DESIDOC Journal of Library & Information Technology, Vol. 39, No. 4, July 2019, pp. 162-168, DOI : 10.14429/djlit.39.4.14462

Usability of Central Library Websites of Iranian Universities of Medical Sciences: An Evaluation

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ABSTRACT

With regard to the potential of huge knowledge dissemination by academic library websites, their usability is considered as a matter of great interest to university administrators as well as users. In the present study, a descriptive survey was designed aimed at evaluating usability of central library websites of type-1 universities of medical sciences in Iran in order to identify their usability issues and to provide inputs for possible remediation efforts to improve the design of similar websites in the future. The research procedure involved a library study to identify the tasks typically needed on library websites, use of the identified tasks to design a checklist for measuring three dimensions of usability (effectiveness, efficiency, and satisfaction), and finally a usability evaluation by two specialists of medical informatics and two librarianship experts. The given websites were rated "good" (60 % - 80 %) in terms of usability and no statistically significant difference was found between evaluations by different experts. It was concluded that more attention to website usability could improve users' interest in services and facilitate realisation of goals in parent organisations. The results of this study could provide a basic framework for website design and improvement through giving proper attention to usability dimensions.

Keywords: Usability; Website; Central library; University of medical sciences; Cognitive walkthrough method; Iran.

1. INTRODUCTION

Currently, websites are among the most basic tools of access to libraries and they also serve as gateways for directing users to information sources and services they need[1]. In this respect, library websites can be appreciated as effective communication channels between users and libraries. The importance of library websites has been further accentuated in respect of rapid expansion of information networks and interlibrary cooperation systems, growing infrastructure for remote learning, as well as extensive use of electronic and digital resources to access textual data for education and research purposes in academic settings[2]. However, there are some challenges in terms of providing access to information through library websites, most notably how to design a usable website with high-quality content, wherein information can be accessed swiftly and easily[3]. Research studies have revealed that the core principles of website design and information organisation have been basically ignored in a large number of websites, and also not enough attention has been paid to core concepts such as usability [4]. Once a website is unable to provide effective access to information, users reflect on it as a waste of time and stop using it[5]. If website designers ignore usability principles so much that users lose interest in the website, it will not matter how much high-quality information it contains within[6]. In other words, monitoring and resolving usability issues of a website are of vital importance for its acceptance and frequent use by users[7-8]. In this regard, it is also of utmost importance to pay more attention not only to hardware, software, content, and aesthetic aspects of website design; but also to audience community, design goals, as well as website usability issues that can be significant for target users[9].

The International Organisation for Standardisation (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". It has also outlined usability evaluation methods along with variables associated with each one[10]. Accordingly, there are various methods of website usability evaluation, classified based on whether evaluators are ordinary users or experts. Examples of expert evaluations are heuristic and cognitive evaluations, being used since the early 1990s[11]. Cognitive evaluation is a task-based applied evaluation method, which involves identifying problems through simulating and assessing degree of difficulty of tasks and determining goals and activities constituting each task[12].

In recent years, researchers have shown growing interest in evaluation of websites and library websites in particular as well

Received : 22 April 2019, Revised : 23 June 2019
Accepted : 27 June 2019, Online published : 15 July 2019

as development of specific guidelines for such evaluations. In this respect, McGillis and Toms[11] evaluated usability of library websites and found that the given websites had problems in terms of addressing users' information needs and they often had reflected traditional library structures. Chiew and Salim[12] also introduced a tool called WEBUSE for website usability evaluations and confirmed that the desired tool was suitable for evaluating a wide variety of websites in different domains and could similarly help web developers improve their websites. Besides; Mustafa[13], Du-Toit[14], Mohammadesmeil[7], and Gharibe Niyazi[15] evaluated usability of academic websites using automated tools or questionnaires and reported that the evaluated websites were lacking in some aspects such as design, interface, and display. These studies rated the websites and also offered some suggestions for improving websites as well.

The review of the related literature explains that; the subject of website usability evaluation has attracted researchers' attention from different fields including librarianship ones interested in usability of library websites over the recent years. The related studies conducted in this field have utilised a wide variety of evaluation methods and tools based on their objectives and subjects. However, the present study was the first one evaluating usability of central library websites of universities with a cognitive approach.

It should be noted that the role of usability, as one of the main determinants of website success, highlights the importance of usability evaluations for library websites, and specifically identifies and elevates their status as information tools among information seekers [7].

2. OBJECTIVES

The main objectives of this study is to evaluate usability of central library websites of universities of medical sciences in Iran in order to identify usability issues of these websites and provide inputs for possible remediation efforts to improve design of similar websites in the future.

