Is Interactivity Important in Information Literacy Tutorial Sites? Comparison Between Highly-Rated and Randomly-Selected Online Tutorials

HyunSeung Koh
Susan C. Herring
School of Library and Information Science
Indiana University, Bloomington
United States
{hskoh,herring}@indiana.edu

Abstract: Online information literacy tutorials are potentially useful tools to facilitate the learning of information literacy skills. Interactivity has been identified as a key element in Web-based learning (Chou, 2003). In this study, 20 highly-rated tutorial sites and 20 randomly-selected tutorial sites were content analyzed for the presence of 36 interactivity features, to test the hypothesis that highly-rated sites would be more interactive. Few differences were found between the two categories of sites; moreover, the information literacy sites displayed little 'Learner-learner' interactivity overall. These results have implications for librarians who design tutorial sites and committees who evaluate tutorial sites, and suggest a need for greater collaboration between educators and librarians in designing online information literacy learning materials.

Introduction

Information literacy is a critical issue in the Information Age, because it is a skill that is directly related to "the success of lifelong learning, employment, and daily interpersonal communication" (Lau, 2006, p. 1). Online information literacy tutorials can be useful tools to facilitate the learning of information literacy skills. In particular, such tutorials can leverage the interactive potential of the Web, while at the same time allowing users to learn independently and at their own pace. Indeed, interactivity has been identified as one of the most important elements in Web-based learning (Chou, 2003). Therefore, it is relevant to examine the interactivity of online information literacy tutorial sites.

The purpose of this study is to examine the status of interactivity in current online information literacy tutorial sites by comparing sites that are highly rated by information experts with randomly-selected information literacy tutorial sites. We do this by conducting a content analysis that adapts the interactivity criteria identified by Chou (2003) for learning contexts to information literacy tutorials. More generally, the results of the study are intended to provide librarians who design online information literacy tutorial sites with insights into further design directions as regards interactivity. In addition, they may provide committees that establish the evaluation criteria for online information literacy tutorial sites with insights that lead them to refine their criteria.

Literature Review

A number of studies have examined the usefulness and effectiveness of online information literacy tutorials (Lindsay, et al. 2006; Noe & Bishop, 2005; Viggiano, 2004; Wade, n.d). However, even though the importance of interactivity in Web-based library instruction has received much attention (Dewald, 1999b), there is a lack of studies that focus on the interactivity of information literacy tutorials. Some studies have suggested future directions for enhancing the interactivity of online information literacy tutorials by incorporating other communications technologies, such as a real-time synchronous chat facility (Orr & Wallin, 2001). However, to our knowledge, no research has yet examined the current status of interactivity in information literacy tutorials.

Research Questions and Hypotheses

In order to address the issues raised in the previous section, this study posed the following question:

RQ1:   What differences in interactivity, if any, are there between highly-rated and randomly-selected online information literacy tutorial sites currently available on the World Wide Web?

By comparing interactivity in highly-rated sites with interactivity in randomly-selected sites, well- and/or poorly-implemented interactive features from the two categories may be identified. Such findings could be useful guidelines for re-examining and developing future directions in information literacy tutorial site design.

Related to this question, we developed three hypotheses. Specifically, because interactivity has been identified as one of the most important elements in Web-based learning, we hypothesized that highly-rated tutorial sites will have more interactive features, as articulated in Hypothesis 1.

H1:   Highly-rated online information literacy tutorial sites will have more interactive features than will randomly-selected online information literacy tutorials sites.

Hypothesis 2 was established based on the assumption that human-to-human interactivity is one of the most important types of interactivity in overcoming the disadvantages of online tutorials, because it helps to "bridge the physical and psychological gap that occurs in online courses" (Chute, et al. 1999; Durrington, et al., 2006). Thus, highly-rated tutorial sites should have more human-to-human types of interaction ('Learner-instructor' and 'Learner-learner' interaction, in Chou's [2003] model) and more interactive functions that belong to the human-to-human type of interaction, whereas randomly-selected tutorial sites should be less likely to do so. More generally,

H2:   The predominant interactive features will be different in highly-rated and randomly-selected online information literacy tutorial sites.

