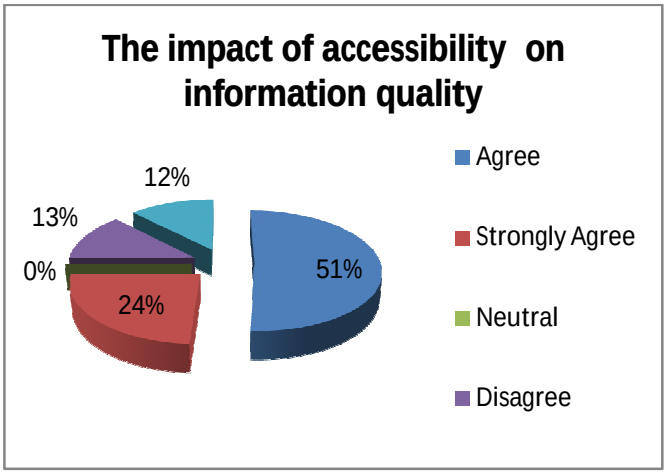

Figure4. Information Accessibility

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 has been 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.

9.4 Validity

Information can sometimes be problematic. It is always important for the information professional and scholars to validate information before accepting it as a source of learning. However, the information found in reference books and other printed materials in public libraries has usually undergone a rigorous selection process. Thus some of the validation of information has already taken place through the selection process, and the same meaning apply on e-learning where electronic source of information must provide valid information.
The result shows that 49% agree, 31% strongly agree, 7% neutral, 8% disagree, 5% strongly disagree) as shown in Figure-5 below

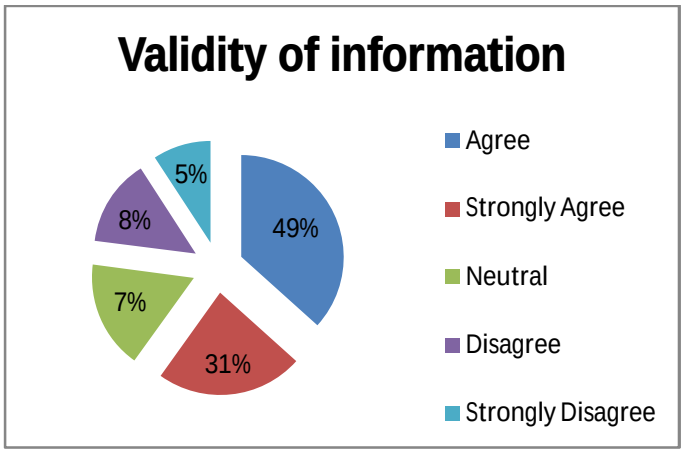

Figure5. Information validity

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

10. Conclusion and Future Work

This paper emphasize that efficiency of e-learning system could not be fulfilled without achieving high level of information quality that enhances student's awareness and understanding of the education courses.

The study concluded that information 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 information quality (Accuracy, Relevancy, Accessibility, and Validity).The accuracy of information where found the strongest dimension that affects the information quality followed by Accessibility, Validity, and Relevancy respectively.

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

References

Al-Saif (2005), 'The motivating and inhibiting factors affecting the use of Web-Based Instructionat the University of Qassim in Saudi Arabia', ETD Collection for Wayne State University.

Aladwani, A. M., &Palvia, P. C. (2002). Developing and validating an instrument for measuring user-perceived web quality. Information & Management, 39(6), 467-476.

Bailey &Pearson,E. (2008). An Educational Tool to Support the Accessibility Evaluation Process.Proceedings of the International Cross-Disciplinary Conference on Web Accessibility (W4A). Raleigh, USA

Bakri, 1997, The education methods in the Arabic countries, Dar Al-shuruk, Lebanon.

Buyukozkan, G., Ruan, D., &Feyzioglu, O. (2007).Evaluating e-learning web site quality in a fuzzy environment. International Journal of Intelligent Systems, 22(5), 567-586.

Cronin & Taylor, (2005), User Capabilities in an Adaptive World.Proceedings of the ACM Workshop on Media Studies and Implementations to Improve Access to Disabled Users. Beijing, China.

Dan Sperbe (2001), Relevance: communication and cognition, Deirdre Wilson. 2nd ed. Oxford; Cambridge, MA: Blackwell Publishers, 2001. ISBN 978-0-631-19878-9.Doherty, P. (1998). Learner Control in Asynchronous Learning Environments.ALN Magazine, 2.Eckerson, W. (2002) "Data Warehousing Special Report: Data quality and the bottom line", Article

Ehlers, U. (2002). Qualitätbeim eLearning istmehrals 'e'.Studie der Uni Bielefeld: Der Lerner stehtimMittelpunkt. In. BundesinstitutfürBerufsbildung (ed.), BWP - Berufsbildung in Wissenschaft und Praxis. Heft 3/2002. Bonn.

Gerhard, J., &Mayr, P. (2002).Competing in the E-learning Environment--Strategies for Universities. Proceedings of the 35th Annual Hawaii International Conference on System Sciences (HICSS'02).