3. METHODOLOGY

This descriptive survey was conducted using the cognitive walkthrough method [16] to evaluate usability of central library websites of Iranian universities of medical sciences. The research population comprised of all 66 central library website of universities of medical sciences in Iran. Among them, 9 website belonged to the central libraries of type-1 universities of medical sciences selected through purposive sampling method. The selected universities (type-1) had been placed in the first level, among the three levels, based on their education and research activities by Iran's Ministry of Health and Medical Education. These universities also had the highest credit level; therefore, they were noteworthy compared with other ones (second and third levels) from the aspect of web facilities. Accordingly; if the problems of the library website of these universities are uncovered and resolved, the rest of the libraries will be able to improve their websites as well.

To create scenarios for expert evaluators; first, a review study was carried out to identify the tasks typically performed in such websites. Using the identified tasks, 19 scenarios were designed to measure the usability of websites within three dimensions of effectiveness, efficiency, and satisfaction, as defined in ISO 9241-11. For each scenario, evaluators firstly determined presence/absence of tasks and then efforts needed to achieve a goal (effectiveness), time spent to meet a purpose (efficiency), and user satisfaction. The presence/absence of tasks was then recorded via binary terms of "yes/no"; effectiveness and satisfaction were scored on a scale of 1 to 10, and the time spent on the tasks was recorded in seconds. This study enlisted the help of four evaluator, two of them as specialists of medical informatics and others as experts in medical librarianship and communications (Table 1).

Table 1. Characteristics of evaluators

Variables		Gender		Sum
		Female	Male	
Evaluators specialty	Librarianship	1	1	2
	Medical Informatics	0	2	2
Age	25-30	1	1	2
	30-35	0	1	1
	>35	0	1	1
Education level	MSc	1	0	1
	PhD	0	3	3
The rate of using the central library website	Weekly up to 2 hours	0	1	1
	Weekly 2 to 4 hours	1	1	2
	Weekly more than 4 hours	0	1	1

The validity of the checklist was also verified by eight experts and professors using a content validity index (CVI) of 0.83 and a content validity ratio (CVR) of 0.81. The reliability of the checklist was subsequently confirmed with a Cronbach's alpha coefficient of (r= 0.80).

For each dimension, the average of scores awarded by evaluators was obtained and it was then divided by the number of items in each component, and then the final result was recorded as a percentage. In terms of usability rating, scores higher than 80 per cent were rated as "excellent" and scores from 60 per centto 80 per cent were rated as "good". As well, scores between 40 per cent and 60 per cent and those from 20 per cent to 40 per cent were rated as "moderate" and "poor"; respectively. Additionally, scores lower than 20 per cent were rated as "extremely bad".

Data analysis was performed through descriptive and analytical the measures and tests (i.e. Mann-Whitney U test) using the SPSS Statistics Software (version 24).

4. DATA ANALYSIS

The search in the related literature for common tasks and functions in library websites revealed seven relevant

Table 2. Identified library website tasks (scenarios) and their categorisation

Group / category	Task No.	Librarian Tasks
Access to library management software and databases on website	1	Find and open the library management system (LMS)
	2	Find Scopus on web site and open it
	3	Find Springer on web site and open it
Library policy and history	4	Find and open library policy
	5	Find and open library history
Help and feedback	6	Find information about librarians on website
	7	Find information about the library opening hours
	8	Find library floor descriptions and maps
	9	Find contact information (Email or Phone numbers)
	10	Find information about library collection
	12	Find and open ask a librarian page
	13	Find and open comments or suggestions pages and send a statement
	15	Find library website registering page and open it
	17	Find library news page
Training	11	Find eLearning files or web pages about databases and …
	14	Find guides or online supports of library
	16	Find information about workshop programs for users
Useful links	18	Find link to other subsidiary web sites
	19	Find link to other central librarys' website

sources[11,17-21]. After reviewing these sources, 19 task for library websites were identified. The given tasks were then divided into five broad components: access to library management software, help-feedback, user-orientedness, navigation-browsing, and accessibility. As shown in Table 2 the categories of help-feedback and user-orientedness each one with six tasks, and accessibility and navigation-browsing categories, containing two tasks, had the highest and the lowest number of tasks respectively.

Evaluation of presence/absence of tasks in each scenario showed that the least included task in the websites was Task 19 (link to websites of other central libraries) and the tasks most incorporated into the websites were Tasks 1-4 (open library management system (LMS), find and open Scopus (Elsevier's abstract and citation database) on the website, find and open Springer (International Publisher Science, Technology, Medicine database) on the website, and find and open library policy page), Task 6 (find information about librarians on the website), Task 9 (contact information), Task 11 (e-learning files), Task 14 (online supports of library), Task 15 (library website registering page), and Task 17 (news and events) in that order. The highest and the lowest number of tasks were observed in the websites of central libraries of Tabriz University of Medical Sciences and Mashhad University of Medical Sciences; respectively (Table 3).

