Understanding the Dimensions of Self-Exploration in Web-Based Learning Environments.

by Lih-Ching Chen Wang, Joshua Gisemba Bagaka

Abstract

This study investigated the dimensions of self-exploration in Web-based learning environments using an attitude survey given to 209 college students. Through factor analysis, five dimensions of self-exploration in Web-based learning environments were identified. One-way analysis of variance revealed statistically significant differences in levels of self-exploration in three dimensions by gender and in four dimensions by native English speaking ability. Understanding the dimensions of self-exploration in Web-based learning environments among college students may help educators (1) design effective Web-based instructional materials, (2) identify Web resources that draw on students' learning needs and interests, and (3) consider different interests of students who speak English as a second language. (Keywords: English as a second language, Internet, self-exploration, Web-based learning; Web-based learning environment.)

Use of the Internet is becoming a daily occurrence in our society. Since 1991, the Internet has emerged as a viable educational tool because of its ability to allow anyone to access anything from anyplace at anytime, either synchronously or asynchronously. Colleges and universities are exploring efficient ways the Web can be used to enhance conventional curriculum and deliver distance education. More and more Web-based learning materials are being developed at all levels and for various age groups. Web-based courses are being created and implemented at an exponential rate. Many students have more opportunities to choose (rather than need) Web-based courses (Wang & Newlin, 2000) and to acquire a degree or certificate from multidisciplinary institutions around the world. Hundreds of thousands of Web sites serve as online tutors teaching a variety of topics ranging from language to science. Using the Web as a tool is becoming more popular. For instance, boys and girls alike chat on the Web, and students use the Web to find information for their class reports. Teachers use the Web to enhance their teaching, and researchers surf the Web for information. Web-based learning has become an active field.

Web-based learning (Hackbarth, 1997; Starr, 1997; Windschitl, 1998) was developed based on the creation of a hypertext learning environment (Kinzie, Larsen, Burch, & Boker, 1996). Marchionini (1988) described the hypertext learning environment as a self-directed, information-fluid environment with high teacher-learner interaction. Heller (1990) emphasized that Web-based learning is
incidental (unplanned learning acquired from the learning environment) and
discovered (full of opportunities for exploration). Shin, Schallert, and Savenye
(1994) further added that the Web is a learner-activated, self-motivated, self-
directed, nonsequential, dynamic, and multipath environment. Sweeters (1994)
concorded that it offers a dynamic, exciting, and powerful learning environment.

As hypertext-based learning on the Internet, Web-based learning environments
are open ended. Learners can determine what is to be learned, how it is to be
learned, in what sequence, and when the learning goal has been reached
instruction learning environment to include the following features of interaction:

* multimedia elements;
* device, distance, and time independence;
* global accessibility;
* worldwide uniformity;
* online resources;
* cross-cultural interaction;
* multiple expertise;
* learner control;
* convenience;
* authenticity;
* non-discriminatory environment;
* cost effectiveness;
* collaborative learning;
* formal and informal environments; and
* virtual cultures.

From the literature, therefore, it can be concluded that self-exploration is a key
element of Web-based learning environments because the Web is an open-ended
environment that can provide a learner the freedom and opportunity for self-
exploration. The cyber-student's willingness to explore independently at a Web site
can be beneficial to further foster the effectiveness of Web-based learning. Thus,
self-exploration is an impetus in Web-based learning.

Ways of using Web-based environments appropriately and effectively to maximize learning for the cyber-students remains to be discovered (Hill, 1997). Understanding the cyber-students' dimensions of self-exploration in Web-based learning environments may help with the designing and developing of an efficient Web-based learning environment.

PURPOSE

The goal of this study was to investigate the dimensions of self-exploration within a Web-based learning environment for college students. College students are appropriate subjects for such a study. Most college students nor only have ready access to computers and Internet resources but also have the learner self-control to explore the Web. In understanding college students' interests and preferences, the aspects that motivate students to self-explore the Web may be better understood.