Hypothesis 3 was established based on the assumption that the highly-rated information tutorial sites will take into account all possible types of interaction that could occur among the three categories of participants in an online tutorial: 'Learners', 'Instructor', and 'Tutorials'.

H3:   Highly-rated online information literacy tutorial sites will use all types of interaction, whereas randomly-selected online information literacy tutorial sites will be less likely to do so.

Data and Sampling

The highly-rated online information literacy tutorial sites were selected from the ACRL PRIMO (Peer-Reviewed Instructional Materials Online) database (PRIMO, n.d.). The Association of College & Research Libraries (ACRL) is a division of the American Library Association (ALA), which is "the oldest and largest library association in the world" (ALA, n.d.). All sites in the PRIMO database are peer-reviewed instructional materials created by librarians, and were selected by the PRIMO committee using eight selection criteria (see http://www.ala.org/ala/acrlbucket/is/iscommittees/webpages/emergingtech/primo/criteria.htm).

As of October 22, 2006, the PRIMO database contained a total of 130 records. All 33 tutorial sites that met the generally used definition of information literacy were manually selected from the 130 records. The generally used definition of information comes from the 2006 Guidelines on Information Literacy for Lifelong Learning by Jesús Lau, chair of the Information Literacy Section of the International Federations of Library Associations and Institutions (IFLA). This definition states, "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (Lau, 2006, p. 7). Therefore, the three major activities of 'locating,' 'evaluating,' and 'using' information must be addressed in a tutorial site in order for it to be included in the sample. From the 33 tutorial sites that met these criteria, 20 sites were randomly selected using a true-random integer number generator (Random.org, n.d.).

For better comparison between the PRIMO tutorial sites and the NON-PRIMO tutorial sites, the number of NON-PRIMO tutorial sites was the same as the number of PRIMO tutorial sites selected. Both sets of sites were selected on one day (October 24, 2006).

In order to select comparable tutorial sites that were not included in the PRIMO database, all keywords already assigned by PRIMO for the 20 PRIMO tutorial sites selected were taken first, along with the keyword 'information literacy,' which was commonly assigned throughout the 20 sites. In addition, the word 'tutorial' was added to 'information literacy' in order to avoid obtaining too many sites unrelated to the focus of this study. A total of 271 search results were obtained through a Yahoo advanced search (information literacy tutorial in the title of the page). Initially, every fifth result was systematically selected and examined. Later, every third result was selected and examined, because 20 tutorial sites that meet the purpose of this study were not obtained through the first selection. The examination criteria were as follows: 1) Does the site contain the three major activities of information literacy?; 2) Is the site not in the PRIMO database?; and 3) Is the site design not obviously based on a PRIMO tutorial site?

Analytical Methods

A content analysis of the 20 highly-rated online information literacy tutorial sites and the 20 randomly-selected online information literacy tutorial sites was conducted using Chou's (2003) framework for interaction type, interactivity dimensions, and interactive functions in Web-based learning systems. The contents of the entire site were analyzed, because interactivity features may be present throughout the site, and the total number of pages in information literacy tutorial sites is not large relative to other types of website.

Chou's framework (2003) was selected for use in this study for three reasons: 1) online information literacy tutorials are a type of Web-based learning system; 2) the framework was developed based on a review of previous literature from diverse perspectives, such as interactivity in communication technology, interactivity in computer-assisted instruction, interactivity in distance learning, and interactivity for Web systems; and 3) its 36 individual interactive functions are well defined.

Chou's technical framework (2003) consists of 4 *types* of interaction (Learner-interface, Learner-Content, Learner-Instructor, Learner-Learner), 9 *dimensions* of interactivity (e.g., Choice, Non-sequential access of choice, Responsiveness to learner, Monitoring information use, Personal choice helper, Adaptability, Playfulness) and 36 interactive *functions* (e.g., Fixed-frame design, Site map, Keyword search). The 36 interactive functions comprised the coding categories of this study.

The presence or absence of the 36 interactive functions was coded at all levels of content in both categories of information literacy tutorial. If an interactive function was present, it was coded with 1; otherwise, it was coded with 0. This coding method is borrowed from Ha and James (1998), who use it to code the interactivity dimensions of 'Playfulness' and 'Choice.'

