Developing Evaluation Matrix of Digital Library Interface by Analyzing Bloopers of Korean National Digital Library Sites

Miah Kam, Jee Yeon Lee
Department of Library and Information Science
Yonsei University
Seoul, South Korea
makiyma@hanmail.net, jlee01@yonsei.ac.kr

***Abstract*— The importance of digital libraries is increasing with the advancement and proliferation of networked online services. This work in progress focuses on developing an evaluation model for analyzing the real-world cases. Firstly, the web bloopers of the Korean digital libraries were identified, then heuristic evaluations were applied to categorize the bloopers into five types, which occur in three main components of the digital libraries. The resulting evaluation matrix consists of one axis for the web blooper types and the other for the digital library components. Each matrix cell has different weighting derived from the heuristic evaluation of the digital libraries in service. Digital library developers, managers, and subject matter experts should be able to consult the evaluation matrix to improve the usability and accessibility of their libraries. Our digital library evaluation matrix, based on the heuristic evaluation model, should raise the efficiency of digital library user interface evaluation.**

Keywords-Digital Library User Interface; Library Service Components; Web Bloopers; Heuristic Evaluation; Evaluation Matrix.

I. INTRODUCTION

The advancement of information technology enabled ordinary people to browse and access online library resources with ease. This new mode of access caused fundamental changes in library user behavior.

Users often visited physical libraries to get the information they needed, but today, more users with information technology exposures, initially access digital libraries before visiting physical libraries [1][2][3]. In addition to many obvious advantages, the ubiquitous access to digital libraries reinforced its use and importance as a *de facto* source of information.

Previous studies found usability, especially interface usability, to be one of most important factors in understanding user satisfaction with digital libraries. Xie [4] found that 'interface usability' was the most important factor in assessing digital library user satisfaction. Hernon and Calvert [5] also claimed that 'ease of use' was one of the most significant factors in measuring e-service quality.

Indeed, many digital library-related studies focused their research on the user interface aspect of libraries, such as Liew [6]. Hariri and Norouzi [7] classified digital library-related topics into 3 groups: (1) user interface and digital libraries, (2) digital libraries and usability, and (3) other studies related to user interface. However, these studies did not provide concrete guideline on how to develop or improve the digital library interfaces. To fill this gap, our aim is to develop a digital library blooper matrix that can be applied easily by practitioners to improve the interfaces of their digital libraries.

The term *blooper*, which refers to a silly mistake, was introduced by Jeff Johnson [8] in 2000 to describe his finding of problematic user interfaces. He conceptualized the Graphical User Interface (GUI) and web bloopers as mistakes, that are committed frequently in designing the interface and consequently influence usability. Web bloopers are often used as a checklist, which guides what not to do in detail and helps managers to improve interface efficiently and effectively. Web bloopers are closely related to the heuristics evaluation method, which was introduced by Nielsen and Molich [9]. Both methods use a checklist to identify usability problems. The heuristics evaluation method is "a method of reviewing the usability of software to find potential problems. Reviewers go through the software systematically with a list of UI design guidelines in hand, noting places where the software's UI violates the guidelines" [8]. Web bloopers show real-world examples of what not to do in the interfaces and, thus, it is possible to simulate the heuristics evaluation by counting how many problematic features exist.

The concept of web bloopers has not yet been fully examined in the academic community, although this concept has great research potential. Only some studies mention web bloopers [10][11], because this concept is firstly written for the practitioner's community. It is difficult to find digital library related studies that use web blooper related ideas to either evaluate or implement the interfaces. Thus, our work in progress attempts to determine whether the use of web bloopers can effectively improve digital library user interfaces.

The Korean digital libraries became more accessible and interactive for users with the advancement of the digital information technology. Although digital libraries place greater concern on the searching and full-text viewing related problems than other web services, libraries share many common usability requirements with other services. In this study, the practical notion of web bloopers was combined

 ISBN: 978-1-61208-382-7

with the examination of the digital library specific usability issues to evaluate the Korean digital libraries' interfaces.

