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HEURISTICS EVALUATION OF ONLINE BOOK PUBLISHERS WEBSITES: A STUDY

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Abstract

The usability and the user interface of a publisher website is an important component to determine the performance and functioning. For the past two decades, right after introducing of heuristic evaluation principles by Nielsen (1990), it has been implemented to measure the usability of various kinds of websites. The user interfaces and usability of book publisher was the subject of some research studies and many evaluation techniques have developed to assess publisher's websites user interfaces.

This study is to evaluate the user interface of the top ten book publishers' websites which are based on the ranking by the "Publishers Weekly", a weekly news magazine focused on the international book publishing business by applying the ten heuristics evaluation principles (Nielsen 1990). The study engages a quantitative and qualitative based survey approaches, and seeks to gather the perception and experiences of Pondicherry University students of post-graduate and PhD students about the book publishers' websites.

The results of the study shows that users liked the publishers' websites user interface as most of them were attractive due to pleasant layout, the use of simple language consistently throughout the system and the use of standards in all areas across the WebPages. The main weaknesses of the publishers websites as per the experience and perception of the respondents were lack of adequate and appropriate feedback, inadequate users control features, limited online help, slow loading due to some websites used heavy graphics and multimedia contents.

Keywords: Heuristics; Principles; Evaluation; Publisher; Websites; User; Interface; Usability; Websites.

1. INTRODUCTION

The effective evaluation of websites has become a point of concern for practitioners and researchers, customers etc. During recent years, different evaluation approaches to websites have been introduced. The evaluation approaches deals with website usability, design, content, quality, user acceptance and a user satisfaction being the most common outcome measures taken while evaluating the websites. With the wide spread use of the World Wide Web (WWW), users are increasingly interfacing to, and interacting with websites. Among a variety of websites, publisher's websites are not different phenomenon. The websites formulates the working environment, so it is important that the publisher's websites are user-friendly in order to help the users to achieve the desired results. Among the various usability inspection techniques, the technique used in this study is 'heuristic evaluation', which involves each interface being scrutinized against a set of recognized usability principles, or the 'heuristics' (Nielsen & Molich, 1990).

It is obvious and the most important for any website designer to design and come up with an interface that is user-friendly by integrating all the information and services with all objectives it is designed for. The publisher's websites provides convenient information to the readers, authors, organizations like libraries and traditional or small online stores.

However, all publishers' websites are not designed by fully surveying the user's needs and its usability. For such situations there is a need to assess the publisher's websites. For example, how easy is it for users to accomplish basic tasks when they first time encounter to know the gaps and identify the problems related users. How quickly can they perform tasks? And how easily can they recover from the errors? How pleasant is it to use the design? This study will address such needs and questions and find out gaps in the design so that improvements can be made in their website.

2. HISTORY OF HEURISTIC EVALUATION

2.1 Development and implementation of heuristic evaluation during 1990s

Nielsen developed the heuristics based on work together with Rolf Molich in 1990. The final sets of heuristics were released by Nielsen in 1994. The heuristics was published in Nielsen's book on Usability Engineering (1993). He provided the tools needed to avoid usability issues and improve the overall product quality. Step-by-step information on which method to use at various stages during the development lifecycle are included, along with detailed information on how to run a usability test and the unique issues relating to international usability. This Usability Engineering (1993) helps nontechnical people improve the systems so that they are not only error-free but also easier and more pleasant to use, and more efficient. It showed how to change the world and does so admirably. Its strengths are to provide a wide selection of methods for improving systems, and allows for the unavoidable constraints of the real world.

Heuristic evaluation is performed by having each individual evaluator inspect the interface alone. Jakob Nielsen (1995) in his paper "*How to Conduct a Heuristic Evaluation*" tells that only after all evaluations have been completed all the evaluators allowed communicating and have their findings aggregated. The results of the evaluation can be recorded either as written reports from each evaluator or by having the evaluators verbalize their comments to an observer as they go through the interface. Written reports have the advantage of presenting a formal record of the evaluation, but require an additional effort by the evaluators and the need to be read and aggregated by an evaluation manager. In a user test situation, the observer (normally called the "experimenter") has the responsibility of interpreting the user's actions in order to infer how these actions are related to the usability issues in the design of the interface. This makes it possible to conduct user testing even if the users do not know anything about user interface design.