Results

Total Number of Interactive Functions

Table 1 shows the total number of interactive functions aggregated from the 20 individual PRIMO sites and the 20 individual NON-PRIMO sites. For example, the total number of 43 means that 43 interactive functions of the 'Learner-interface' type of interaction were present in the 20 PRIMO sites.

Types of interaction	Interactive functions	20 PRIMO sites	20 NON-PRIMO sites
Learner-interface	9 functions (1 – 9)	43	39
Learner-content	16 functions (10 – 25)	102	106
Learner-instructor	7 functions (26 – 32)	**40**	**23**
Learner-learner	4 functions (33 – 36)	5	4
Total		190	172

Table 1: Number of interactive functions of each type manifested in the tutorial sites.

The results of an independent-sample T-test conducted using SPSS show that the difference for 'Learner-instructor' between the 20 PRIMO sites and the 20 NON-PRIMO sites is significant, whereas the differences for the three other types of interaction between the two categories of site are non-significant. In addition, the results of independent-sample T-tests show that the differences for the 36 interactive functions between the 20 PRIMO sites and the 20 NON-PRIMO sites are all non-significant.

Predominant Types of Interaction

In order to compare the four types of interaction that include different numbers of interactive functions in the 20 PRIMO sites and in the 20 NON-PRIMO sites and identify the predominant type of interaction, the total number of interactive functions that were present in each type of interaction was divided by the total number of possible functions that could appear in the 20 PRIMO sites and in the 20 NON-PRIMO sites and shown in Table 2.

Types of interaction	Interactive functions	20 PRIMO sites	20 NON-PRIMO sites
Learner-interface	9 functions (1 – 9)	**0.24 = 43/180**	**0.22 = 39/180**
Learner-content	16 functions (10 – 25)	**0.32 = 102/320**	**0.33 = 106/320**
Human-to-computer interaction		0.29 = 145/500	0.29 = 145/500
Learner-instructor	7 functions (26 – 32)	**0.29 = 40/140**	**0.16 = 23/140**
Learner-learner	4 functions (33 – 36)	0.06 = 5/80	0.05 = 4/80
Human-to-human interaction		0.20 = 45/220	0.12 = 27/220

Table 2: The total number of interactive functions that are present in each type of interaction in the 20 tutorial sites divided by the total number of possible functions that could appear in the 20 tutorial sites.

The results of a one-sample T-test in SPSS show that the differences between 'Learner-interface,' 'Learner-content,' and 'Learner-instructor' in the 20 PRIMO sites and in the 20 NON-PRIMO sites are significant, whereas the differences between 'Learner-learner' and the other types in the 20 PRIMO sites and in the 20 NON-PRIMO sites are non-significant.

Predominant Interactive Functions

In order to compare the 36 interactive functions in the PRIMO and the NON-PRIMO sites and identify the predominant interactive functions, a one-sample T-test was conducted. Table 3 shows the total number of interactive functions whose differences are statistically significant, excluding the interactive functions whose differences are non-significant.

Type of Interaction	Interactive functions	PRIMO sites	Interactive functions	NON-PRIMO sites
Learner-interface	1. Fixed-frame design	18	1. Fixed-frame design	20
Learner-content	10. Links to related education sites	18	10. Links to related education sites	18
	11. Links to related learning materials	18	11. Links to related learning materials	17
	12. Multimedia presentation	13	12. Multimedia presentation	17
	19. On-line help on content	13	13. Online quiz for self-evaluation	16
	20. User guidance on system	13	20. User guidance in system	14
	13. Online quiz for self-evaluation	10	21. Study guidance	13
	21. Study guidance	8		
Learner-instructor	26. Email to instructors	16	26. Email to instructor	9
	32. Comments on the sites, etc	8		
	27. Email to Web master	7		
	29. Chatroom	7		

Table 3: Number of interactive functions present in the tutorial sites.

Discussion

H1: Highly-rated online information literacy tutorial sites will have more interactive features than will randomly-selected online information literacy tutorials sites.

