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A quantitative approach to evaluate usability of academic websites based on human perception



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Abstract In this competitive world, websites are considered to be a key aspect of any organization's competitiveness. In addition to visual esthetics, usability of a website is a strong determinant for user's satisfaction and pleasure. However, lack of appropriate techniques and attributes for measuring usability may constrain the usefulness of a website. To address this issue, we conduct a statistical study to evaluate the usability and accessibility levels of three popular academic websites based on human (user) perception. Two types of usability evaluation techniques were employed in this study. First one is Questionnaire-based evaluation and second one is performance-based evaluation. Usability assessment was performed by analyzing the results from the observed task success rates, task completion times, post-task satisfaction ratings and feedback. We also investigate the possibility of there being any impact of task completion times on participant's satisfaction levels. The results of the questionnaire based evaluation were observed to be consistent with the results of performance-based evaluation. Accessibility evaluation was carried out by testing the degree of compliance of the web pages as per WCAG 2.0 guidelines.

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1. Introduction

There has been an increasing focus on Usability engineering in the last few decades. In context to websites, usability can be defined as a quality attribute that describes how easy it is for

a user to navigate through the website [1]. A website not only serves as a platform for the educational institution to interact with its stakeholders, but also helps to shape its image [2]. Academic websites are meant to provide information to a wide variety of users. Users of educational website are mostly concerned with two major points – finding the information being sought with ease and finding it in a timely fashion [3,4]. This requires achieving high levels of usability. We perform the usability test on the websites of three prominent educational Institutions namely, Institute K, Institute KGP and Institute D. All the three Institutions provide Under Graduate (B.Tech), Post Graduate (M.Tech) and Post Graduate (Ph.D) courses. All the three Institutions have excellent, highly

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educated and renowned professors who provide immense knowledge and brilliant teaching to the students. We found that these information's are very essential to be reached to the users and the only medium is via websites. Thus we studied the websites of these three Institution's and tried to find out that which website meets the user's needs easily and fulfill users satisfaction [5]. The different types of users accessing the academic websites are as follows:

- Prospective students and parents looking for general information about the Institute, details about the various short and long term courses offered by it and admission procedures.
- Current students and faculties of the institute who access the site to get up-to-date information regarding the announcements, current happenings and future events like conferences, workshops and seminars.
- Researchers who would like to know about the ongoing research activities in the Institute.
- Alumni who would like to stay connected with the Institute.

This paper has been organized as follows. Section 2, provides a related work on the Usability. Following which, Section 3 provides the main objective of this paper. Section 4 provides detail report on the different methodologies used for Usability Evaluation of the websites. Analysis and the experimental results are provided in Section 5. Finally, Section 6, concludes our study.

2. Literature survey

Mustafa and Al-Zoua'bi [3] in 2008 focused on evaluating nine different Jordanian universities. The evaluation was performed using questionnaires and online automated tools. After a study of related literature, they came up with a list of 23 website usability criteria. The questionnaire was developed and designed based on identified usability criteria, which were divided into 5 categories - Content organization and readability, Navigation and links, User Interface design, Performance and effectiveness and Educational Information. Each of these categories deals with one usability aspect. Usability index for each category and the overall usability is computed and the usability levels are determined. Automated tools - HTML Toolbox and Webpage Analyzer were used to measure the websites internal attributes-load time, html check errors and browser compatibility issues of the websites, which cannot be perceived by users.

Okene and Enuhpere [6] in 2011 conducted a study to evaluate the websites of Delta State Polytechnics, namely Delta State Polytechnic, Ozoro and Delta State Polytechnic, Ogwashi-Uku. This study was inspired from research conducted by Mustafa and Al-Zoua'bi mentioned above. Two online automated tools - HTML Toolbox and WebPage Analyzer were used along with a questionnaire.

Manzoor and Hussain in their research in 2012 designed a "Web Usability Evaluation Model" and used it for evaluating ten higher educational websites in Asia [7]. The websites were evaluated in two phases. First they conducted a survey among thirty students in three different universities to determine the problems faced by the students while interacting with the websites. After analyzing the survey results, they came up with

the model (WUEM) to evaluate the usability of the websites. WUEM consists of 17 measures which were divided into five feature categories - website contents, webpage design, navigation, page design layout and accessibility.

In an evaluation of Utrecht University website carried out by Lautenbach et al. [8] in 1999, researchers proposed that 'surveyability' and 'findability' are reliable and effective measures of usability of web pages. Surveyability criteria are the users' satisfaction with the legibility and comprehensibility of the pages and findability is the users' ability to find information on the pages. A study was conducted during which the subjects were observed while they performed one of the four different set of search tasks for information on the university website. Each of these set of search tasks contained three sub-tasks. After completion of each search, subjects answered a questionnaire to measure the user's ability to survey the pages and find the information. A final score for usability of the web pages was calculated by taking the average of overall score for surveyability and findability.

In a usability study performed by Chaparro in 2007 [9], the university portal website at Wichita State was evaluated before it went 'live'. Three groups of users - faculties, staff and students participated in the study. Tasks were identified which were representative of common activities conducted by each user group. These included searches for both general and specific information within the portal. The participants were asked to complete a series of tasks, one at a time. Post each task completion; participants rated its ease/difficulty on a 5-point scale. Performance data - success, task completion time and subjective data-perceived task difficulty, satisfaction were gathered for each participant. Post completion of all tasks, participants completed a satisfaction survey and was interviewed for overall comments.

In 2007 Kostaras and Xenos [10] employed Heuristic evaluation for usability assessment of Hellenic Open University website. The evaluation was conducted in two phases by usability experts. In the first phase, the evaluators were encouraged to navigate through the application to get a feel of the system. In the second phase, evaluators validated the implementation of each Heuristic rule derived by Nielsen. At the end all the evaluators submitted their individual reports describing their finding which included the rule violations that were detected by them. The detected violations for each heuristic rule are presented and discussed in this paper.

Daher and Elkabani in their research performed a qualitative study on usability of web portals in six Lebanese universities [11]. Further they performed a usability study on Beirut Arab University (BAU) web portal. During the first part of the study, the researchers distributed questionnaires among students of six Lebanese Universities to gain an overview of the usability problems encountered. The questionnaire study measured nine common services on the web portals of the universities. The researchers performed a comparative study of the usability of the common services available on the university web portals based on the results of the questionnaire. In the second part of the study, both qualitative and quantitative evaluation of usability of BAU web portal was performed. The students, faculty members and employees at BAU participated in the study. The researchers performed qualitative study by distributing a questionnaire among the participants. As part of the quantitative study, participants were asked to perform specific tasks while being videotaped, to gather

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