In heuristic evaluation, UI (user interface) specialists study the interface in depth and look for properties that they know, from experience, will lead to usability problems. Under proper circumstances, these methods can be effective. Jeffries et.al (1991) experiments a pre-release version of a forthcoming software product, and organized groups to evaluate its interface with the four techniques described above: i) heuristic evaluation ii) usability testing iii) guidelines and iv) cognitive walkthroughs. Nielsen (1992) in his paper, finding usability problems through heuristic evaluation, writes, that usability specialists were better than non-specialists at performing heuristic evaluation, and double experts with specific expertise in the kind of interface being evaluated performed even better. Major usability problems have a higher probability than minor problems of being found in a heuristic evaluation, but more minor problems are found by the absolute numbers. Usability heuristics relating to exits and user errors were more difficult to apply than the rest, and additional measures should be taken to find problems relating to these heuristics. Usability problems that relate to missing interface elements that ought to be introduced were more difficult to find by heuristic evaluation in interfaces implemented as paper prototypes but were as easy as other problems to find in running systems. Constantine (1994) reports that several authors have proposed heuristic evaluation approaches. Sometimes the heuristics are specified as a general usability principle Shneiderman (1992) says that it is difficult to map these general principles to specific evaluable items. In other cases the heuristics are indeed specified as concrete items, and verifying the compliance of the interface with these items if possible by inspecting the interface.

3. Implementation of Heuristic Evaluation in various websites in 2000's

Heuristic evaluation as a methodology for investigating the usability of websites gained popularity much fast and was widely acknowledged as usability expert principles. It has been implemented in various areas of websites. Bolchini et.al.(2000) in the paper on "Developing Heuristics for the Semiotics Inspection of Websites", distinguish between various evaluation dimensions of the design such as content (what is communicated), information architecture (the structuring of used and interacted with), graphics and layout. information in a meaningful way), navigation (how the information architecture can be used and interacted

with), graphics and layout (Figure 1). Comparing two applications with identical designs on all these dimensions, the “signs” used on the interface to indicate content, functions and links can still be very different.

Hartson et al. (2001) referred to 18 comparative UEM (Usability Evaluation Methods) studies and found that 14 only used ‘thoroughness’ as a criterion for comparison and that the remaining four studies also used validity as criterion. Most of the former computed the ‘thoroughness’ criterion using a raw count of the usability problems encountered by the UEMs rather than account of the real problems encountered by real users in real work context. The work of Hartson (2001) gives a general overview of attributes and UEM performance measures that can be used in studies to evaluate and compare UEMs. The criteria or UEM performance measures include: thoroughness (the proportion of real problems found on an interface), validity, reliability, effectiveness, cost effectiveness and downstream utility.

3.1 HE implementation in various websites from 2010-to present

Many government organizations use web heuristics for the quality assurance of their websites. Heuristics may be used by web designers to guide the decisions about a website in development, or by web evaluators to optimize or assess the quality of an existing website. Kuijera et.al (2010) examines five government websites with heuristics principles with special attention to their presumed use, content, validity, and presentation format. Findings raised questions about the usability of heuristics for web design and web evaluation purposes. More research has to be done on the actual use and effects of website.

Huai-Yu Wu et.al (2013) evaluated the “*Usability of Taipei Public Library and Chicago Public Library websites*” by means of heuristic evaluation. 10 evaluators invited from Taiwan and the United States to find out the usability problems of both countries websites. The research also examines whether the goals of both public libraries have been met. Both of the websites have two major usability problems and most problems are minor or cosmetic. Briefly, the objectives of both public libraries have met the provision of services on the interfaces of the websites although there are a number of usability problems. The value of heuristic evaluation discovery is approved with respect to the process and results since it is

Jeonjeonghyeon et.al (2014) applied user interface evaluation heuristics to “*The National Library of Korea’s digital library*”. The heuristics were developed through literature review and case analysis, while considering the characteristics of digital libraries. The evaluation of heuristics include specific criteria according to the seven classification schemes such as purpose of the digital library and user support; menu and navigation; action and interaction; provided information; visual design; feedback and help; and information retrieval. Based on the heuristics, 267 problems were found in “The National Library of Korea’s digital library”. Practical and specific improvement suggestions were made for each problem to enable immediate implementation of the suggestions when the renovation of the digital library commences.

