EDUCATIONAL INSTITUTIONS PORTAL SYSTEM UTILIZATION: A STUDENT PERSPECTIVE

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ABSTRACT

Bulletin boards are increasingly used in educational institutions to enhance students' educational experiences. This research examines a recently introduced campus portal in a Midwestern university that has several communications modules, including email, chat, and bulletin board. The portal in general and the bulletin board module in particular are examined. Several variables pertaining to students' perceptions of the portal and the bulletin board, such as system friendliness and easiness of use, are explored to discover the factors that encourage student system use. The results point to the importance of system design that takes student perspective into consideration. Research conclusions and recommendations are discussed.

INTRODUCTION

A recently introduced portal information system to a Midwestern university has a rich combination of synchronous and asynchronous communications modules, including chat, email, listservs, and bulletin boards or message boards (the term bulletin boards will be used throughout and abbreviated as BBs). Three classes in the school of business were asked to use the portal system, and especially the embedded BB module. The students showed some reluctance to use the system, and eventually it was not used as hoped or expected by the instructor. Few students posted questions or comments on the BB, and participation in the online discussions was somewhat limited.

This has led to questions about the factors that influence the student use of the BB system, and to discover any inherent problems within the system or any difficulties the students might have faced when using the system.

Bulletin boards are used for every conceivable subject matter. Examples are using it to facilitate communications between intelligent agents for B2B transactions (Wu & Sun, 2002), and forming support communities or groups for persons with a special need or illness (Patsos, 2001). The use of BBs in education has increased since it was introduced in 1978 (Moschovitis, C., Poole, H, Schuyler, T, and Senft, T, 1999). Today, many schools have portals that include the BB system either with the off-the-shelf systems, such as Blackboard (Cartwright, 2000; Novitzki, 2002), and WebCT (Hutchins, 2001) or within faculty members' course Web sites.

BB systems play an important role in facilitating communications between faculty members and their students by enabling asynchronous communications (Collins, 1998 Dabbagh; and Schmitt, 1998). Students leave their questions, comments, announcements, and notes on the BB for other students and the instructor to read and to respond. Some BBs have features that enable participants to upload files, images, and allow users to have their own avatars (small images that identify users and represent their favorite character or person), which allows for a richer BB experience.

The BB was used by three undergraduate classes in a Midwestern university. Two classes were an introduction to Management Information Systems for juniors, and one class was an online storefront business application, as part of an advanced ecommerce class for seniors.

The following sections describe the background literature review, the questions this research purports to answer, research methodology employed, research results, a discussion of the results and the conclusions reached, and finally, research limitations and recommendations for future enquiry.

LITERATURE REVIEW

Several studies were conducted about the use of BBs in general educational settings (Sanders, and Morrison-Shetlar, 2001; King, 2001; Morley, and LaMaster, 1999), while others related more to the widely used systems of WebCT and Blackboard (Hutchins, 2001; Dabbagh, and Schmitt, 1998; Forman, and Wimayer, 2000; Cole, 2000). Many other studies were in the context of the general use of BBs outside the educational context (Sweeney, and Ingram, 2001; Smeaton, and Keogh, 1999; Jaffe et al., 1999; Tillquist, 1996; Marwick, 2001; Sulaiman, and Meadows, 1991; Miller et al., 1996).

Student demographic factors are often examined in relation to their effect on student learning skills and educational abilities. Sanders, and Morrison-Shetlar (2001) found a highly positive effect of the Web component on student learning, problem solving, and critical thinking skills. Females were found to have more positive attitudes towards Web-based learning than males, and student age, race, year in school, computer experience, and learning style were found to be independent of student Web use. Morley and LaMaster (1999) examined WebCT's use by students and found several reasons why they were not using its BB module, including: complexity, lack of training and technical skills, problems in logging on to the system, and lack of time to use the system. Academic incentives, student motivation and accountability were important factors in encouraging students to use the system.

