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Students' Assessment on the Usability of E-learning Websites

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Abstract

The advancements in the field of information and communication technologies have offered a novel strategy to education, by switching the conventional process of obtaining and transferring knowledge. The prospects of web technology have been well recognized by educators, and the e-learning system is being heavily adopted around the world to yield the benefit of technology. However, still some challenges exist for the educational administrators to attract learners to their e-learning services.The e-learning websites should provide good usability, so that interactions of learners can be as natural and spontaneous as possible. In this study we have considered Shackel's usability model to ascertain usability attributes and to develop questionnaire for the survey. The survey has been conducted among final year undergraduate students of South Eastern University of Sri Lanka (SEUSL). The sample includes both experienced and inexperienced users of e-learning websites. The findings reveal that experience and/or lack of experience of students do not carry much connotation in this study but confirmed that the usability attributes are vital for the natural and spontaneous interactions with e-learning web sites.

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Keywords: e-learning, usability, user interface, website design;

1. Introduction

The advent of information and communication technology (ICT) has diminished the popularity of the mail based distance learning method. The technological innovation, the so called web-based instruction (WBI) has made teaching, learningand training processes to be delivered over the Internet (Lee, 2001). Establishing a web based education system has become a predominant belief of the current academics and educational administrators. Today, universities, training institutions, and government agencies are extensively investing to develop e-learning software, e-learning authoring tools and learning management systems etc.

The term e-learning has been broadly defined as multimedia based instruction, delivered using various instructional methods, which can be accessed by learners through their computers at their own will (Clark

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& Mayer, 2003). The term e-learning has also been mutually used with web-based training, online learning, distributed learning, internet-based learning and net-based learning (Urdan & Weggen, 2000). The capabilities of web technology have been better recognized by learners, educators and designers, and has been embraced to develop a lot of educational websites, the new learning environment, and the distinction of technological attributes of a website with regards to the educational process (Mioduser *et al*., 2000) are as follows:

- web strengthens the *manipulation of information* (generating, transmitting, sorting, process and retrieving information),
- web serves as the *communication facilitator* (e-mail, conferencing and chatting),
- web becomes a *creation environment* (user-friendly tool for creating web content), and
- web serves as an *instructional delivery medium* (digital educational activities).

Despite e-learning technology presents a number of benefits, it still has challenges for educationalists, particularly on attracting learners to their e-learning services (Liao & Lu, 2008). The interface of an e-learning website is considered as the entry point for the visiting learners whose interactivity, learnability and sustainability totally rely on its layout, content, information and other attributes of the site. Usability of the website opens the door for flourishing delivery of teaching and learning activities. Therefore, this study has been carried out to examine the corresponding influence of usability attributes of an e-learning website.

2. Usability

Generally, usability is defined as the extent, to which a product or system effectively and efficiently satisfy the needs and specifications of users. Usability is important for a userfor accepting a product or system. The term usability has been defined diverselyby different scholars and it has been discussed inhuman-computer interaction (HCI) literature (Teo *et al*., 2003). According to Nielsen (1993), usability often refers how well users can use the functionality of the system. ISO has defined usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (ISO, 1998). Bevan (2001) has categorizedthe standards related to usability as follows:

a) The use of the product (effectiveness, efficiency and satisfaction in a particular context of use).
b) The user interface and interaction.
c) The process used to develop the product.
d) The capability of an organization to apply user-centred design.

Therefore usability primarily focuses on making a system easy to learn and use. Studies show that redesigning user interface of a system based on the user testing (i.e. interaction measurement between users and computer systems) and iterating can considerably enhance usability, because usability can be meaningfully measured only during the execution of tasks. Hence, the most promising approach to the generation of usable systems is to iterate design and usability evaluation until a satisfactory solution is achieved (Nielsen, 1993; Shackel, 1991). The e-learning websites should provide good usability so that interactions of learners can be as natural and spontaneous as possible. The followingsare usability evaluation methods to elicit information on web design aspects (Nielsen, 1993; Levi, & Conrad, 1997; Tullis, 1998; Keevil, 1998; Morkes & Nielsen, 1998).

a) heuristics, i.e. design principles, can be used by experts to judge usability,
b) benchmarking can be used to compare one Web site with another or against a set of standards,
c) prototyping can be used to quickly and cheaply develop a mock site that can be shown to users before the real site is launched,
d) a web site can be evaluated against a checklist of usability items, or
e) users can participate in focus groups or in controlled laboratory sessions in order to provide feedback on the usability of the site.