Heyckendorff (2015) evaluated the usability of the design of the TeleHealth system, named Telekit, developed for the Danish TeleCare North Trial, early into the design process in order to assess potential problems and limitations which could hinder its successful implementation. Five experts, including one who pilot-tested the Telekit system, individually evaluated its usability and its compliance with heuristics for the interaction design. Here the usability problems were categorized according to Rolf Molich's severity classification.

4. USABILITY OF THE WEBSITES

4.1 What is usability?

The term "usability" was started to be used from 1998 (Bevan, Kirakowsk and Maissel, 1991). The International Standards Organization (ISO) in 1994 defines 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"*.

The term usability can be understood from different point of views. Whether an IR or any other type of website, every user interfaces has its fair share of the usability problems. Nielsen (1993) suggests that usability cannot be measured by one dimension; these five attributes are associated with the usability components which include learnability, memoability, efficiency, error recovery, and satisfaction. While Hix and Hartson (1993) suggested that usability relies on the following factors which include first impression, initial performance, long-term performance, and user satisfaction. Also, Booth (1989) and Brink et al. (2002) share similar viewpoints that define usability as the effectiveness, efficiency, ease to learn, low error rate and pleasing. Nielsen's and ISO's usability definitions are the most widely used.

5. HEURISTIC EVALUATION OF USER INTERFACE

5.1 What is an interface?

The term "user interface" specifies how the programme and the user communicate (Powell, 1991). Hildreth (1982) gives two definitions. The point or process which joins two or more system components:

- (a) A shared boundary defined by common physical, signal and logical characteristics, across which data travel.
- (b) A device that facilitates interpretation of two systems between data communications equipment and data processing equipment or terminal installations.

Interfaces between computers and communication systems may be divided into various classes of functions, e.g. physical, electrical, logical, and procedural. The salient characteristics of interface features are that they generally created in a layer of software that lies between the user at the terminal and the actual search and retrieval mechanism of the catalogue (Lawrence et al, 1983). An interface exists to provide access to the

system functions in a manner that is complete, efficient and acceptable to users. It must therefore be effective, giving access to all functions and its displays must be in a form, which is intuitively accessible. It must be efficient requiring minimum user effort to invoke functions and offering easy recovery from errors and wrong choices. It must be aesthetically pleasing, must use comprehensible language and use technologies and hardware (e.g. keyboard and mouse) that are easily manageable by the user. It must be accessible at all levels of user's skills and knowledge and should encourage users to increase their knowledge about what clues or knowledge fragments are critical for the efficient and effective use of the front-end (Flower et al, 1991).

Table 1 - Usability factors studied by various Researchers

<i>Researcher</i>	<i>Usability Factors</i>
<i>Booth (1989)</i>	<i>The effectiveness, efficiency, eases to learn, low error rate.</i>
<i>Hix and Hartson (1993)</i>	<i>First impression, initial performance, long-term performance, and user satisfaction.</i>
<i>Nielsen (1993)</i>	<i>Learnability, efficiency, memorability, low error rates, and Satisfaction.</i>
<i>ISO (1994)</i>	<i>Effectiveness, efficiency, satisfaction</i>
<i>Brink et al. (2002)</i>	<i>The ease of use, learn, remember, tolerate to errors and pleasing.</i>
<i>Paithankar and Ingle (2012)</i>	<i>Practicability, operability, learnability, affect, access control, and resilience</i>

5.2 Usability evaluations

It is nearly impossible to design a user interface right at first time, we need to test and plan for modification by using iterative design, Nielsen suggested (1993). Evaluation is considered as a basic step in the iterative design process. Moreover, there are varieties of approaches to follow in evaluating the usability, which include formal usability inspection (Kahn and Prail 1994), the cognitive walkthrough (Wharton et al., 1994), heuristic evaluation (Nielsen, 1993), Contextual Task Analysis (Usability Methods, 2013), paper prototyping (Lancaster, 2004). The definitions of these usability inspection methods are summarized in Table 2.