RESEARCH QUESTIONS

The study addressed the following research questions:

1. What are the dimensions of self-exploration within a Web-based learning environment for college students?

2. Do the levels of self-exploration on the World Wide Web vary significantly by gender?

3. Do the levels of self-exploration on the World Wide Web vary significantly by whether the student is a native English speaker or not?

METHODS

Sample and Instrumentation

The subjects of the study were 209 college students, 120 male and 89 female. Forty-one spoke English as a second language (ESL), and 168 were native English speakers enrolled in a variety of disciplines in an urban university in the Midwestern United States.

An attitude survey was used in the study. (Find one sample question in Figure 1 and the complete survey online at www.iste.org jrte/.) The survey instrument included carefully selected phrases of advisement that sought to determine the desire or willingness to self-explore the Web. Examples of phrases used included:

* I desire to...
* I wish to...
* I want to...
* I hope to...
* I will be eager to...

The survey instrument consisted of five core factors with 17 attributes that asked participants to indicate their willingness to self-explore the Web. These 17 attributes were designed to promote the college students' own desire to independently explore Web sites related to their interest, relevance, expectancy, and satisfaction. In addition, the instrument provided an accurate Web address for each questionnaire, to ensure participants' confidence in self-exploration of the Web. All 17 items in the survey instrument used a five-point Likert-type scale.

Procedures

All the subjects were scheduled to complete four hours of instruction on using the World Wide Web. The instruction covered the concepts of URL (e.g., www.nfl.com); search engines such as Yahoo, Lycos, Infoseek, or WebCrawler; and using a search engine to find favorite Web sites. Subjects completed the paper-and-pencil self-report survey after the instruction.

Data Analysis

Factor analysis, a data reduction technique, was used in this study to identify dimensions of self-exploration in Web-based learning environments. Through factor analysis, a relatively smaller number of factors used to represent relationships among sets of many interrelated variables can be identified (Norusis, 1990). By using factor analysis, scales that measure the same concepts or variables can be created by assessing the factorial validity of the questions. Thus, the complexity of learning behavior can be reduced to a more limited number of factors (Bryman & Cramer, 1990).

Seventeen Web attributes were factor analyzed using an orthogonal rotation with a varimax procedure to delineate the underlying five dimensions that were associated with learner's self-exploration on the World Wide Web. The following criteria were used in extracting the factors (Hair, Anderson, Tatham, & Black, 1995): a factor with an eigenvalue greater than one, that explains at least 5% of the total variance in the self-exploration items, and factors that account for a total variance of at least 50% will be selected. In addition, only an item with a factor loading greater than 0.4 would be included in each factor grouping. The one way analysis of variance (ANOVA) was then used to examine difference in level of self-exploration on the Web by gender and whether the respondent is a native English speaker.
RESULTS

Following factor analysis, a total of five factors (dimensions) were identified. Table 1 presents the five dimensions of self-exploration that were extracted from the 17 attributes, their factor loadings, eigenvalues, and percent of variance explained, together with the Cronbach alpha reliability coefficients. All 17 self-exploration items met the factor loading criteria of 0.4 and were included among the factors identified.

The five dimensions accounting for 63.3% of the total variance emerged from the factor analysis. Each dimension was based on the common characteristics of the variables it included. For instance, the factor labeled Holiday/Entertainment included four items, namely, visiting Easter, Christmas, Thanksgiving, or Disney World Web sites. This factor had an eigenvalue of 4.550, explained 26.8% of the total variance, and had a Cronbach alpha reliability of 0.759.

Other dimensions were labeled Sports, Famous U.S. Parks, Educational Opportunities, and Internet Shopping. The five dimensions combined accounted for the other 63% of the variance. Their level of internal consistency (Cronbach alpha) was moderate to high, ranging from 0.584 to 0.811.

Table 2 presents the rank order of all 17 attributes of self-exploration on the Web based on the mean rating according to the respondents of the study. Among the 17 designated Web sites, the top five Web sites that respondents desired to self-explore for information were Disney World (M = 3.94, rank = 1), the Internet yellow pages (M = 3.85, rank = 2), study at a U.S. graduate school (M = 3.82, rank = 3), state's visitor bureau (M = 3.80, rank = 4), and listing of national parks (M = 3.76, rank = 5).