Using the Web as a medium for course delivery is an important supplement to the traditional medium of face-to-face communications. Sweeney and Ingram (2001) compared three different approaches of course delivery: face-to-face, bulletin boards, and chat rooms. They found that face-to-face delivery was perceived as superior in its effectiveness compared with the other approaches. They also found that while gender and Internet experience did not affect student perceptions of delivery approaches, ethnicity (or racial group) did.

Bulletin board discussions were found to affect student relationships and face-to-face classroom interaction (King, 2001). Students were found to become 'noisy' before and after class, signaling an increased interactions between students, and they were making more friends with their fellow classmates after realizing that there are other students sharing similar hobbies and interests.

Some bulletin boards permit participants to use pseudonyms that mask their identity on the board. This allows for freedom of presenting ideas and disagreeing with other participants on the board. Jaffe et al. (1999) conducted an experimental study where they set up two BBs and randomly assigned 114 students to them. In one of the BBs students were allowed to mask their identities with pseudonyms, while they used their real names in the other. The analysis showed that males did not mask their gender with pseudonym identities but females did, and that females exhibited certain elements of social interdependence such as references to others and self, and they put supporting statements on the BB more often than males. This reflects a stronger sense of confidence for males in posting on the BBs compared to femails.

Using BBs reaches beyond system ease of use and reliability. User acceptance and system values congruence play an important role in system usage. Tillquist (1996) reports in an empirical study in a workplace context that organizational orientation is the most influential in determining voluntary user participation among the three variables examined: social, organizational, and individual orientations. The study concludes that an information system is used when users become convinced of the effect of using it in mediating organizational values, and when these values are perceived in organizational relationships.

User needs are critically important to be identified when designing a BB because they play an important role in determining system acceptability and use. Sulaiman and Meadows (1991) compared three different BB systems: 1. Humanities Online Bulletin Board (HUMBUL), 2. Bulletin Board for Libraries (BUBL), and 3. National Information on Software and Services (NISS). The results of the study pointed to the importance of identifying the needs of the users such as their need for the right information in a menu based system, and their need for training and other types of help in using the system, such as navigational aids.

The preceding studies concentrate on two dimensions. The first is students, including their needs, demographics, training and technical skills, their relationships, acceptance and use of the system. The second dimension is the system itself. System characteristics include complexity, problems logging on, and session time. Not

only the students' dimension is important for BB use, but the attitudes instructors have towards using that medium along with their encouragement and support of student use play an important role in motivating students to use BBs. From these studies, the following questions are posed.

RESEARCH QUESTIONS

The development of the research questions is based on the literature review presented earlier. Several factors that were examined in previous studies are reexamined here, and additional variables are added to explore their relationship to campus portal and BB use.

1. Is there a relationship between student demographic variables and students' attitudes towards using campus portals and bulletin boards?

2. Do these demographic variables make a difference in students' attitudes towards using campus portals and bulletin boards?

3. Do the variables of age, gender, school seniority, living location (on- vs. off- campus), computer literacy level, and trouble logging into the system affect the use of the campus portal and the bulletin board system?

METHODOLOGY

This section describes the portal system examined in this research, the embedded BB module, the sample chosen, the survey instrument used to collect the data and the survey administration process.

A Description of the Portal and the BB Systems

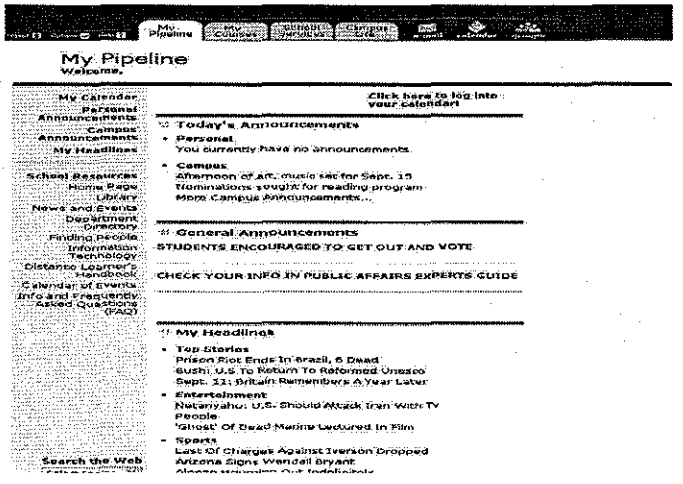
The portal that was introduced campus wide in the beginning of the fall semester of 2001 has many interesting features that encourage student use. Before students are able to use it, they must log on to the portal with a unique user ID and a password that is at least six characters long. When students log on, they are greeted with general school announcements and news links to the latest news stories currently in the press.