To simplify the notion of usability, Shackel's concept of usability was taken into consideration. Shackel (1984) describes usability as "a technology's capability to be used easily and effectively by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios". Usability typically refers to the elegance and clearness with which the user interface of a computer program or a website is designed.

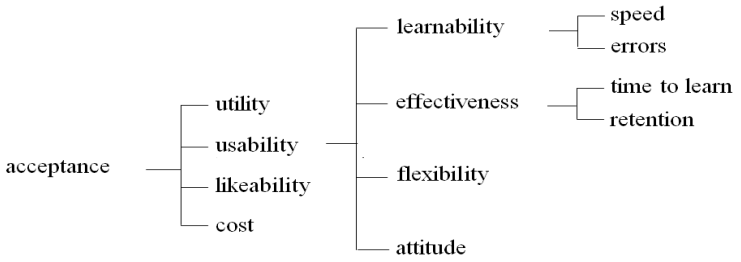

Fig. 1.Usability concept of Shackel

Shackel (1984) has presented a model of product perception where product acceptance is the highest level of concept. System acceptability is determined by three factors, such as utility, usability and likeability. Utility refers to a system whether it does what is needed functionally while usability refers to ability of users to utilize the functionality in practice, on the other hand likeability refers to affective evaluations; furthermore, utility, usability and likeability are balanced against the cost of the system. Thus, acceptance of a system is the function of perceived utility, usability, likeability and costs. Fig. 1 shows the usability concept of Shackel that is to measure the usability based on its functional requirements on the following four scales:

a) Effectiveness, which refers the outcomes of interaction, with regards to quickness and glitches;
b) Learnability, which pertains to the association of effectiveness to teaching, and consistency of utilization;
c) Flexibility, which refers to adaptation to tasks and/or environments, apart from the above mentioned; and
d) Attitude, which refers to the acceptable levels of human costs in terms of tiredness, discomfort, frustration and personal effort.

3. Research Methodology

The development of e-learning systems needs to have learner in the centre of development process (Minović *et al*., 2008). Consequently, this present study has been carried out amongst final year students of Management and Information Technology (MIT) program of the Faculty of Management and Commerce, South Eastern University of Sri Lanka (SEUSL) to analyse the characteristics of usability, related an e-learning website and their intuitive significance on the characteristics of usability. Participants are hesitant to take part in qualitative studies conducted in classrooms settings; however, they are keen in participating in surveys based on quantitative methods (Borrego *et al*., 2009). Since this study has also been conducted in a classroom, the quantitative method was adopted and consequently yielded a 100% response rate. Though, the students sample are not representative of the entire population, the use of students sample for this kind of study is appropriate, since they are the main end users (Biswas & Biswas, 2004).

Shackel's usability criteria such as effectiveness, learnability, flexibility and attitude were adopted to design the questionnaire. It consists of two sections: section 1 for demographic characteristics of respondents and section 2 contains sixteen items, measured on a five point likert scales. It has been assumed that there are two types of students, those who are: a) experienced in accessing e-learning

websites, and b) inexperienced. Therefore, the questionnaire has been designed to capture responses of both, experienced and inexperienced users and two types of scale's descriptors, such as strongly satisfy (5) to strongly dissatisfy (1) and very important (5) to very unimportant (1), have been proposed for the same usability attributes. 32 students from a class were invited to participate in the survey and all the collected questionnaires have been found suitable for analysis.