The rating of the five composite dimensions of the self-exploration on the Web was determined by an aggregate mean rating across the sub-items (Table 1). The rank order and mean rating for the five dimensions of self-exploration and presented in Table 3.

From these rankings, it is shown that Famous Parks (M = 3.72, rank = 1) had the highest level of self-exploration, followed by Internet Shopping (M = 3.67, rank = 2) and Educational Opportunities (M = 3.59, rank = 3). Holiday/Entertainment (M = 3.34, rank = 5) had the lowest level of self-exploration, followed by Sports (M = 3.50, rank = 4).

Gender and Self-Exploration

Table 4 presents analysis of variance results and rank order of the five dimensions of self-exploration by gender. From these results, it is clear that the rank order of the five dimensions of self-exploration differed between male and female respondents. For instance, Sports had the highest level of self-exploration for males, while Internet Shopping had the highest level self-exploration among
females. However, for both male and female respondents, Famous U.S. Parks had the second highest level of self-exploration, followed by Educational Opportunities. Holiday/Entertainment ranked fifth among males and fourth among females.

The levels of self exploration differed significantly by gender for the dimensions of Holiday/Entertainment, F = 5.55, p < 0.05; Sports, F = 46.59, p < 0.01; and Internet shopping, F = 11.26, p < 0.01. For the dimensions of Holiday/Entertainment and Internet Shopping, female respondents had a significantly higher level of self-exploration than their male counterparts. For the dimension of Sports, males had a significantly higher level of self-exploration than females. No statistically significant differences were observed by gender in the self-exploration dimensions of Famous U.S. Parks or Educational Opportunities.

ESL Respondents versus Native English Speakers in Self-Exploration

Table 5 presents the analysis of variance results and rank order for the five dimensions of self-exploration between the ESL and native English speaker respondents. These findings show that the rank order of the five dimensions of self-exploration is fairly similar between the ESL respondents and native English speakers.

For both ESL and native English speaker respondents, Famous U.S. Parks had the highest level of self-exploration, followed by Internet Shopping and Educational Opportunities. However, the levels of exploration differ significantly between ESL and native English speaker respondents in the dimensions of Holiday! Entertainment, F= 8.38, p < 0.1; Famous U.S. Parks, F= 8.66, p < 0.01; Educational Opportunities, F= 6.23, p < 0.05; and Internet Shopping, F= 3.95, p < 0.05. In these four dimensions, ESL respondents had a significantly higher level of self-exploration than native English speakers. No statistically significant differences were observed between ESL respondents and native English speakers in Sports.

DISCUSSION

Through factor analysis, five composite dimensions of self-exploration among college students were identified. The Cronbach alpha reliability measures of internal consistency for these five dimensions were generally high, and they accounted for a significant amount of variance. By using college students, we were able to identify common Web self-exploration dimensions in a population that has ready access to computer and Internet resources.

Research on the relationship between self-exploration and Web-based learning is still scarce, despite the fact that Web use has become commonplace in society, particularly among college students. To make instruction user friendly and convenient to the learners, this technological advancement will need to be integrated into the learning environment.
The study found that the levels of self-exploration on the Web significantly vary by whether the participant is a native English speaker. The ranking of the self-exploration were generally similar for both ESL and native English speaking students. More important, ESL students had a higher level of self-exploration than native English speakers in all but the Sports dimension. This finding demonstrates that, though ESL students were perhaps more eager to self-explore on the Web, their desire for self-exploration may be further enhanced by making the Web more accessible to non-native English speakers. Currently, the Web is predominantly English, which makes it more accessible to English speakers and those non-English speakers who may be eager to learn English. If the Web increases its availability in other languages, it will not only enhance accessibility to a wider society, but may also present native English speakers with motivation to become multilingual.