There are two sets of links that users can click on. One set is on the left side of the page, and the other is towards the top of the page. The left side links take students to different school resources, such as the library's web site, department directory, a search engine to find people or topics, a link for distance learning courses and learning material, and the university's calendar of events. The upper links take the students to courses they are taking or have taken in the past, school services, and email and group services. For the students to be able to use the BB module on the system, they have to enter the class web site and click on the message board link.

The BB module shows the class name that this particular BB pertains to, then it displays the instructor's name and a link to edit the description of that particular BB (that link is for instructors only). A link that enables participants to start a discussion thread is presented as "Post a Topic." When clicked, users can enter the title of the thread and any contribution they want to add, which could be questions, comments, or links to other web pages.

Figure 1 shows a capture image of the first page users see after they log on to the portal system.

FIGURE 1
A CAPTURE OF CAMPUS PORTAL



The Sample

A convenience sampling approach is followed to collect the data for this research. This approach is chosen because the system was newly introduced and not many students used it across campus. Ninety four students divided into three classes in the School of Business participated in the research.

Class size varied among the three classes: 44 and 45 were in the undergraduate classes, about 95% of which are juniors and 5% are seniors, and six students in the graduate class. The students' average age is 23, and their age range is 18-53. The sample is evenly divided between males and females (49.5% and 50.5% respectively). Majority of them (82.1%) said that they had an intermediate level of computer experience.

The Survey Instrument

A survey instrument based on the work of King (2001); Morley, and LaMaster (1999); and Sanders, and Morrison-Shetlar (2001) was developed for this research. Students were asked to log into the survey site and show the degree of their agreement with the statements on the survey. The survey had 26 statements divided into three parts. The first part inquired about the demographic variables of the subjects, including age, gender, and student level (freshman, sophomore, junior, and senior). The second part inquired about the student use of computers in general and the portal system in particular, including usage for entertainment, education, general information, communication (email), and other uses. Also, this part asked students to rate their computer literacy on a scale of three points from novice to expert (with examples of each category). The third part inquired about the students' attitudes towards using the portal system in general and the BB module in particular. Five-point Likert-type scale was used to measure student agreement with the survey's statements. The scale ranged from "strongly agree" that has a value of five to "strongly disagree" that has a value of one.

The statements ranged from inquiring about the students' general attitude towards using computers, such as "I like using computers," to more specific ones about the school portal, such as "I think the portal is friendly to use." Also, the survey had specific statements about the BB module, such as "I like to use the message board feature of the portal."

Survey Administration

The survey was put on the web for easy student access. Students were asked to log on to the survey site and state their agreement with the survey statements, which took between 5 and 10 minutes to answer. The survey has a greeting section that instructed the respondents on how to answer the survey, then the survey statements were displayed, and after they click on the submit button, they are taken to a thank you message with an email link to the researcher for any comments or concerns that the respondents might have had while responding to the survey.

RESULTS

A correlation matrix was drawn to examine the relationships between the different variables in the research. The statistically significant relationships ranged from positively strong, such as between the perception of the BB on the portal as a valuable educational medium and the positive preference to use the portal BB ($r = .812$, $p < 0.01$), to negatively strong, such as the perception that the BB is complicated and the need for training to use the BB ($r = -.706$, $p < 0.01$). The following discussion will focus on the correlations analysis results.

