

Evaluating the Usability of Saudi Digital Library's Interface (SDL)

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Abstract— Usability of digital library is recognised as an important element of any DLs projects. This paper used questionnaire based usability test as a method for evaluating the usability of SDL's interface. Based on related studies, a set of sixteen items covering four axis: efficiency, effectiveness, Aesthetic appearance and learnability have been developed to evaluate the Saudi Digital Library interface (SDL). Twenty-two undergraduate students from the department of Information Studies participated in completing the Likert-scales questionnaire. The main finding of the study indicated that the SDL's interface level of usability practice was not acceptable, in particular regarding aesthetic appearance. Moreover, it seems to be that problems facing other Internet applications in Saudi Arabia will continue to influence the development of digital libraries projects.

Index Terms— Digital Library, Interface Design, Questionnaire-based usability test, Saudi Digital Library, Usability.

I. INTRODUCTION

Higher education in Saudi Arabia is expanding significantly because of the huge government investment in human resource development, particularly higher education reform. Prior to 2002, there were only eight government universities and two private universities located in the main cities; however, today, there are twenty-five government universities and eleven private universities dispersed across the country [1, 2]. As a result of this development, in 2010, the Saudi Digital Library (SDL) was established by the Ministry of Higher Education (MOHE). According to the library's website, the sophisticated digital library aims to support the educational process and to meet the needs of researchers, students, and professionals in higher education. It has more than 24, 000 full e-books in various scientific specializations. In addition, the SDL has subscribed to about 300 local, regional, and international publishers [3, 4]. Yet, a significant issue associated with electronic projects that has been addressed by many authors is the ease of using the systems. Maurer argued that if a system is difficult to use, users will react to it in one of several ways: First, they will not use it at all. Second, they will carry out their tasks elsewhere. Third, they will use it as little as possible. Finally, they will spend time and seek support to learn how to use it [5].

The issue of ease of use for electronic projects becomes more significant in developing countries, including Saudi Arabia. Salem [6] argued that the most important factors causing the failure of electronic initiatives in these countries

are a lack of experience with large ICT projects and inadequate awareness of website design issues. This lack of awareness of website design among designers, including usability, accessibility, and information architecture, has been confirmed by many studies across several domains in Saudi Arabia (e.g., eGovernment, eCommerce) as a reason for the failure as the majority of their websites, which suffered from serious web-design problems that did not encourage people to use them [7, 8]. Another issue that needs to be addressed is the fact that the SDL is the only digital library where academics can access electronic information resources for educational purposes as the SDL is the single access point to the national and international electronic resources. Therefore, users' experiences in using technology would play a great role in the usage of systems. This has been identified as a significant element that needs to be considered when designing a website [9].

This study, therefore, attempted to fill this gap in knowledge by testing the usability of the SDL's interface using a questionnaire to clarify how Saudi university students see library's website in terms of usability. The study is organized into four sections. Section two is a review of the literature, focusing on studies that used questionnaire-based usability tests. The third section describes the research methodology. The analysis and results are discussed in the fourth section. Finally, the fifth section summarizes the study.

II. LITERATURE REVIEW

The rapid development of information and communication technology (ICT) continues to have a significant impact on all sectors of society. The library and information industry is no exception, with terms such as electronic library, digital library, hybrid library, and virtual library being used interchangeably to represent the same concept of collection digital objects that can be accessed over the Internet, together with methods of selecting, organizing and managing these objects [10]. Ease of access and ease of use are core characteristics of any online electronic projects and reflect the main objective of establishing these projects.