Overall, this hypothesis was not supported. However, Table 1 above shows that highly-rated tutorial sites have more interactive features of the 'Learner-instructor' type than do randomly-selected tutorial sites, whereas there are no significant differences in 'Learner-interface,' 'Learner-content,' and 'Learner-learner' interactivity between highly-rated and randomly-selected tutorial sites. This suggests that highly-rated online information literacy tutorial sites make more effort to overcome one of the disadvantages of online tutorials—the difficulty for the instructor to provide immediate responses to students' questions—than do randomly-selected online information literacy tutorial sites. This is supported by the fact that 'Email to instructors', 'Chatrooms (Learner to Instructor)', 'Comments on the sites, course, instructor, etc.' are the three interactive functions that highly-rated information literacy tutorial sites have more of than do randomly-selected information literacy tutorial sites.

It was found by means of a T-test that there are no significant differences for any of the 36 interactive functions between highly-rated and randomly-selected tutorial sites. However, the PRIMO sites had fewer interactive functions than did the NON-PRIMO sites in terms of 'Multimedia presentation,' 'Online quiz for self evaluation,' and 'Study Guidance/Feedback.' This tendency runs contrary to our hypotheses, and it is inconsistent with PRIMO selection criterion #7, which notes the importance of use of graphics and interactive elements such as programmed feedback. However, it is possible that this tendency was due to chance, because the sample size was relatively small.

H2: The predominant interactive features will be different in highly-rated and randomly-selected online information literacy tutorial sites.

This hypothesis was not supported. Table 2 above shows that the most predominant type of interaction in both the highly-rated and randomly-selected tutorial sites was 'Learner-content.' Notably, this is not a type of human-to-human interaction. In addition, it was seen in Table 3 that the three top predominant interactive functions in both categories of tutorial site are 'Fixed-frame design', 'Link to related education sites,' and 'Link to learning materials', which do not belong to either the 'Learner-instructor' or 'Learner-learner' interaction types.

This result suggests that human-to-human interaction features are not the highest priority in either the highly-rated tutorial sites or the randomly-selected tutorial sites. However, the 'Learner-instructor' type of interaction and 'Email to instructor' are the second most predominant type of interaction and the second most predominant interactive function, respectively.

H3: The highly-rated online information literacy tutorial sites will use all types of interaction, whereas the randomly-selected online information literacy tutorial sites will be less likely to do so.

This hypothesis was not supported; however, the results indicated a consistent pattern. As shown in Table 2 above, both highly-rated and randomly-selected tutorial sites manifest three types of interaction (Learner-interface, Learner-content, and Learner-instructor), whereas both rarely use the Learner-learner type of interaction.

The results suggest that neither the highly-rated nor randomly-selected online information literacy tutorial sites seem to take into account the importance of collaborative learning among learners, which is one characteristic of good library instruction (Dewald, 1999a).

Conclusion

The results of this analysis revealed few differences between highly-rated and randomly-selected online tutorial sites in terms of frequency or type of interactive functions. This suggests, somewhat surprisingly, that interactivity is not a major criterion according to which PRIMO rates information literacy tutorial sites. Even more surprising, Learner-learner interaction in both categories of information literacy tutorial sites is almost entirely missing. This is surprising because there is no obvious reason why online information literacy tutorial sites should not take advantage of peer learning.

These findings could help practitioners to confirm or redirect their current direction as regards the design and evaluation of online information literacy tutorials. One future design and evaluation direction might be that

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more human-to-human interactive features, in particular 'Learner-learner' types of interaction, could be included. This could benefit the users of such tutorial sites by providing peer feedback and enhanced motivation for learning. More generally, information literacy tutorials designed by librarians are important Web-based learning systems. Thus, it might be meaningful for librarians and educators to work together more closely and share frameworks found to be useful in order to facilitate online learners' learning processes.

This study is limited by the fact that Chou's framework was not established in consideration of the special context of information literacy tutorials, which are different from semester-long courses (Dewald, 1999b), nor does it include a complete set of interactive features. Furthermore, only one source was used for selecting each sample, the PRIMO database for highly-rated tutorial sites and Yahoo! for randomly-selected tutorial sites. A broader sample analyzed using a different set of interactivity features might produce somewhat different results.

Future research should collect information literacy tutorial sites highly rated by librarians and tutorial sites highly rated by educators from diverse sources and compare the two sets of sites from perspectives in addition to interactivity, in order to identify similarities and differences and establish the best frameworks for the design and evaluation of tutorial sites.

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