The study further demonstrated that a student's level of self-exploration differs by gender, particularly in the dimensions of Sports and Internet Shopping. The challenge for Web developers, therefore, is to design Web sites that are gender neutral. For instance, the Sports Web sites may need to be designed in a way to increase the interest of female viewers, while the Internet Shopping Web sites need to strive to attract the interest of male viewers.

Potential and Challenges of Self-Exploration on Web-Based Learning

The advantages of using the World Wide Web for education are myriad. First, training centers can distribute knowledge on a large scale (to the entire world).

In addition, the World Wide Web allows distribution of pages without the overwhelming costs for printing, mailing, and transport. Another advantage is that all information can be corrected and updated at once for all users from only one server site. Finally, the Web allows multiple media to be used for teaching, including text, images, and digital video, and can enhance communication between teachers and learners as well as among learners. Because of these great advantages and flexibility in sending and receiving any information for anyone at anytime from almost anyplace in the whole world, Web-based learning continues to expand its potentials in global learning.

Although the World Wide Web is popular, certain pitfalls and challenges are inherent in using it as a learning environment. For example, if learners are not carefully prepared, it is easy for them to become lost in "cyberspace" (Crossman, 1995). Web-based learning environments are also changing fast and in more ways than can be followed by any one individual. Accomplishing learning that is really effective requires much more work to select appropriate sites because there is excess information that a learner can freely search and learn. Other problems that might occur in World Wide Web learning include social isolation caused by lack of verbal cues and human social interaction. However, it is obvious that self-exploration with appropriate learner control will play a major role in Web-based learning in the next millennium.
Recommendation for Future Research

In addition to the five dimensions of self-exploration found in this study, there may be many other dimensions that merit further study. Also, if another group of college students were used as subjects, the results of the survey may vary. For example, if we asked college students from another country who were enrolled in English as a foreign language programs or college students in countries other than the United States, their willingness for self-exploration of these Web sites may be different. Thus, using a Web survey technique to conduct an international study with the same questionnaire may be challenging but promising. Furthermore, a study to investigate whether learner control will affect a learner's task performance in Web-based learning may also be beneficial.

Table 1

<table>
<thead>
<tr>
<th>Factor Analysis of Self-Exploration Items on the World Wide Web</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Factor Variance Cronbach Factors Loading Eigenvalue Explained Alpha</td>
</tr>
<tr>
<td>Holiday/Entertainment</td>
</tr>
<tr>
<td>Easter</td>
</tr>
<tr>
<td>Christmas celebration</td>
</tr>
<tr>
<td>Disney World</td>
</tr>
<tr>
<td>Thanksgiving on the Internet</td>
</tr>
<tr>
<td>Sports</td>
</tr>
<tr>
<td>NBA</td>
</tr>
<tr>
<td>NCAA</td>
</tr>
<tr>
<td>NFL</td>
</tr>
<tr>
<td>Famous U.S. Parks</td>
</tr>
<tr>
<td>Listing of national parks</td>
</tr>
<tr>
<td>Yosemite National Park</td>
</tr>
<tr>
<td>Yellowstone National Park</td>
</tr>
<tr>
<td>State visitor bureaus</td>
</tr>
<tr>
<td>Educational Opportunities</td>
</tr>
<tr>
<td>Study at an open university</td>
</tr>
<tr>
<td>Study abroad</td>
</tr>
<tr>
<td>Study at a U.S. graduate school</td>
</tr>
<tr>
<td>Internet Shopping</td>
</tr>
<tr>
<td>Internet yellow pages</td>
</tr>
<tr>
<td>Mail order on the Internet</td>
</tr>
<tr>
<td>Internet shopping malls</td>
</tr>
<tr>
<td>Percentage of total variance explained 63.3</td>
</tr>
<tr>
<td>Table 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Means and Standard Deviations of Self-Exploration on the World Wide Web (n = 209)</th>
</tr>
</thead>
</table>
Self-Exploration Items M * SD

