AUTOMATED USABILITY EVALUATION OF E-LEARNING WEBSITES IN SAUDI ARABIA

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ABSTRACT

Web usability is a significant factor in increasing user satisfaction, performance, trust, and loyalty. Web usability is particularly important for people who mostly depend on the website and for one reason or other cannot visit an institution, such as online distance education students. Accordingly, universities and educational websites need to determine the types of usability problems they have on their websites. However, far too little attention has been paid to providing detailed information regarding the types of specific usability problems that could be found on e-learning websites in general, and specifically, in the Kingdom of Saudi Arabia (KSA). The aim of this paper is to study and analyse the usability of university websites that offer distance education courses in the KSA. A total of 12 universities in Saudi Arabia were considered, which include 11 affiliated and one private university. The analysis of the data represents the level of usability of distance education websites. Results reveal that in Saudi Arabia, distance education websites are reliable, but violate basic usability guidelines.

KEYWORDS

University Websites, Credibility, Trustworthiness, Online Trust, Website Design, Saudi Arabia, Distance Education

Index Terms *— Saudi Arabia, Distance Education, University Websites, Credibility, Trustworthiness, Online Trust, Website Design*

1. INTRODUCTION

Today, the websites are crowded in both the Graphical User Interface and contents. This makes searching for information on universities web-based is complex. Therefore, sometimes university websites are become the obstacles to achieving that, once usability guidelines violated. Usability is an essential factor to measure the quality of the website. Usability becomes more vital once the system critical or for people who cannot visit an institution and depend mainly on the website—for example, online distance education students. To ensure that students join their online distance education programs and not go elsewhere, universities should be certain that their websites are usable. Therefore, deanships of e-learning and distance education websites at universities require high usability.

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Usability is one of the most important characteristics of any website. If the website is not usable, no one going to use it. Usability can make users comfortable interacting with the website, registering their personal information, and then become loyal users [1]. Usability is defined by ISO 9241-11, 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" [2].

The remainder of the paper is organized as follows: First, there is an overview of usability evaluation, presented in Section 2; then, a brief description of distance education in the KSA is given in Section 3. In Section 4, there is a brief description of relevant previous studies and a literature review. In Section 5, objectives of this work are presented. Section 6 presents the methodology used. Websites evaluation automated tools is presented in Section 7. In Section 8, tool-based results are provided; in Section 9, there is a discussion of these results. Finally, conclusions and future work are discussed in Section 10.

2. USABILITY EVALUATION

There are different types of evaluation methods exists to examine usability. These methods categorized into three categories based on how the usability problems are identified:

- Expert evaluation methods: include methods that involves one or a group of experts in the process of identifying usability problems. Common usability method related to this category is a Heuristic evaluation[1, 3, 4]and Cognitive walkthroughs[5, 6] method.

- User evaluation methods: include methods that involve users in the process of identifying usability problems. Common examples for this category is a low fidelity prototype and involving users in focus user groups or controlled laboratory sessions to provide usability feedback[7-9].

- Tool-based evaluation methods: include methods that involve software in the process of identifying usability problems. Common usability tools related to this category are Qualidator, Website Grader, Search Engine Optimization (SEO), and Web page Analyser.

3. A BRIEF NOTE ABOUT DISTANCE EDUCATION IN THE KSA

In the present day, the Kingdom of Saudi Arabia (KSA) has witnessed growth in the number of universities in the country. According to the Ministry of Higher Education in the KSA, there are 35universities in Saudi Arabia. There are 25 government universities,10private universities, and one university focusing exclusively on graduate education and research—King Abdullah University of Science and Technology (KAUST). Among the 36 universities, only 11 government universities have been authorized by the Ministry of Higher Education to offer distance education courses ranging from bachelors' to masters' degrees. On the other hand, only one private university (the Arab Open University) has been accredited by the Ministry of Higher Education. In this study, all 12 universities were considered, evaluated, and analysed (Table 1).

TABLE 1: YEAR OF ESTABLISHMENT OF E-LEARNING AND DISTANCE EDUCATION DEANSHIPS AT UNIVERSITIES IN THE KSA

No	University	Year of Establishment	
		Gregorian	Hijri
1	King Abdulaziz University (KAU)	2002	1423
2	Islamic University in Madinah	1961	1381
3	IMAUM	2007	1428
4	King Faisal University (KFU)	2009	1430
5	TAIBUAHU	2005	1426
6	Taif University (TU)	2011	1432
7	Jazan University (JAZANU)	2009	1430
8	Aljouf University (JU)	2007	1428
9	Najran University (NU)	2011	1432
10	University of Dammam (UD)	2010	1430
11	Saudi Electronic University (SEU)	2011	1432
12	Arab Open University	2002	1423

Table 2 shows the number of e-learning students enrolled in each university for male and female.