Humphreys, R. Close, R. C.,.,&Ruttenbur, B. W. (2000). e-learning& technology: technology & the internet are changing the way we learn: Sun Trust Equitable Securities .

Iivari, 1987, How's the e-learning baby? Factors leading to success or failure of an educational technology innovation. Educational Technology, 44, 5–27.

Juran, Joseph M. (2004), Architect of Quality: The Autobiography of Dr. Joseph M. Juran (1 ed.), New York City: McGraw-Hill, pp. 6–7, ISBN 978-0-07-142610-7, OCLC 52877405

Larry P. (2009) "Information Quality Applied", Wiley Publishing, Indianapolis. ISBN 978-0-470-13447-4

Macleod M. &Papadopoulos,1998, An Analysing Tool to Facilitate the Evaluation Process of Automatic Lecture Transcriptions.Proceedings of the World Conference on e-Learning in Corporate, Government, Healthcare, and Higher Education (E-LEARN 2009).

Miller (2010), Holmes (Spring). Information Systems Management 13 (2):79–82. http://dx.doi.org/10.1080/10580539608906992 |url= missing title (help). Retrieved 16September2010.

Paulsen M.F . (2002) ,Online Education Systems: Discussion and Definition of Terms ,NKI Distance Education ,http://home.nettskolen.com/~morten .

Psaromiligkos, Y., &Retalis, S. (2003). Re-evaluating the Effectiveness of a Web-based Learning System: A Comparative Case Study.Journal of educational multimedia and hypermedia, 12, 5-20.

Saleh, 2001, the implementation of new teaching methods, Dar AlfikerAlrabir, Cairo- Egypt

Spencer, D., &Hiltz, S. R. (2001). Studies of ALN: An Empirical Assessment. Proceedings of the 34th Hawaii International Conference on System Sciences(HICSS-34).

Stracke, C. M. (2006). Quality Standards for Quality Development in e-Learning: Adoption, Implementation and Adaptation of ISO/IEC 19796-1. Q.E.D. - The Quality Initiative E-Learning in Germany.The National Project for Quality in e-Learning.

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

Williams J. B.. Jacobs J. S, "Exploring the use of blogs as learning spaces in the higher education sector." Australasian Journal of Educational Technology 20(2): 232-247 (2004)

Zhao, L. and Callan, J., Term Necessity Prediction, Proceedings of the 19th ACM Conference on Information and Knowledge Management (CIKM 2010). Toronto, Canada, 2010.