Disney World 3.94 0.93
Internet yellow pages 3.85 0.88
Study at a U.S. graduate school 3.82 0.82
State visitor bureaus 3.80 0.81
Listing of national parks 3.76 0.82
Yellowstone National Park 3.68 0.92
Mail order on the Internet 3.63 1.05
NBA 3.62 1.15
Yosemite National Park 3.60 0.91
Internet shopping malls 3.59 1.02
Study at an open university 3.58 0.93
NCAA 3.53 1.10
Study abroad 3.37 0.97
NFL 3.33 1.18
Thanksgiving on the Internet 3.25 0.91
Christmas celebration 3.15 1.08
Easter 3.00 1.03

* 5: Strongly agree.
4: Agree.
3: Neutral.
2: Disagree.
1: Strongly disagree

Table 3

Means and Rank Order of the Five Dimensions of Self-Exploration

Dimension M Rank

Holiday/Entertainment 3.34 5
Sports 3.50 4
Famous U.S. Parks 3.72 1
Educational Opportunities 3.59 3
Internet Shopping 3.68 2

Table 4

Analysis of Variance Results for the Differences in Five Dimensions of Self-Exploration, by Gender

Male Female

Dimension M Rank M Rank

Holiday/Entertainment 3.23 5 3.48 4
Sports 3.86 1 3.01 5
Famous U.S. Parks 3.71 2 3.73 2
Educational Opportunities 3.55 3 3.64 3
Internet Shopping 3.54 4 3.88 1

Dimension F P

Holiday/Entertainment 5.55 0.019 *
Sports 46.59 0.000 **
Famous U.S. Parks 0.07 0.789
Educational Opportunities 0.73 0.394
Internet Shopping 11.26 0.001 **

* p < 0.05.
** p < 0.01.

Table 5

Analysis of Variance Results for the Differences in Five Dimensions of Self-Exploration between ESL Students and Native English Speakers

<table>
<thead>
<tr>
<th>Dimension</th>
<th>ESL (M)</th>
<th>Rank</th>
<th>NES (M)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holiday/Entertainment</td>
<td>3.64</td>
<td>4</td>
<td>3.26</td>
<td>5</td>
</tr>
<tr>
<td>Sports</td>
<td>3.42</td>
<td>5</td>
<td>3.516</td>
<td>4</td>
</tr>
<tr>
<td>Famous U.S. Parks</td>
<td>3.98</td>
<td>1</td>
<td>3.65</td>
<td>1</td>
</tr>
<tr>
<td>Educational Opportunities</td>
<td>3.85</td>
<td>3</td>
<td>3.524</td>
<td>3</td>
</tr>
<tr>
<td>Internet Shopping</td>
<td>3.89</td>
<td>2</td>
<td>3.63</td>
<td>2</td>
</tr>
</tbody>
</table>

Dimension F p

<table>
<thead>
<tr>
<th>Dimension</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holiday/Entertainment</td>
<td>8.38</td>
<td>0.004</td>
</tr>
<tr>
<td>Sports</td>
<td>0.30</td>
<td>0.587</td>
</tr>
<tr>
<td>Famous U.S. Parks</td>
<td>8.66</td>
<td>0.004</td>
</tr>
<tr>
<td>Educational Opportunities</td>
<td>6.23</td>
<td>0.013</td>
</tr>
<tr>
<td>Internet Shopping</td>
<td>3.95</td>
<td>0.048</td>
</tr>
</tbody>
</table>

* p < 0.05.
** p < 0.01.

Figure 1

Sample survey question.

Directions

Here are 17 statements describing how you might feel about exploring in a World Wide Web learning environment. For each statement listed, please circle a number corresponding to how much you agree or disagree with that statement.

1. "Before you apply for admission to graduate schools in the U.S.A., it is better to pay a virtual visit to those universities and read the information provided. For example, http://www.yahoo.com/Regional/Countries/United_States/Education/Colleges_and_Universities!all.html gives a complete listing of all colleges and universities in the United States." I desire to explore this link whenever I have a chance to or when I want to apply to a graduate school in the United States.

Strongly Agree Agree Neutral Disagree Strongly Disagree

5 4 3 2 1


Contributors

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