4. Analysis and Results

The demographical data of the respondents have been illustrated in the table 1. It shows that the majority of the students participated in the survey are female, and around 84% of respondents are having more than three years of experience of browsing the Internet for various purposes. This shows that they have sound knowledge on Internet and are aware of all types of websites, especially the e-learning sites. Because, more than 71% of them have said 'yes' to the question related to the experience of accessing e-learning websites and around 84% of the respondents have spent more than one hour for accessing Internet per day.

Table 1. Demographic Data of Respondents

Item	No.	Percentage
Gender		
Male	10	31.25
Female	22	68.75
Years of experience using the Internet		
Less than 3 year	5	15.63
Between 3- 5 year	15	46.88
More than 5 years	12	37.50
Internet accessibility at home		
Yes	11	34.38
No	21	65.63
Hours of Internet access per day		
Less than 1 hour	5	15.62
Between 1 to 3 hours	19	59.38
More than 3 hours	8	25.00
Experience of accessing e-learning websites		
Yes	23	71.88
No	9	28.13

An independent descriptive analysis on the data collected from both, experienced and inexperienced visitors of e-learning websites were done to know their perceptual differences, expectations, and opinions. Table 2 shows the mean score and standard deviation for each usability characteristic experienced by the respondents.

Table 2. Users' Experiences on Usability Characteristics

No	Usability Characteristics	N	Min	Max	Mean	SD
	Effectiveness					
1	Quick visual presentation	23	2	5	4.17	0.834
2	Fast completion of transactions	23	1	5	3.70	1.146
3	No distraction	23	1	5	4.00	1.168
4	No errors	23	1	5	3.87	1.217
	Learnability					
5	Learnable features and functions	23	2	5	4.30	0.822
6	Readily available instructions	23	2	5	3.83	1.114
7	Memorable steps	23	2	5	3.91	0.848
8	Appealing and pleasant site	23	1	5	3.26	1.137

	Flexibility					
9	Easy navigation	23	2	5	4.09	0.949
10	logical navigation process	23	2	5	4.00	0.905
11	Understandable site direction	23	2	5	3.91	0.733
12	Easy get back option	23	1	5	3.17	1.154
	Attitude					
13	Easy to use	23	1	5	3.83	0.984
14	Satisfying material and information	23	2	5	3.65	1.112
15	Satisfying content of the sites	23	2	5	3.87	0.920
16	Satisfying learning outcome	23	1	5	3.57	1.237

Further the findings have indicated some of the important characteristics that scored a mean value of 4 and above. Those are: quick visual presentation of the website, no distracting features in the website, learnable features and functions of the website, easy navigation and logical navigation process of the website. Though some of them are strongly satisfied (max: 5) with all of the usability characteristics, few of them expressed their strong dissatisfaction (min: 1).

Table 3 presents the data obtained from the inexperienced users of e-learning websites and their perceptual importance and expectation of usability characteristics of an e-learning website. The total mean score 4.58 indicates that all the usability characteristics are perceived more important. The usability character, appealing and pleasant website, scored a mean value of 3.33, which indicates that some of the learners do not much bother about the appealing and pleasant design of the e-learning website. It simply shows that they focus more on acquiring information and knowledge, rather than enjoying the appearance of the site. One of the learnability characteristic, i.e. learnable features and functions of an e-learning website scored a mean value 5 which exhibits that this characteristic is very important for a learner. Majority of the usability characteristics are felt very important (max: 5), the characteristics such as memorable steps and appealing and pleasantare neither marked as important nor important (min: 3).