The aims and method of this research are as follows. Firstly, we inductively generate web blooper types and digital library components by analyzing the operational Korean national digital libraries such as 'Dibrary of the National Library of Korea', 'The National Assembly Digital Library' and 'The National Library for Children and Young Adults'. Secondly, we develop a digital library blooper matrix with the web blooper types and digital library components. Finally, we develop a digital library user interface evaluation matrix based on the heuristics evaluation.

In Section II, five cases of the actual web bloopers were shown. In Section III, we discovered bloopers and components which are divided into two axes. In Section IV, we developed an evaluation matrix by using the evaluation model and assigning weightings. Finally, in Section V, we concluded this work to show contributions, applicable area, limitations and potential future works.

II. CASE ANALYSIS

Three Korean national digital library sites were analyzed and over 260 web bloopers were found. The web bloopers were categorized into five groups according to their characteristics considering simplicity of errors, the amount of information and convenience of use. This categorization were used to evaluate usability regarding user interface design.

A. Case 1 - User Support and Purpose of Operation

The blooper shown in Figure 1 was from the Online Archiving & Searching Internet Sources (OASIS) [12] site of the National Library of Korea. This site behaves differently for different web browsers. The 'Back' button does not work when viewing the site via Internet Explorer (IE): however, it works when viewing via Google Chrome. This kind of inconsistency is an example of what can go wrong in the 'general website' component of the digital libraries.

Figure 1. A web blooper of 'User Support and Purpose of Operation'.

B. Case 2 – System Menu and Navigation

The blooper shown in Figure 2 was found in the Government General Gazette of the Chosun [13] site of the National Library of Korea. Selection of one of the search results did not always produce the expected outcome. Unselected results sometimes showed up or nothing showed up at all. This can be regarded as a navigation problem and an example of what can go wrong in the full-text viewing component of digital libraries.

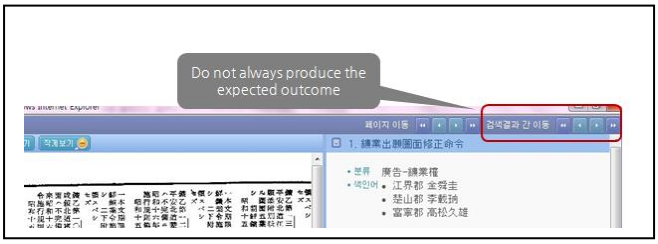

Figure 2. A web blooper of 'System Menu and Navigation'.

C. Case 3 - Motion and Interaction

This web blooper of Figure 3 occurred in the Dibrary [14], which is the digital library for the National Library of Korea. There was a problem with the checkboxes, which limited the search scope to a specific resource type. The checkboxes were under the main search menu. It was not possible to uncheck the boxes unless the user selected another checkbox. This probably occurred as the checkboxes were implemented as radio buttons. This problem occurred in the 'general website' component.

Figure 3. A web blooper of 'Motion and Interaction'.

D. Case 4 - Information Provision

The case in Figure 4 was also gathered from the Dibrary [14] site. In the federated search, which targeted resources on other sites, only the top five results were shown for each site. To see the lower ranked results, users had to go to the corresponding external site. This problem was categorized to occur in the 'searching and search results' component.

Figure 4. A web blooper of 'Information Provision'.

 ISBN: 978-1-61208-382-7

E. Case 5 - Visual design

The web blooper shown in Figure 5 was yet another case from the Dibrary [14] site. For the subject category search, it was difficult to tell which one was selected, as none of the icons or the font colors of descriptions' changed, even when the user's mouse pointer was on a specific subject description. This was a visual design problem, and it occurred in 'searching and search results' component.

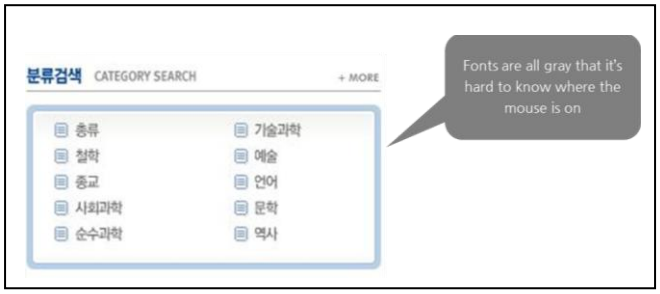

Figure 5. A web blooper of 'Visual design'.