Table 2- Summary of Usability Inspection Methods

<i>Authors</i>	<i>Method</i>	<i>Definition</i>
<i>Nielsen (1993)</i>	<i>Heuristic Evaluation</i>	<i>Heuristic evaluation is done by small set of experts and according to a set of heuristics to produce a list of usability problems in a user interface.</i>
<i>Kahn and Parail (1999)</i>	<i>Formal usability inspection</i>	<i>Formal usability is accomplished by designers and development teams reviewing the user task and performance.</i>
<i>Wharton et al.,(1994)</i>	<i>The cognitive walkthrough</i>	<i>The cognitive walkthrough focuses on the learnability and the use of a user interface</i>
<i>Lancaster (2004)</i>	<i>Paper prototyping</i>	<i>Evaluating the paper version of an interface which can be done at the early design stage</i>
<i>Usability Method Accessed (2013)</i>	<i>Contextual text analysis</i>	<i>It is a research method that focuses on observing user while performing task and conducting one-on-one interviews regarding users behavior</i>

6. METHODOLOGY

The primary objective of this project was to evaluate the top ten book publisher's websites based on the ranking by the "Publishers Weekly", a weekly news magazine focused on the international book publishing business namely: Pearson, Thomson-Reuters, Reed Elsevier, Wolters Kluwer, Random House, Hachette Livre, Holtzbrinck, Grupo Planeta, Cengage and McGraw-Hill Education. The criteria selected to rank these publishers are based on various parameters such as annual revenue, highest publications and best selling publications. The top publisher's websites should be good to meet all the requirements of the users or clients but there is no such rule. So, this project is trying to test top publishers whether they also maintain best websites or do not pay much attention to that. What made them to reach at the top in the ranking list? To answer some of these questions, this research project is carried out by surveying with students of the Pondicherry University to find out the answers to the questions raised in the objectives. The method selected must be able to identify as many usability problems as possible, that is inexpensive and convenient to carry out and can reach out to as many users as possible within a time frame. Heuristic evaluation is a good choice for this study as it can be implemented in the form of a survey, based on a set of heuristic principles prepared by Nielsen (1992). There will be two surveys to evaluate the publisher website user interface. One will be based on the heuristic principles to evaluate the websites and other will be through questionnaire, with several questions to draw out users' opinions and comments on publisher websites, so as to find out answers to the questions raised in the objectives.

6.1 Different types of evaluation techniques

Evaluation can be done as laboratory studies or field studies. Each has its pros and cons. Evaluation can also be conducted at different stages of the designing processes. In this study, the evaluation is done on publisher websites. With this in mind, the following evaluation methods are discussed:

(a) *Subjective evaluation methods* also known as survey methods are directly based on the users' judgment. This involves real users but information is not gathered while users interacting with the systems. Examples are:

- i. *Questionnaires*: Questionnaire for User Interaction Satisfaction (QUIS 5.0) was developed by Norman and Shneiderman (1989), the Software Usability Measurement Inventory (SUMI) developed as part of the CEC ESPRIT Programme, Project 5429, Metrics for Usability Standards in Computing (Music, 1992) and the ISONORM 9241 Questionnaire developed by PrOmper (1993).
- ii. *Interviews* need careful planning and a good degree of expertise on the part of the interviewer. Interviews are well suited to exploratory studies in which the evaluator does not yet know in detail what he is looking for.

