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Feature Requirements in Educational Web Sites: A Q-Sort Analysis

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INTRODUCTION

There is relative paucity of original research that explains phenomena related to usability of educational websites. Educational websites can be used to provide web-based instruction, which itself is a relatively recent phenomenon and research in this area is in its infancy. Educational websites are built with a different set of criteria as compared to other sites, such as those having an e-commerce or marketing focus. More research is needed to build a theoretical foundation for feature requirements in educational web sites. The online environment has become a powerful interactive medium for promoting higher order thinking skills in students. This environment uses a web based interface in which students interact with course materials, other students and the instructor. Usability of the web site plays an important part in meeting learning objectives specified in course material being delivered online (Hazari, 2005). As in any new approach to teaching and learning, critical issues need to be examined before Web-based instruction is fully integrated into teaching processes. When developing educational web sites, features that support pedagogy should be given primary consideration. It is therefore important to identify key elements that will have maximum impact on learning. Using Q-sort analysis (which is a type of Factor Analysis), this study will investigate feature requirements of educational websites. Based on the analysis of user requirements in relation to several variables that were identified from review of literature, group characteristics should emerge. Similarities and differences between groups will be investigated and implications of these results for development of educational web sites will be presented in this study.

REVIEW OF LITERATURE

Although there exists much literature on traditional teaching and learning, the use of web for education is a relatively recent phenomenon and research in this area is in its infancy. Bonk & Dennen (n.d.) call most web materials to be "pedagogically negligent". Janicki & Liegle (2001) reported that web-based educational material are generally poor in educational content as authors of web based material have never had a course in learning theory and the web content they develop lacks foundations of learning theory. On the other hand, professionals such as teachers who may have knowledge of learning theories lack the technical skills to develop educational materials for the web (Murray, 1996). Educational web site development is not an exact science and these sites are built with a different set of criteria as compared to other sites, such as those having an e-commerce or marketing focus. More research is needed to build a theoretical foundation for educational web site design and web-based instruction.

The review of literature has been used to extract following statement variables (under 3 major criteria) relating to usability of educational websites: Operational definitions of these variables as it relates to the study are provided below:

USABILITY

1. Ease of navigation through website [NAVI]
2. Visual appeal of web pages [VISU]
3. Consistency of design between webpages [CONS]

LEARNABILITY

4. Clearly stated objectives and instructions [OBJT]
5. Quality of instructional content [CONT]
6. Good Interactivity (such as Quizzes, simulations) [INTR]

TECHNICAL FUNCTIONALITY

7. Multimedia elements (such as audio/video) [MULT]
8. Web page download/refresh time [REFR]
9. Cross browser (such as IE, Netscape) functionality [COMP]

Usability can be defined as how a user can use the functionality of a system in relation to 1) how easy it is to learn, 2) how efficient it is to use, 3) how easy it is to remember, 4) how it can be used with few errors, and 5) how pleasant it is to use (Lu & Yeung, 1998).

Research on usability exists (Palmer, 2002) but many websites do not apply these principles thereby making them difficult to use. When developing websites, one of the first questions an organization should answer is what is the purpose in creating this site? To an educational institution, the overall goal may be to determine how the site can be used to enhance the quality of learning in students. Whatever the motivation, it is essential to keep these goals at the forefront when planning, developing and maintaining the websites (Warlick, 2005). Educational websites in particular can benefit from learnability features. Key factors in evaluating a site's learnability include clearly stated objectives and instructions, quality instructional content, and good interactivity throughout the site (Conner, n.d). *Technical features* of websites such as download times, image refresh rate, use of audio, video, ability to work with different browsers often determine success rate of websites in attracting repeat visitors (previously also referred to as sticky sites). For development of educational websites, these elements become especially important because equipment used in educational institutions is not state-of-the-art, and may not be able to support cutting edge technologies such as high bandwidth Java applets that may be embedded in Web pages for purpose of interactivity. Use of multimedia elements - including audio and video, web page download time, and cross browser functionality are key considerations when evaluating the technical functionality of an educational site.

METHODOLOGY

The sample in this study consisted of graduate business students. Students were given instructions to visit a web site that explained the nature of the study and provided information on how the Q-sort statements should be sorted. This was important since students are more used to completing questionnaires in survey format that use Likert scale, open-ended, or close-ended questions (such as those used during end of term class evaluation of instruction), but may not be familiar with the peculiarities of the Q-sort procedure.

Q-sort methodology relies on using theories for item development. It is useful in exploratory research and a well-developed theoretical literature guides and supports its users (Thomas and Watson, 2002). Q sort uses ipsative (self-referenced) technique of sorting participant's statements about subjective conditions. It is a variation of factor

Table 1. Participant Ranked scores

Statement	Mean	SD
Ease of Navigation	3.84	0.98
Visual Appeal	3.00	1.03
Consistency of design	2.36	1.06
Clear Objectives/Instructions	3.49	1.01
Quality of instructional content	3.72	0.96
Good Interactivity	3.21	0.88
Multimedia Element	1.98	0.85
Web page download time	3.00	1.01
Compatibility across browsers	2.38	1.08

analysis technique that uses Q -methodology theory to analyze correlation measure (Brown, 1980).

PRELIMINARY RESULTS

Prior to conducting Q-sort analysis, ranked scores of all participants (before identifying factor groups) on each statement variable have been calculated for preliminary descriptive statistics. These are shown in Table 1. (Mean Score normalized as: 5= Most important , 1= Least important)

Next, a Q-Sort analysis will be conducted (research is in progress). The goal is to look a correlation between variables, correlation between factor groups, and identification of factor groups by rotation to extract similar patterns of response, the statement variables in each factor group which are statistically significant, and a comparison between factor groups to identify consensus or disagreement of statement variables.

DISCUSSIONS AND APPLICATIONS FOR PRACTICE

In this study, Q-methodology will be used to define participant viewpoint and perceptions, empirically place participant in groups, provide sharper insight into participant preferred directions, identify criteria that are important to participants, explicitly outline areas of consensus and conflicts, and investigate a contemporary problem relating to educational web site usability by quantifying subjectivity. Results will be useful to web developers, administrators, and users in evaluating criteria that make an effective educational website. For further research, similar studies will be useful in other areas such as development and evaluation of e-commerce sites from a user perspective.

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