TABLE 2: NUMBER OF ONLINE DISTANCE EDUCATION STUDENTS IN THE KSA 2014

No	University	Male	Female	Total
1	King Abdulaziz University (KAU)	1,959	1,909	3,868
2	Islamic University in Madinah	700	0	700
3	IMAUM	5,156	3,733	8,889
4	King Faisal University (KFU)	5,911	6,901	1,2812
5	TAIBUAHU	1,530	1,713	3,243
6	Taif University (TU)	2,014	1,041	3,055
7	Jazan University (JAZANU)	876	810	1,686
8	Aljouf University (JU)	199	66	265
9	Najran University (NU)	1,005	977	1,982
10	University of Dammam (UD)	957	1,241	2,198
11	Saudi Electronic University (SEU)	4,490	2,771	7,261
12	Arab Open University	1,914	2,340	4,254

4. LITERATURE REVIEW

Evaluations of the usability of websites have been the subject of many research projects, such as e-learning (e.g. [10, 11]), e-government (e.g. [12, 13]), e-commerce (e.g. [14-18]), mobile website interfaces (e.g. [19, 20]), m-commerce (e.g. [21, 22]), and virtual reality and augmented reality (e.g. [23, 24]). In addition, there are some automated usability evaluation websites conducted.

Alexander et al. [25] evaluated the usability and accessibility of three UK e-government websites and investigated if these two related. Two automated usability evaluation tools used namely: Bobby and Lift. Based on the automated evaluation selected websites evaluated by heuristics and walkthrough evaluation. Their study showed that UK e-government is high compliance with WCAG and a relatively low usability rating.

Junaini et al. [26] evaluate three African countries websites by using WebQual tool. The tool found that the HTML elements in handcoded pages and presented the highest number of accessibility problems.

Mustafa et al. [27] utilized HTML Toolbox and Webpage Analyser to evaluate nine university Jordanian websites. Their results showed that the overall usability level of the studied Websites is acceptable.

Sukhpuneet et al. [28] make use of two automated tools namely: Site Analyser and Qualidator tool to evaluate educational universities of Punjab and provides their ranks according to evaluation criteria. Their results showed that websites designers could focus on specific features where are they lacking.

Ivory study et al. [29] used three usability tools namely: W3C HTML, UsableNet life, and WatchFire Boby. Their results showed that the tools helped designers to identify a larger number of usability problems.

Oliha et al. [30] evaluated the usability of two Polytechnics websites in Nigeria. They used HTML toolbox and webpage analyzer. Their study revealed that the overall usability level is acceptable, but there are some weaknesses in the phase of design and interfaces.

5. OBJECTIVES

The main objective of this study is to examine the web usability of e-learning and distance education deanships websites at universities in the KSA, compare the online distance education websites of universities in the KSA, and then offer suggestions for the design of an ideal online distance education website for a university to increase the site'susability.

6. METHODOLOGY

The usability evaluation conducted by a human (users and experts) evaluate the external attributes of the website, rather than its internal attributes (such as webpage download time). External attributes depend on the website and its usage, while the internal attributes of the website depend on how the website has been designed and developed [31]. In this study, automated tools used to evaluate the internal attributes.

7. WEBSITE EVALUATION USING AUTOMATED TOOLS

The evaluation method utilized to evaluate the usability of the e-learning websites of Saudi universities by using automated tools. There are many automated evaluation tools available to assess different usability attributes. In this study, three different evaluation automated tools were chosen to analyse different usability factors such as performance, load time, navigation, mobile friendly, and user satisfaction. SEO, accessibility, and security will help to increase user satisfaction. The selected website evaluation tools are:

- The webpage analyser 0.98 is a free tool for Website Optimization utilized to measure the website performance tool and webpage speed analysis to improve a website's performance.

- The Qualidator Tool is a free online tool that measures website against website performance, accessibility, SEO, and usability.

- The website Grader is a free online tool that grade website against website performance, Mobile, SEO, and Security.

Table 3 shows the Performance, Accessibility, Mobile, Search Engine Optimization (SEO), Usability, and Page Analysis.

TABLE 3: WEBSITE EVALUATION AUTOMATED TOOLS

Criteria	WebPage Analyser	Qualidator	Website Grader
Performance	√	√	√
Accessibility		√	
Mobile			√
SEO		√	√
Security			√
Usability		√	
Page analysis	√		

8. RESULTS OF AUTOMATED TOOLS

- Results of WebPage Analyser Tool

Testing website download speed and the size of the webpage influences the usability of any website. The data obtained used only to represent the extent and the level of website download speed and size of the webpage possessed by the university websites in Saudi Arabia. In this study, the total size of the website, the total size of images, the percentage of images in the total size, and the download times have been collected. The results obtained from the WebPage Analyser are presented in Table 4.