(b) *Objective evaluation methods* are also known as observational methods (Macleod 1992), which involve real people using working systems. They are based on user's observation and interacting with the system and can range from being almost entirely informal to highly structured tasks. In these methods, user performance will be measured by having a group of test users performing a predefined set of test tasks while collecting time and data. Some of the examples are:

- i. *Direct observation* is suitable if the system is fully implemented and in its natural work setting.
- ii. *Video recording* allows data to be separated from analysis and can yield tremendous details. Time is required to analyze the data recorded.
- iii. *Interaction monitoring*, is automatically gathering data about how people interact with the system.
- iv. *Co-operative evaluation*, in which the observer (evaluator) asks questions of the user during performance of a task, for example when the user is encountering a problem, but not providing a comment. Alternatively the observer asks the users retrospectively what they have done to avoid interfering with the way people work.
- v. *Thinking aloud method*, in which users comment on the system as they use it. This method may seem artificial to the users and some test users have difficulties keeping up with their comments as they use the system.
- vi. *Constructive interaction method*, in which two users work together on a task and 'tell' each other about what they are feeling, doing or intending to do etc. This is more 'natural' than when simply thinking aloud.

(c) *Expert evaluation methods*, which are drawn upon expert knowledge to make judgments about the usability of the system for specific end-users and tasks. These methods lie between subjective evaluation methods and objective ones. They are subjective because expert examines and answers questions according to his own personal assessment. They are also objective because the examination criteria are based on clear test rules and criteria. The examples include:

- i. *Usability Inspection methods* introduced by Nielsen and Mark (1994) in which the evaluation of the user interface is based on the considered judgment of the inspectors. Usability inspectors can be usability experts, software designers with special expertise or end-users with content or task knowledge.
- ii. *Specialist reports and expert walkthrough*. The 'specialist reports' represent a long established, loosely defined way of evaluating the usability of a system. It is based on the expertise of the experts in imagining how the system will match the abilities and preferences of the intended users. The expert walkthrough is a variation of the specialist report but is more methodological.
- iii. *Cognitive walkthrough* is a method which attempts to introduce psychological theory into the informal and subjective walkthrough technique. It is based on the theory of learning by exploration and on modern research in problem solving (Wharton et al. 1994).

- iv. *Checklists, guidelines and principles (heuristics)*. Checklists are popular because they can be applied in an easy way however, expert knowledge is needed to answer questions and to interpret results. Guidelines tend to be system or platform specific. Usability principles are statements that involve issues affecting usability. They can provide a useful framework for structuring the questions on a checklist. For example, the 'heuristic evaluation' developed by Jakob Nielsen and Rolf Molich (1990) derived ten usability heuristics from a factor analysis of 249 usability problems. These heuristics can be used by a small group of evaluators to evaluate a user interface. Several evaluators independently critique the system to come up with potential usability problems.\

7. DATA COLLECTION TOOL

There are many data collection tool for conducting survey including the following:

- i. *Census*, a tool where data is collected from every unit in a group or population.
- ii. *Sample Survey* is a type where part of population is approached for data collection.
- iii. *Administrative data*, collected as a result of an organization's day-to-day operations, e.g. data on enrolment.

Qualitatively data can be gathered in a variety of ways as given below:

- i. *Questionnaires*, series of questions can be prepared for the purpose of gathering information from respondents
- ii. *Interviews*: Conversation between two or more people where questions are asked by the interviewer to obtain information from the interviewee(s)
- iii. *Focus groups*, a group of people are asked about their attitude towards a product, service, concept, and idea.
- iv. *Observation*: A group or single learners can be asked to perform a specific task or action.

A qualitative questionnaire was designed based on Nielsen' ten heuristics principles (as shown below) and conducted a survey to identify the usability problems in publishers website's user interfaces. The ten heuristics principles (Nielsen's (1992) are:

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error Prevention & Correction
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design

9. Help the users in recognizing, diagnosing and recovering from errors
10. Help and documentation.

Along with the ten heuristics principles, some general questions were added to find out the user experience and perception of visual and presentation style, navigation and interactivity, advertizing etc.