Since the 1990s, much research and development has taken place in the field of digital libraries, starting with the creation of specialist digital libraries (e.g., education, health care, and learning). The usability of digital libraries, which refers broadly to the user's experiences and satisfaction while using a digital library, has been the focus of the majority of such these studies. Usability is important because it encourages use of a system by those who connected to the Internet and attracts users who are not yet connected. According to Chowdhury [11], the focal point of a digital library is its website, so the literature on the

usability of digital libraries is extensive and rich [12]. Moreover, the usability attributes axis which has been proposed by the International Organization for Standardization (ISO) or by the research community since the 1980s to guide the measurement of computer systems are still evolving and changing. For instance, the ISO 9126-1:2001, which has been revised to the ISO/IEC 25010:2011, understandability and attractiveness have been renamed with appropriateness and interface aesthetics and error protection, and accessibility have been added [13]. The research community also uses a number of different usability attributes, for instance, Nielson [14] proposed learnability, efficiency, memorability, errors, and satisfaction, whereas Tsakonas and Papatheodorou [15] specified learnability, ease of use, aesthetic appearance, navigation, and terminology. This has given the usability research community the ability to identify sub-attributes according to the context, the study objective, and the perspective of the researcher. Also, the literature shows that digital libraries have been evaluated from various perspectives, including interface design and features, search facilities and process, text size and color, graphics and background color, labeling and language, navigation and information organization, and content and service [16, 17, 18, 19].

In addition, the different usability test techniques either involve users such questionnaires, thinking aloud, and observation or do not involve users, such as heuristics, cognitive, walkthrough, and action analysis; however, they have several things in common [20, 21]. Questionnaire-based usability test techniques are widely used for testing the usability of digital library website designs. Conyer [22] stated that the advantages of this approach included that it is easy to conduct and inexpensive. In addition, it is easy to quantify. However, the questionnaire-based usability test, as with other kinds of empirical evaluation, has the limitation that it does not observe or measure actual performance; rather it tends to seek users' opinions and their experiences [23].

III. METHODOLOGY

This study used a questionnaire-based methodology. The questionnaire was developed after reviewing and analyzing several digital library usability studies that used questionnaires to collect data [9, 20, 24,25]. Four axis of usability were identified: efficiency, which refers to the effort to complete tasks; effectiveness, which refers to the ability of users to complete tasks; aesthetic appearance, or the consistency of the whole interface design; and learnability, which refers to how easy and quickly users can use the system. Sixteen questions were drawn from these four axis, and responses were recorded using Likert- scales with end points ranging from (1) strongly disagree to (5) strongly agree. The following table shows the four axes with its items.

TABLE1. THE FOUR AXIS WITH ITS ITEMS

| AXIS | ITEMS |
|----------------------|--|
| Efficiency | Generally, the SDL is easy to use. |
| | The SDL responded without errors. |
| | The SDL responded quickly. |
| | Overall, The SDL is well designed in terms of helping users find what they want. |
| Effectiveness | Information located in the homepage is easy found. |
| | Generally, tasks can be completed easily. |
| | Overall, I'm satisfied using Saudi SDL. |
| | The search facility provided in the SDL is effective. |
| Aesthetic appearance | The menu functions is well organized. |
| | Color, graphics, and icons have been used appropriately. |
| | Text type and font size are readable. |
| | Text color and background color are consistent. |
| Learnability | The SDL's interface is easy to lean. |
| | The terminologies used are understandable. |
| | Steps to complete tasks are clear and understandable. |
| | SDL has an appropriate help function.. |

IV. RESULT AND DISCUSSION

Twenty-two students from the department of Information Studies participated in this study. The following table shows the general information of participants.

TABLE2. GENERAL INFORMATION OF RESPONDENTS

| Gender | Avg. age | Edu. status | Daily frequency use | Avg. Computer experience |
|--------|----------|---------------|---------------------|--------------------------|
| Male | 24 years | Undergraduate | 6 hours | 10 years |

Internal reliability of the instrument used in this study was examined with Cronbach's Alpha to determine the consistency of the items listed in the four Axis on the questionnaire distributed. The statistics showed that the value was (0.743) for the sixteen items, which was acceptable. On the other hand, the internal validity, which is concerned about the verification that items listed in the four Axis are based on the study's objective, were considered. Consequently, the sixteen items questionnaire was developed and reviewed based on the related literature, as well as its applicability to the SDL. The external validity, which is concerned about to what extend the condition of the test is somewhat similar to the real world [26] was of concern and the test was carried out in the college's lab where the students usually use it to access the SDL. The following table shows the result of the study.

