ABSTRACT

E-learning is increasing dramatically, and most of the institutions invest a huge amount for developing and deploying e-learning system. In the last years, the quality of e-learning system is one of the most important topics that the researchers are investigating. E-learning generates an effective learning for higher education study and provides an opportunity for students to enroll on higher education courses. An access to everything on E-learning web sites is provided to the Students without being required to attend the classrooms. In the recent years, the rapid growth of web based technologies is more valuable. The web based E-learning system emerged a means of skill training and knowledge acquisition for encouraging both academia and industry to invest the resources in the adoption of this system. In this paper we have presented the comprehensive descriptive explanation of the classification of e-learning website selection criteria that have been proposed over the last 30 years with the classification mainly into two categories: Quality Factors & E-Learning Specific Factors.

Keywords: Selection criteria, Multi-criteria decision making (MCDM), Quality Factors, Reliability.

1. INTRODUCTION

E-Learning exploits interactive technologies and communication systems to improve the learning experience. It has the potential to transform the way we teach and learn across the board. It can raise standards, and widen participation in lifelong learning. More than a decade ago, the World Wide Web (WWW) became a new and fast gateway for the communication purpose. The World Wide Web makes the communication between the people very fast and easier. In the present day, the World Wide Web is adopted in almost areas, such as education, business government and entertainment [1]. E-learning is wide set of applications and processes that manage diverse types of electronic media to deliver education and training [2]. E-learning is the advance develop tool in the twenty-first century which will generate a new era of education under the concept of any one can study anywhere and anytime. The key success factors to create E-Learning criteria together with education are used to measure the effectiveness of E-Learning [3].

In the recent years, the growth and use of e-learning system has increased at a very rapid rate due to the significant and favorable advantages provided by e-learning systems such as convenience, portability, flexibility and global learning community [4]. For the e-learning service provider the internet acts as primary interface with the e-learners. As the e-learning systems are widely used now a day, then it is desirable and considerable to evaluate the quality of these systems. Many organizations are still working with the evaluation of the quality of the e-learning systems by using different approaches, technologies and models [5]. Consequently website quality should be considered as a critical success factor for these types of systems. The evaluation of the quality of e-learning systems can be represented as a multi criteria decision making problems. Multi-Criteria Decision Making methodology is a powerful tool...
widely used for the evaluating and ranking problems containing multiple, usually in conflicting selection criteria [6].

The rest of the paper is structured as: A study of past researches (literature review) is presented in section 2, in section 3 proposed classifications of E-Learning website selection criteria is provided, a brief conclusion is provided in section 4.

2. LITERATURE REVIEW

Quality evaluation of e-learning systems is a dynamically developing area now a day. It aims at eliminating the effects of lack of face to face contact with the teacher and with the learning team [7]. According to a study done by Pruengkarn et al. the problem of the selection of E-learning web sites was addressed by considering mainly six selection criteria as functionality, reliability, usability, efficiency, maintainability and portability [1]. Covella and Olsina presents a taxonomy of e-learning sites and applications, and ultimately the quality requirements for the Functionality characteristic are thoroughly described, regarding an intentional audience. The aim of this work is to systematically evaluate attributes and characteristics that allow determining the degree of fulfillment of elementary and global quality requirements in the e-learning domain [8]. Lanzilotti et al. proposed a new framework for quality of e-learning system called TICS (Technology, Interaction, Content, Services), which focuses on the most important aspects to be considered when designing or evaluating an e-learning system [9]. Buyukozkan et al. presents a quality evaluation model based on the multi-criteria decision making to measure the e-learning Web sites performance by taking several criteria as (i) right and understandable content (ii) complete content (iii) personalization (iv) security (v) navigation (vi) interactivity (vii) user-interface [2]. Prougestaporn et al. they represent cost efficiency, speed, quality and service as the main selection criteria for the selection and evaluation of e-learning web sites [3]. Abdellatief et al. provide an evaluation technique for the selection and evaluation of e-learning web sites by considering four quality characteristics named Service Content, System Functionality, Information Technology and System Reliability. These are appended with 11 sub-characteristics with the respective attributes by following the structure of standard IOS/IEC 9126 [4]. Zaman et al. present work discusses this process and, through investigations, suggests a framework to improve the quality aspects of the University Consortium Education System [7].