TABLE 4: CLASSIFICATION OF WEBSITES BY WEBPAGE SIZE AND DOWNLOAD SPEED

Name of the university	Total size of the website	Total size of the images	Percentage of images in total size	Download time at 56K connections
KAU	1885781	930851	55	393.63
IU	3013113	451273	98	949.76
IMAUM	284501	61956	6	61.10
KFU	1017485	734151	19	212.18
TAIBUAHU	974124	789597	74	212.74
TU	2155286	1250190	44	441.35
JAZANU	3126833	458363	99	969.56
JU	2461388	2273857	72	514.35
NU	457998	448225	11	93.88
UD	2528954	2039003	84	525.42
SEU	629	0	0	0.53
ARABOU	633	0	0	0.53

The web optimization's WebPage Speed Report has the connection rate starting from 1.44 Mbps to 14.4K. According to the usability guidelines [32], the optimal download time for a homepage is 10 seconds. So, for better download speed, it is suggested to design 45 kb to 55 kb–sized homepages. Table 5 shows that only two universities fall in the <10 seconds category, and only one university fall under the >100 seconds category. Other homepages of universities in Saudi Arabia fall under the > 200 seconds category. Saudi Arabia has pictures, which occupies nearly 70 to 98 percent of the overall website size.

- Results of Qualidator Tool

The result of Qualidator Tool is shown in Table 5. This tool measured against the key usability, accessibility, SEO, and Overall. Unfortunately, TAIBUAHU university website could not be tested. Since, the error message returned by the server indicated that the operation has timed out. From the result of the Qualidator Websites analyser tool, IMAUM University score (82.5%) more points than other university websites in terms usability. Whereas UD, JU, and NU universities websites score respectively (81.7%, 80.8%, 80.6%) more points in terms accessibility. Both JU and IU universities websites score (79.6%) more in SEO. Overall JU university websites score (78.5%) more points than other universities. Followed by NU university websites score (77.3%) more points than other universities.

TABLE 5: RESULTS OF WEBSITE QUALIDATOR TOOL

No	University Website	Usability	Accessibility	SEO Search Engine Optimization)	Overall
1	KAU	68.6%	67.2%	68.1%	72.8%
2	IU	76.5%	76.3%	79.9%	75.7%
3	IMAUM	82.5%	74.4%	76.6%	75.3
4	KFU	72.8%	69.0%	61.4%	70%
5	TU	66.5%	65.6%	67.3%	66.2%
6	JAZANU	68.9%	65.3%	65.3%	67.7%
7	JU	77.9%	80.8%	79.6%	78.5%
8	NU	75.9%	80.6%	75.2%	77.3%
9	UD	78.3%	81.7%	70.4%	76.4%
10	SEU	77.7%	78.5%	68.3%	75.3%
11	ARABOU	66.7%	65.8%	71.9%	66.3%

- Results of Website Grader Tool

The result of Website Grader Tool is shown in Table 6. This tool measured against the key performance, Mobile, SEO, Security, and Overall. Unfortunately, TAIBUAHU university website could not be tested. Since, the error message returned by the server indicated that the operation has timed out. From the result of the Website Grader tool, UD and KFU University score (80) more points than other university websites in Overall. In addition, four universities (TU, JAZANU, SEU, and ARABOU) score less than (50). For Mobile design, four universities score zero, whereas, the other universities score full mark. Seven universities score less than half regarding the performance term. UD and SE Universities score high performance (30, 26 respectively) comparing with the other universities.

TABLE 6: RESULTS OF WEBSITE GRADER TOOL

University	Performance	Mobile	SEO	Security	Overall
KAU	14/30	30/30	15/30	10/10	69
IU	14/30	30/30	15/30	10/10	69
IMAUM	14/30	30/30	20/30	10/10	74
KFU	14/30	30/30	25/30	10/10	79
TU	14/30	0/30	10/30	10/10	34
JAZANU	19/30	0/30	10/30	0/10	29
JU	20/30	30/30	15/30	0/10	65
NU	12/30	30/30	30/30	0/10	72
UD	30/30	30/30	10/30	10/10	80
SEU	26/30	0/30	10/30	10/10	46
ARABOU	13/30	0/30	10/30	0/10	23

9. RESULTS AND DISCUSSION

Table 12 presents a summary of the score for each of the 12 university websites. For the “design” factor, only the SU and KAU website scored more than half of the total, where the rest scored half or less. The SEU, NU, KAU, and IU university websites achieved the highest score (61 percent) for the “easy to use” factor, where the rest of the websites scored less than half. This indicates that half of the university websites have usability problems on their websites. On the

other hand, most university websites achieved a high score on “reliability factors.” The JU university website scored the lowest for both the “validity” and “expertise” factors, followed by the NU university website. Three universities (KAU, KFU, and SEU) websites achieved full marks in the expertise area.

10. CONCLUSION AND FUTURE WORK

The purpose of the current study was to examine the web usability of distance education websites in Saudi Arabia universities. The results of this investigation show that university websites are reliable and are designed well, but violate basic accessibility, and usability guidelines. Therefore, university websites in Saudi Arabia should be required to be evaluated periodically using established criteria such as usability, accessibility, and credibility. Consequently, this will help the universities improve their websites to meet users’ needs. The current study should be repeated using the user evaluation method.

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