TABLE3. QUESTIONNAIRE RESULTS

| Axis | Strongly disagree, n (%) | Disagree n (%) | Natural n (%) | Agree n (%) | Strongly Agree, n (%) | Mean | |
|----------------------|--|----------------|---------------|-------------|-----------------------|----------|------|
| Efficiency | Generally, the SDL is easy to use. | 3 (13.6) | 4 (18.2) | 3 (13.6) | 7 (31.8) | 5 (22.7) | 3.32 |
| | The SDL responded without errors. | 0 (0.0) | 5 (22.7) | 7 (31.8) | 7 (31.8) | 3 (13.6) | 3.36 |
| | The SDL responded quickly. | 0 (0.0) | 3 (13.6) | 7 (31.8) | 5 (22.7) | 7 (31.8) | 3.73 |
| | Overall, The SDL is well designed in terms of helping users find what they want. | 2 (9.1) | 7 31.8) | 6 (27.3) | 3 (13.6) | 4 (18.2) | 3.00 |
| Effectiveness | Information located in the homepage is easy found. | 4 (18.2) | 3 13.6) | 4 (18.2) | 7 ((31.8) | 4 (18.2) | 3.18 |
| | Generally, tasks can be completed easily. | 0 (0.0) | 4 (18.2) | 7 (31.8) | 9 (40.9) | 2 (9.1) | 3.41 |
| | Overall, I'm satisfied using Saudi SDL. | 0 (0.0) | 7 (31.8) | 6 (27.3) | 7 (31.8) | 2 (9.1) | 3.18 |
| | The search facility provided in the SDL is effective. | 4 (18.2) | 7 (31.8) | 6 (27.3) | 3 (13.6) | 2 (9.1) | 2.64 |
| Aesthetic appearance | The menu functions is well organized. | 4 (18.2) | 2 (22.7) | 3 (13.6) | 4 (18.2) | 6 27.3) | 3.14 |
| | Color, graphics, and icons have been used appropriately. | 7 (31.8) | 7 (31.8) | 5 (22.7) | 3 (13.6) | 0 (0.0) | 2.18 |
| | Text type and font size are readable. | 8 (36.4) | 8 (36.4) | 3 (13.6) | 3 (13.6) | 0 (0.0) | 2.05 |
| | Text color and background color are consistent. | 5 (22.7) | 5 (22.7) | 5 (22.7) | 5 (22.7) | 5 (22.7) | 2.00 |

For the sixteen items, descriptive statistic was investigated including frequency, percentage and mean. The above table present the result of the questionnaire. Overall, a mean value of participants of all sixteen items was 3.04. and the mean value for the four axis were 3.35, 3.10, 2.34 and 3.38 respectively for efficiency, effectiveness, aesthetic appearance and learnability. Although, the result of the analysis in general were natural, items regarding aesthetic appearance were found to be negative with a mean value of 2.34, so the website failed to provide an appropriate good aesthetic appearance. Also, this can be noticed in fourth item of effectiveness which was concern about search functionality with a mean value of 2.64. On the other hand, only three items across the four axis shown positively attitude of a mean value of 3.41 and above which were 3.73, 3.41 and 3.95 respectively for the SDL responded quickly, generally, tasks can be completed easily and the terminologies used on the SDL's interface are understandable.

V. CONCLUSION

The usability evaluation of SDL by using a questionnaire based usability test techniques showed that similar issues were raised in this study that support previous studies that investigated official Saudi Arabia website within various domains. The level of usability practice was not acceptable, particularly for the aesthetic appearance axis. This turn to the issue of having a website as the key point today is not only to have a website, but how effective the website is in terms of usability, accessibility and findability. Addressing these issues can reduce other factors that can limit the use SDL as in the case of Saudi Arabia the familiarity with online activities is generally low. This is because of the absence of other Internet applications. Hence, considering usability issues is significant to bridge the new concept of the digital divide, which is skills divide mainly using the Internet as a tool for pursuing a better life [28].

VI. REFERENCES

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