In terms of the evaluation of effectiveness (success in achieving goals) of the central library websites of universities of medical sciences in Iran, the highest effectiveness was observed in the website of Tabriz University of Medical Sciences, related to Tasks 1 and 2 (search software and databases) and the lowest effectiveness was spotted in the website of Tehran University of Medical Sciences, associated with Task 8 (library map) (Appendix 1 includes detailed tables).

The frequency distribution of task efficiency in the evaluated library websites were illustrated in Fig. 1. As can be seen; the central library website of Isfahan University of Medical Sciences was the most time-consuming among the websites evaluated; therefore, it was the least efficient one, and the central library website of Shahid Beheshti University of Medical Sciences was specified as the most efficient one.

Considering user satisfaction in evaluation of central library websites of universities of medical sciences, the central library website of Tabriz University of Medical Sciences was rated "excellent" and the rest of websites were rated "good".

Mann-Whitney U test was also used to check whether there was a statistically significant difference between the

Table 3. Frequency distribution of presence/absence of tasks in the evaluated library websites

University/Task	Tehran	Iran	Shahid Beheshti	Tabriz	Mashhad	Shiraz	Ahvaz	Esfahan	Kerman
T1	4	4	4	4	4	4	4	4	4
T2	4	4	4	4	4	4	4	4	4
T3	4	4	4	4	4	4	4	4	4
T4	4	4	4	4	4	4	4	4	4
T5	0	4	4	4	0	0	4	4	2
T6	4	4	4	4	4	4	4	4	4
T7	2	4	4	4	3	0	4	4	4
T8	0	0	0	1	0	0	0	0	0
T9	4	4	4	4	4	4	4	4	4
T10	3	4	4	4	3	3	4	4	3
T11	4	4	4	4	4	4	4	4	4
T12	4	4	4	4	4	4	4	4	4
T13	0	4	4	4	4	4	4	3	4
T14	4	4	4	4	4	4	4	4	4
T15	4	4	4	4	4	4	4	4	4
T16	3	4	4	4	4	4	1	4	4
T17	4	4	4	4	4	4	4	4	4
T18	1	4	4	4	0	4	4	4	3
T19	0	0	0	4	0	0	0	2	2

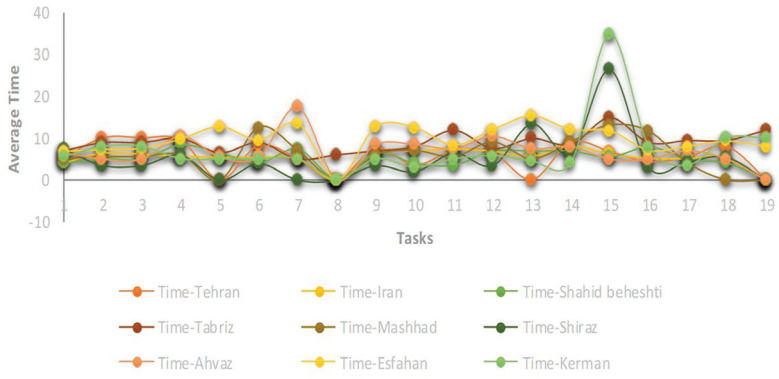

Figure 1. Frequency distribution of task efficiency in the evaluated library websites.

evaluations by specialists of medical informatics and those of medical librarianship experts. The results of this test revealed no difference in terms of effectiveness (p-value= 0.339), efficiency (p-value= 0.245), or satisfaction (p-value=0.335) dimensions.

Overall, the usability of the central library websites of Iranian type-1 universities of medical sciences was rated as "good" (60 % - 80 %). Among the evaluated library websites, the one belonging to Tabriz University of Medical Sciences was the most usable and the central library website of Tehran University of Medical Sciences was the least usable one. The most common usability problems in the evaluated websites were related to user-orientedness, specifically scarcity of information about working hours, library history, and workshops, and also those related to navigation and browsing, specifically lack of links to other library websites.

5. DISCUSSIONS

Even though the evaluated websites were rated "good" in terms of usability, there were a few issues in some usability components, most notably user-orientedness (poor information about working hours, library history, and workshops) and navigation and browsing (lack of links to other library websites), which, if not properly addressed, could negatively affect performance and ultimately usability of library websites[22].

A review of the related literature on usability of academic library websites showed that these studies had been generally carried out using methodologies other than cognitive walkthrough method[23-26] and this study was the first employing cognitive walkthrough method to meet the evaluation purposes.