Syamsuddin addressed the problem of e-learning web sites as a multi-criteria decision making problem and provide a framework for the evaluation of e-learning web sites based on combination of AHP (Analytical Hierarchical Processing) and FST (Fuzzy Set Theory) by
considering ISO 9126 characteristics as the selection criteria [12]. The selection criteria such as program content, web page accessibility, learner’s participation and involvement, web site security and support, institution commitment, interactive learning environment, instructor competency, and presentation and design were presented in [13]. Sarrayrih et al. presented the selection criteria based on the characteristics of ISO-9126, which are usability, functionality, and reliability [14]. Anita Lee-Post addresses the question of how to guide the design, development, and delivery of successful e-learning initiatives based on theories of a user-centered information systems development paradigm [15]. Cristina POP proposes a mathematical model was proposed to determine the probability that a student uses an e-learning platform based on the factors (criteria) that determine the quality of the platform and the socio-demographic variables of the student [16]. Mehregan et al. introduce a new approach to e-learning system assessment by identify and prioritize the preliminary e-learning critical success factors (CSFs) or enablers that need to be concentrated by universities and educational institutes using Fuzzy analytic hierarchy Process (FAHP) method [17]. Bentley et al. proposed the survey method for the evaluation of impact of E-learning web sites [18]. Wang and Pang applied fuzzy set theory and a compromised MCDM method - VIKOR method to evaluate the service quality of online auction [19].

Researchers provide a number of selection criteria for the selection and evaluation of E-Learning websites for which a proper classification is needed so that it will be possible to evaluate the various E-learning websites by considering all selection criteria together. In this research, we have proposed a classification of E-Learning websites selection and evaluation criteria which can lead to the better selection and evaluation. A schematic presentation of these selection criteria is provided in figure 1.

The selection criteria and the sub-criteria for the evaluation of e-learning websites are mainly categories into two broad categories as (1) Quality Factors and (2) E-Learning Specific Factors. All the selection criteria and sub criteria included in this study are summarized here.

1. Quality Factors

Quality characteristics are defined as a set of attributes of a software product by which its quality is described and evaluated. Quality classifies its evaluation under six criteria these are functionality, portability, maintainability, usability, reliability, and efficiency. Each of these criteria consists of several sub criteria as described below.

1.1 Functionality: A set of attributes that relate to the existence of a set of functions which meets the stated and implied needs. Functionality further contains Suitability, Accuracy, Interoperability, Compliance, and Security.

1.2 Portability: A set of attributes that relate to the ability of software to be transferred from one environment to another. Portability is divided into three sub-criteria as Adaptability, Installability and Replaceability.

1.3 Maintainability: A set of attributes that relate to the effort needed to make specified

3. E-LEARNING WEBSITE SELECTION CRITERIA CLASSIFICATION

In the open literature, many researchers emphasizes on the selection and evaluation of E-Learning websites by considering it as a multi-criteria decision making problem (MCDM).
modifications. Maintainability is classified into four sub-criteria namely Analyzability, Changeability, Stability and Testability.

1.4 Usability: A set of attributes that relate to the effort needed for use. Usability is divided into three sub-criteria as Understandability, Learnability and Operability.
“Figure 1: Classification of E-Learning Websites Selection Criteria”
1.5 **Reliability**: A set of attributes that relate to the capability of software to maintain a specified level of performance when used under specified conditions. Reliability basically consists of three sub-criteria maturity, Fault Tolerance and Recoverability.

1.6 **Efficiency**: A set of attributes that relates to provide appropriate performance, relative to the amount of resources used, under stated conditions. Efficiency is divided into two sub-criteria as time behavior and resource behavior.

2. **E-Learning specific factors**

   E-Learning specific criteria are concerned with the learning community (learners & teachers), the content present on the website, ease of implementation and performance of websites. The brief description and the classification about the E-Learning specific criteria is provided here.

2.1 **Ease of learning community**: Learning community is a group of peoples who share common goals and attitudes in the form of their participation, interactions and relationships within the activities of the group. Ease of learning community includes other learners & teachers and accessing shared data.

2.2 **System content**: System content are those in which the materials are available online for the purpose of e-learning. System content includes up-to-date content, sufficient content and useful content.

2.3 **Personalization**: Personalization is a means of meeting the customer requirements in an effective and efficient manner. Personalization includes learning progress and performance.

2.4 **General factors**: Besides the quality factors and e-learning specific factors, there are some factors which affect the selection and evaluation of e-learning websites. General factor includes applicably in phase, required time, required budget, required valuators, required equipment, immediacy of the response, information provided.

4. **CONCLUSION**

As the E-Learning concept becomes more and more popular now a days, there is a need to find the best E-Learning websites to gain knowledge. In this study, our main emphasis is on the various selection criteria and sub criteria provided in the open literature for the selection and evaluation of various E-Learning websites. A classification of the selection criteria and sub criteria together present in the literature is proposed in this work, which can lead a better evaluation of E–Learning websites. In this work the selection criteria are mainly categories into two main categories Quality factors and the E-Learning specific factors and the brief description of these criteria and sub criteria is provided.

**REFERENCES**


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