Appendices

Appendices 1: The relationship between study variables

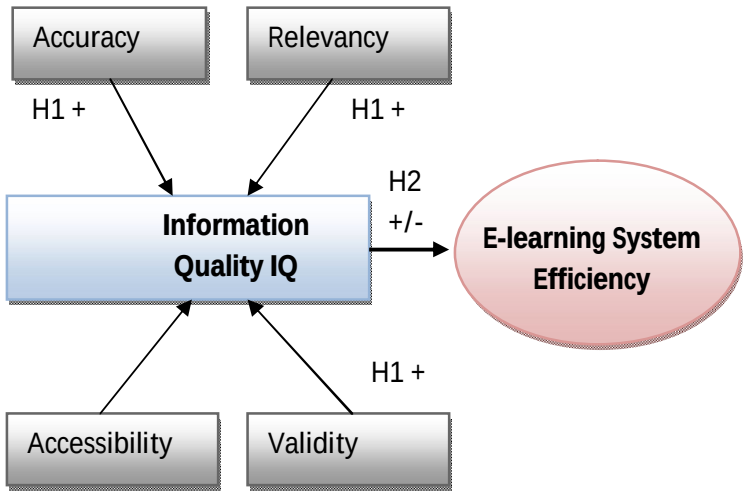

Figure 1

Appendices 2:Information Accuracy

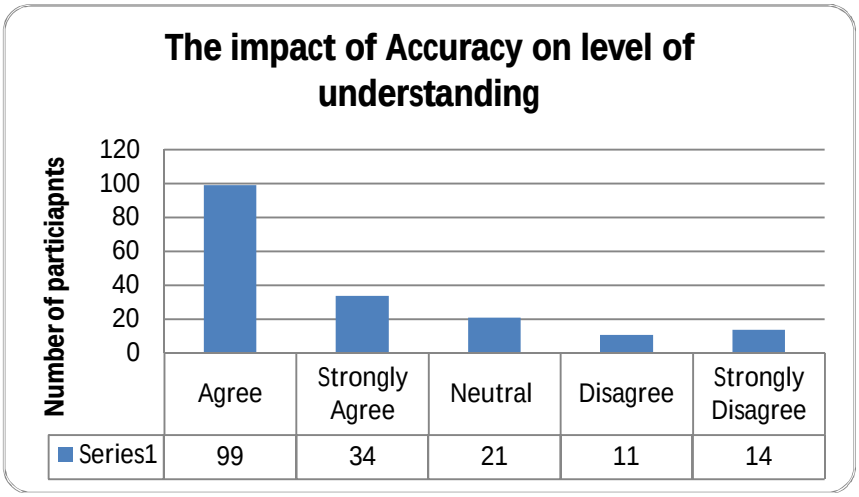

Figure 2

Appendices 3: Information Relevancy

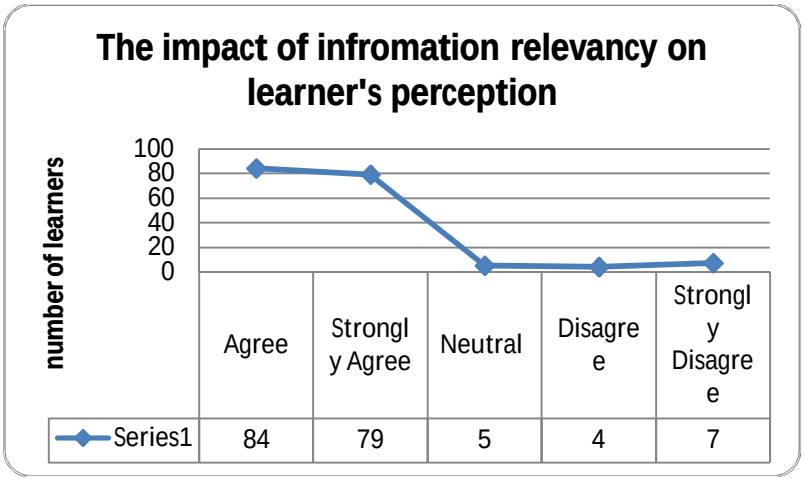

Figure 3

Appendices 4: Information Accessibility

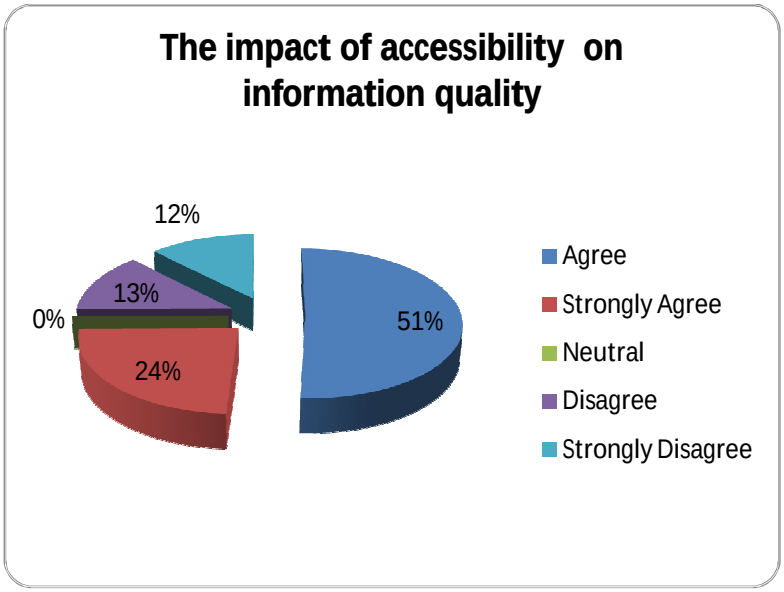

Figure 4

Appendices 5: Information validity

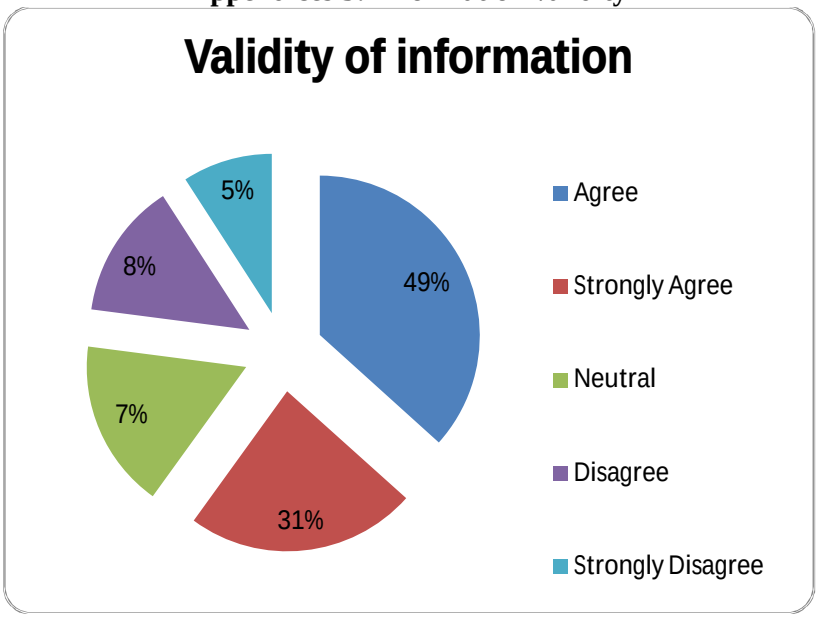

Figure 5