Reviewing the existing literature, it was revealed that most of the problems of library websites of Iranian universities of medical sciences had been related to the content of the main page, including library history, working hours, etc. Moreover; Mashhad, Tabriz, and Iran Universities of Medical Sciences had been rated "excellent"; Isfahan, Shiraz, Kerman, Shahid Beheshti, and Ahvaz Jundishapur Universities of Medical Sciences had been rated "good"; and Tehran University of Medical Sciences had been rated moderate in terms of usability[27]. The ultimate goal of a user visiting such websites is to access resources and information needed for education or research; therefore, problems in achieving this goal mostly undermine website usability and consequently user satisfaction with online services provided. According to Poll, one cannot overstate the importance of library websites having library-specific content and properties such as addresses, lists, and links for accessing databases and electronic journals, as well as a section for news and announcements about courses and workshops to be held in the library. The main motive for the use of a website is to make maximum use of content provided in that medium. Therefore, individuals managing information on a website are required to keep contents up-to-date and make sure that they come from reliable sources. Content also plays a leading role in attracting users to a website, as they decide how many users find the contained information useful. The richer the website content get, the more the users tend to visit it and the more satisfied they will be in doing so[8]. These findings were consistent with the results of the present study; the fact that many missing features that could have a significant impact on usability of evaluated websites were simple and easy to provide which reflected lack of attention to usability criteria during design processes. Due attention to usability in the design of digital libraries is known to be associated with higher likelihood of frequent visits, user satisfaction, and fulfillment of user goals[28].

Examining the third dimension of usability, i.e. user satisfaction, all the evaluated websites were rated as "good". A study conducted by Okhovvati also evaluated usability of central library websites of Iranian universities of medical sciences but through Nielsen's heuristic method [24]. In that study, problems with design and aesthetics were found to affect user satisfaction. The aesthetic aspects focus on appearance of a website and how attractive and pleasing it is for users, but poor aesthetic design can give an impression of poor service quality, resulting in poor user experience and low user satisfaction with a website. Despite using different methods (cognitive walkthrough method vs. Nielsen's heuristic evaluation), the present study and the research carried out by Okhovvati reached the same findings with regard to user satisfaction dimension of usability for central library websites of Iranian universities of medical sciences.

Other studies had also highlighted a relationship between frequency of use of library websites and user satisfaction with the components of their web pages. For example, in a study by Rezapoor on usability dimensions of the central library website of Mashhad University of Medical Sciences, it was reported that user satisfaction with the website was favorable because of attention to the website components. In that study, the effectiveness of the evaluated library website was also rated as "good"[29]. Thus, regarding the effectiveness dimension of usability, there was a consistency between the results of the present study, obtained with the help of expert evaluators, and those in the research conducted by Rezapoor, wherein the evaluation was performed by ordinary users.

In a study by Nemati Anaraki, surveying knowledge and ability of medical students in three universities of medical sciences (Iran, Tehran, and Shahid Beheshti) in terms of using electronic resources and digital portals of university libraries, it was also reported that it was taking users a long time to reach their goals and this was undermining their satisfaction with the digital portals. In contrast, the results of the present study showed the good speed of access to library websites and their pages. It should be noted that this discrepancy could be related to the speed of the Internet connection as well as communication infrastructure issues[30].

Considering the results obtained about usability of the evaluated library websites, it seems that more efforts should be put into addressing design problems so as to make the websites more efficient and more attractive. Administrators and designers of library websites, even those with related experience and expertise, must thus improve their knowledge about standards and core components of website usability and how to incorporate them into website design and functions. Furthermore, more attention should be paid to opinions and expectations of target users as the primary visitors of the websites at the time of designing such websites and other online platforms for delivering scientific content. It is also imperative to direct more attention to those features that allow for more convenient and faster use of the websites in line with search and navigation goals. It is expected that such recommendations can improve the dynamism of the websites and their popularity among users both inside and outside the target groups, and thus contribute to knowledge sharing, advancement, and dissemination through university libraries.

6. CONCLUSION AND SUGGESTIONS

Today, academic libraries are required to provide their services via easily accessible platforms such as websites and also put constant efforts into expanding electronic services. Achieving these goals necessitates sensible use of all tools and components available for improving website design and functions. Identifying the problems of central library websites of Iranian universities of medical sciences, the present study attempted to lay the groundwork for improving usability of these websites. Resolving the identified problems can thus have a significant impact on usability of library websites and ensure that users will be more inclined to utilise the services therein provided. In general, the results of this study could provide a framework for design and improvement of library websites with proper attention to usability dimensions. Administrators of academic library websites are accordingly recommended to pay much more attention to the needs of users as the primary visitors of the websites and make attempts to provide services best suited to them via enlisting the help of designers with appropriate expertise and experience. Without this attitude, it would be impossible to reach an acceptable level of user

satisfaction with website services and consequently realise the goals of parent organisations.

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doi: 10.1108/02640471311299146.

ACKNOWLEDGMENT

This study was part of an MSc thesis supported and funded by Tabriz university of medical sciences (TUOMS) and approved by the Ethics Committee of TUOMS (under the code: IR.TBZMED. REC.1396.669).

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