8. GENERAL USABILITY OF PUBLISHERS WEBSITES

The publisher's websites contained many other features, these facilities were found in the general evaluation, other than English, French, and German, Spanish and Hindi was found. French topped with 63.04% of respondents. The level of interactivity rate was found medium by 61.59 % of respondents. Publishers' websites provided various links to the users to follow through various highly used social networking sites like FaceBook, YouTube, Twitter, Flicker and RSS feeds.

8.1 Users feedback on publishers' websites

Generally, users found Publishers websites to be highly integrative, easy and quick to access. They accept the interaction and indicated that websites are convenient. At the end of the general questions, the respondents were asked to rate the publishers websites. Overall 52.17% of them rated 'Good', followed by Very good (30%). The areas of concern are that users found websites to be unfriendly because of the lack of online help and feedback, difficulty in navigating etc.

9. CONCLUSIONS AND RECOMMENDATIONS

The implementation of Heuristic Evaluation by Nielsen and Molich (1990) is a bold and perfect method of usability evaluation whereas an analyst finds usability problems by checking the user interface against a set of supplied heuristics or principles. These evaluation methods have proved to be very much beneficial because of its simplicity which is now widely taught and practiced in the new media sector, where user interfaces are often designed in a short space of time and budget that may restrict the amount of money available to provide for other types of interface testing. There are strengths that websites can rely on and weaknesses that need to address. Problems need to be looked into, so that a set of recommendations can be formulated and incorporated into future designing of websites.

9.1 Users attitudes and perception towards the publishers' websites

Overall, the respondents found the publisher websites used natural language throughout the system and the use of technical jargon is kept to a minimum. The layout is pleasant, clean and minimal in design. Colors, conventions and icons are applied consistently across the web pages. They also found it easy to recognize and use the graphical menus and text buttons that were available. In addition, web pages contained only relevant and adequate information. These factors make the user interface more friendly and natural.

Negative comments of the respondents including the websites did not provide frequent feedback to keep users informed about what is going on. In addition, the feedback given was not appropriate and useful. In fact, less than half of the users (48.9%) felt that the publisher did not inform users when it detected an error. Instructions for using websites were also not visible. Users control features were missing and help messages on display seldom pinpoint the exact problem and do not suggest solutions to deal with the problem. Moreover, WebPages does not exhibit much flexibility and efficiency of use. There were no 'accelerators or shortcuts' in some websites and frequent actions could not be customized in the interface.

9.2 Common problems faced by users with the publishers websites

Some of the common problems encountered by users are slow loading and difficulty due to poor feedback and help functions, navigability problems and lack of control features. A fifth (20.5%) of the users (18 users) felt that the instructions were not visible. Also about 39-40% of the users felt that user control features were missing.

9.3 Recommendations to improve the websites

Based on respondents perceptions with regard to the Nielsen's (1990) ten heuristic evaluation principles, the following recommendations are made for improving the publisher websites user interfaces:

- (a) The publishers' websites needs to increase the visibility of the system status.
- (b) Increase the user control and freedom as the users felt that user's control features were missing. Some navigability buttons are restrictive.
- (c) The websites need to be more error preventive and should correct the error automatically
- (d) Provide more online help documentation and more detailed help to users.
- (e) Provision in the system to suggest solutions when users encountered errors.

Other future trends that can be incorporated into the publishers websites retrieval techniques; enhanced records including additional controlled and uncontrolled access points; acceptance of search expressions of books and titles in natural language, with facilities for using a dictionary to provide for abbreviations, synonyms or spelling variants; provision of context-dependent automatic help; using terms from relevant records retrieved to enhance the search strategy; and displaying the most relevant records first.

9.4 Suggestions

There are several limitations to this study however; these limitations can also serve as opportunities for further research work. This present research work does not attempt to evaluate the services, the background, and the revenue of the publishing company except the usability of user interfaces. To measure those parameters perhaps such studies can be conducted in future.

This present research work does not go to compare the ten book publishers' websites that have been selected. It does not look into the finding of best publishers' website rather it attempts to find the usability. In such cases research study can be conducted by applying the ten principles of heuristic evaluation (Nielsen 1990). The above issues are recommended for future studies so as to provide greater and wider area of scope to evaluate book publishers and many other websites.

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