There are also various other cases of web bloopers on Korean national digital library sites. By categorizing these bloopers and identifying corresponding digital library components where the bloopers were found, an evaluation matrix with two axes was developed.

III. DISCOVERING BLOOPERS AND COMPONENTS

A. Axis 1 – Bloopers Types

Based on the analysis of the discovered bloopers, the bloopers were categorized into five types: 1) User Support and Purpose of Operation, 2) System Menu and Navigation, 3) Motion and Interaction, 4) Information Provision, and 5) Visual Design. These types are similar to the ones used by Jeff Johnson [15][16]. Each type in turn was further divided to reflect the finer understanding of the bloopers. A brief description of five blooper types and the further divided sub types are as follows:

1) User Support and Purpose of Operation: supporting users, language, customization and browser;

2) System Menu and Navigation: clearance of navigation, structure and location path;

3) Motion and Interaction: matter of overlapped link, link motion, form, loading speed, system feedback;

4) Information Provision: related to relative link, consistency, relevance, recency, and understandability; and

5) Visual Design: icon, color, image, font and layout.

B. Axis 2 – Digital Library Components

By conducting a literature review [15][16] and analyzing ten prominent websites of libraries and information centers, three digital library components were identified: 1) general website, 2) full-text viewer, and 3) searching and search results.

IV. DEVELOPING EVALUATION MATRIX

A. Evaluation Model

The resulting matrix of Table 1 consists of five blooper types (22 subtypes) and three library components. The second and third stages of Jakob Nielsen's Heuristic Evaluation [17] were used to develop a weighted evaluation table. The five phases of Heuristic Evaluation were: 1) pre-evaluation training: give evaluators needed domain knowledge and information on the scenario, 2) evaluation: individuals evaluate user interface and make a list of problems, 3) severity rating: determine how severe each problem is, 4) aggregation: group meets and aggregates rating, and 5) debriefing: discuss the outcome with the design team.

TABLE I. WEIGHTED BLOOPER EVALUATION MATRIX OF DIGITAL LIBRARY INTERFACE.

		Digital Library Components(DLC)		
Blooper Type	***Blooper Subtype***	***DLC 1)[a]***	***DLC 2)[b]***	***DLC 3)[c]***
Type 1) User Support and Purpose of Operation	1)-1 : Users			
	1)-2: Language			
	1)-3: Customizing			
	1)-4 : Browser			
Type 2) System Menu and Navigation	2)-1 : Navigation			
	2)-2 : Structure			
	2)-3 : Location path			
Type 3) Motion and Interaction	3)-1 : Overlapped link			
	3)-2 : Link motion			
	3)-3 : Form			
	3)-4 : Loading speed			
	3)-5 : System feedback			
Type 4) Information Provision	4)-1 : Relative link			
	4)-2 : Consistency			
	4)-3 : Relevance			
	4)-4 : Recency			
	4)-5: Understandabability			
Type 5) Visual Design	5)-1 : Icon			
	5)-2 : Color			
	5)-3 : Image			
	5)-4 : Font			
	5)-5 : Layout			

a. Digital Library Component 1), General website
b. Digital Library Component 2), Full-text viewer
c. Digital Library Component 3), Searching and search results

 ISBN: 978-1-61208-382-7

B. Weights

Each cell is colored differently to show different weights. The weights were assigned not just by counting the frequency of specific bloopers but also to reflect the needs of digital library sites. This should allow evaluators to refer to the matrix easily and efficiently when evaluating the interfaces. There are three levels in weighting. The most frequently occurring blooper types in a component with high importance are dark colored. The problem, which occurs on this level, should be fixed as soon as possible. Light gray-colored cells refer to less serious problems but with higher frequency of occurrence than the white-colored cells. The white-colored cells refer to general bloopers with lesser impact on the interface's usability than the light gray ones. In summary, these weightings was assigned by considering the seriousness of each observed example. The resulting matrix is as shown in Table 1.