Table 3. Users' Expectations of Usability Characteristics

No	Usability Characteristics	N	Min	Max	Mean	SD
	Effectiveness					
1	Quick visual presentation	9	4	5	4.56	0.527
2	Fast completion of transactions	9	4	5	4.56	0.527
3	No distraction	9	4	5	4.44	0.527
4	No errors	9	4	5	4.67	0.500
	Learnability					
5	Learnable features and functions	9	5	5	5.00	0.000
6	Readily available instructions	9	4	5	4.56	0.527
7	Memorable steps	9	3	5	4.11	0.601
8	Appealing and pleasant site	9	3	4	3.33	0.500
	Flexibility					
9	Easy navigation	9	4	5	4.78	0.441
10	logical navigation process	9	4	5	4.78	0.441
11	Understandable site direction	9	4	5	4.56	0.527
12	Easy get back option	9	4	5	4.33	0.500
	Attitude					
13	Easy to use	9	4	5	4.89	0.333
14	Satisfying material and information	9	4	5	4.89	0.333
15	Satisfying content of the sites	9	4	5	4.89	0.333
16	Satisfying learning outcome	9	4	5	4.89	0.333

As mentioned earlier, the survey questionnaire consisted of sixteen items, measured on a five point likert scales, and it has been designed in such a way to record responses of both, experienced and inexperienced e-learning website visitors. Fig. 2 illustrates the comparison of experiences and expectation of both respondents. All the usability attributes, except the attribute, *appealing and pleasant site* are marked as important for an e-learning website by the inexperienced students, whereas the experienced students have indicated their actual occurrences encountered while accessing e-learning websites. Of the usability attributes, *appealing and pleasant site* and *easy get back option* have not found to be satisfying the experienced users.

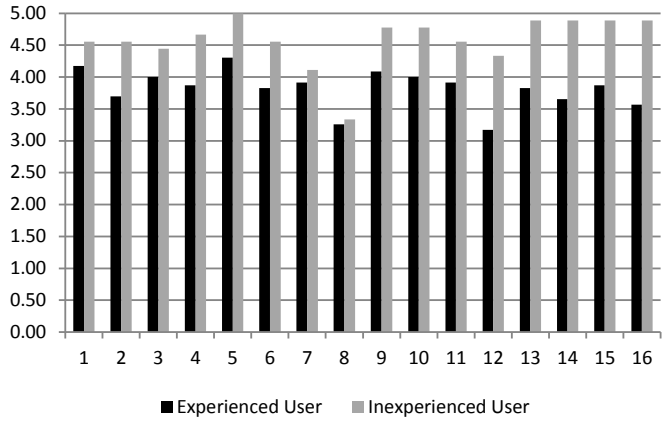

Fig.2.Comparison of experiences and expectations of respondents

As explained above, the experienced students have demonstrated satisfaction over the usability attributes of e-learning websites they accessed for their learning purposes; while inexperienced students have expressed their perception on the importance of the usability attributes for accessing e-learning websites. When combining and comparing both finings, based on the outcomes it is evident that, all the attributes yielded satisfaction and were felt important. The total mean value (4.03) confirmed that finding.

It is also noteworthy that there is a similarity among the expectation of inexperienced users and satisfaction of experienced users. Both average experience and expectation are on the positive sides, none of the characteristics yielded negative result from any of them.

5. Conclusion

The e-learning technology has tremendously enhanced teaching and learning pursuits, and consequently educational institutions and administrators around the globe have begun to expend more on revolutionary technologies. Nevertheless, obstacles and provocations still obviously exist. The e-learning websites should offer superior usability for the purpose of sustaining students.

Experience and/or lack of experience of students do not carry much connotation in this study, due to the fact that, the theory of perception and experience are practically on the same degree, however, their satisfaction and anticipations are positively grabbed to establish a standard, for boosting usability characteristics in the development process of e-learning websites. Consequently, the developer ought to integrate the experiences and anticipations of users.

The outcomes of experienced users had indicated that there is a space for enhancing the characteristics of usability, as the maximum scales are not affected; and the outcomes of inexperienced users lead that

there is a greater expectancy with regards to characteristics of usability of an e-learning website, and the new users are conscious about all the characteristics,which encourage them to use websites for their learning purposes. It can be determined that e-learning websites are acknowledged and appreciated based on the characteristics of usability, therefore, designers and educational administrators have to contemplate all the usability characteristics for the purpose of retaining users towards theirs sites, and to acquire successful e-learning implementations.

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