V. CONCLUSTIONS AND FURTHER WORK

A. Contribution

The evaluation matrix should be used for assessing the usability of the digital library interfaces. As the matrix was developed by analyzing the sites in service, it should be also applicable to the real-world cases by the developers and managers of the digital libraries.

Most of the existing web bloopers were about general web sites and no special attention was paid to the particularities of the digital libraries. Thus, our digital library-specific evaluation matrix based on the heuristic evaluation model should raise the efficiency of digital library user interface evaluation.

B. Applicable area

The evaluation matrix can also be used as an evaluation tool of various general websites. Although the development started with the national digital library sites, this matrix should be applicable in various areas, because it is composed with combinations of essential elements of websites and critical web bloopers. This can be used in evaluating web sites such as search engines, and educational websites which need to be checked continuously to ensure the usability.

C. Limitations & future work

Although it was possible to find 260 web bloopers, the resulting evaluation matrix was only based on three Korean national digital libraries. Thus, it is not possible for us to claim strong reliability of the research outcome. Thus, additional digital libraries, especially in countries other than Korea, will be analyzed to augment the current evaluation matrix.

The resulting evaluation matrix with one axis of five web bloopers types and the other of three digital library components makes 15 cells and 66 cells when we further categorized the blooper types. In the future, each digital library component will be re-examined to check the benefit of further dividing each component. In addition, examples and explanations will be added to each cell to further assist the users of the evaluation matrix.

REFERENCES

[1] S. Joo, J. Lee, "Measuring the usability of academic digital libraries: Instrument development and validation," The Electronic Library, vol. 29 issue 4, 2010, pp. 523-537.

[2] I. Xie, "Users' evaluation of digital libraries (DLs): Their uses, their criteria, and their assessment," Information Processing and Mangement, vol. 44, 2008, pp. 1346-1373.

[3] J. Hwang and E. Lee, "Development of service quality measurement model and index for digital libraries", Journal of Korean Library and Information Science Society, vol. 41 issue 1, March. 2010, pp. 121-147.

[4] I. Xie, "Evaluation of digital libraries", Library & Information Science Research, vol. 28, 2006, pp. 433-452.

[5] P. Hernon and T. Calvert, "E-service quality in libraries: Exploring its features and dimensions", Library & Information Science Research, vol. 27 issue 3, 2005, pp. 377–404.

[6] C. L. Liew, "Cross-cultural design and usability of a digital library supporting access to Maori cultural heritage resources," Victoria University of Wellington: New Zealand, 2008.

[7] N. Hariri and Y. Norouzi, "Determining evaluation criteria for digital libraries' user interface: a review", The Electronic Library, vol. 29 issue 5, 2011, pp. 698-722.

[8] J. Johnson, "GUI Bloopers: Don'ts and do's for software developers and web designers," San Francisco, CA: Morgan Kaufmann Publishers, 2000.

[9] J. Nielsen and R. Molich, "Heuristic evaluation of user interfaces," In Proceedings of ACM CHI'90 Conference on Human Factors in Computing Systems, 1990, pp. 249-256.

[10] J. Cappel James and Z. Huang, "A usability analysis of company websites," Journal of Computer Information Systems, vol. 48 issue 1, September. 2007, pp.117-123.

[11] M. Shelstad, "Content matters: analysis of a website redesign", OCLC Systems & Services, vol. 21 issue 3, 2005, pp. 209-225.

[12] OASIS, <http://www.oasis.go.kr/ctrlu?cmd=main> 2014.12.28

[13] Government General Gazette of Chosun, <http://gb.nl.go.kr> 2014.12.28

[14] Dibrary, <http://www.dibrary.net> 2014.12.28

[15] J. Johnson, "Web bloopers: 60 common web design mistakes, and how to avoid them," Morgan Kaufmann; 1 edition, April. 2003.

[16] J. Johnson, "GUI Bloopers 2.0, second edition: common user interface design don'ts and dos," San Francisco, CA: Morgan Kaufmann Publishers; 2nd edition, September. 2007.

[17] J. Nielsen, "Heuristic evaluation," in Nielsen, J. and Mack, R. L, Eds. New York: John Wiley and Sons, 1994.

 ISBN: 978-1-61208-382-7