Table 1 shows the significant relationships between the variables examined in this research. There are a number of weak but significant relationships between several variables, such as instructor encouragement and perception of the importance of the portal ($r = .394$, $p < .01$), the perception of the friendliness of the portal and the perception of the BB on the portal as a valuable educational medium ($r = .473$, $p < .01$); and students' positive preference to use the BB on the portal ($r = .483$, $p < .01$). Usage is defined here as the frequency or number of times the portal or the BB is used.

Stronger relationships are found between the perception of the friendliness of the portal and portal usefulness ($r = .613$, $p < .01$); portal usefulness and the perception of the portal as a valuable educational medium ($r = .664$, $p < .01$); the perception of the BB on the portal as a valuable educational medium ($r = .585$, $p < .01$), and students' positive preference to use the BB on the portal ($r = .595$, $p < .01$).

Students who liked to use the BB module on the portal viewed the portal as a valuable educational medium (r =

.655, $p < .01$), and viewed the BB on the portal as a valuable educational medium ($r = .812$, $p < .01$). One high negative relationship is between the perception of the complexity of using the portal and the need for training to use it ($r = -.705$, $p < .01$).

Instructor encouragement of the students to use the BB is weakly, but positively, correlated to student perception of the portal as useful ($r = .245$, $p < .01$), also positively correlated to students' positive preference to use the BB on the portal ($r = .259$, $p < .01$). Students' reported difficulty logging in to the portal is positively, but weakly correlated with their perception of the easiness of using it ($r = .273$, $p < .01$). Students who liked using the portal did not perceive it as complicated ($r = .220$, $p < .05$).

These correlations reveal that as students perceive the portal as a friendly, valuable, and viable medium to use, they are more apt to use it. This has several implications for portal design and individual module component development within it. Portal systems need to be easy to navigate and negotiate to find the information users expect to find when they use these systems. This reflects on the user perceptions that the system is friendly to use and useful, which is expected to increase its use. When individual system components, such as BBs and chat rooms have these characteristics as well, the expectation of system usage is raised.

One way ANOVA, or Analysis of Variance, is used to measure the differences between group means examined in the study. ANOVA is used because the measures of the questions or statements of the study are interval and are considered continuous rather than discrete or categorical. Several earlier studies used the Likert-type scale and analyzed the results using parametric rather than nonparametric statistical methods, such as (Shaw, DeLone, and Niederman, 2002; and Tastle and Russell, 2003).

ANOVA is used to determine if student gender (male, female), student level (freshman, sophomore, junior, senior, and graduate), and computer literacy (novice, intermediate, and advanced) would make any difference in the perceptions of students' positive attitudes to use computers, portal friendliness, importance, usefulness, training required to use the portal, student tendency to participate in class, the perception of the portal as a valuable educational medium, the BB module on the portal as a valuable educational medium, and portal complicatedness.

Computer literacy or experience is self-reported computer knowledge description by the users, which ranges from novice (Use email, a word processing program), through intermediate (Use Spread Sheet programs, little programming knowledge), to advanced (Build my own computers, build networks, expert in a programming language).

The result of the analysis shows that there is no significant difference between male and female students as to the above mentioned variables; however there is a significant difference between students at different levels in school and students' aversion or delight in class participation ($F = 3.499$, $p < .01$), as shown in Table 2. Also, the analysis shows that students' computer experience makes a difference as to their positive attitudes to use computers ($F = 4.944$, $p < .009$), their perceptions of the portal friendliness ($F = 16.041$, $p <$ .01), portal usefulness ($F = 6.692$, $p < .002$), training required to use the portal ($F = 3.348$, $p < .040$), the perception of the portal as a valuable educational medium ($F = 5.031$, $p < .008$), and students' positive attitude to use the BB on the portal ($F = 3.305$, $p < .041$), as detailed in Table 3.

DISCUSSION

The correlations matrix in table 1.0 shows the significant correlations between the variables examined in this research. The student perception of the portal friendliness, where the students feel that they can use the portal without trouble, and that they can easily navigate through its menus, is significantly correlated to their perception of the portal usefulness. It is essential that the students feel that they are able to negotiate their way through the portal if they want to reap any of its benefits.

A significant relationship is found also between the student perception of the portal friendliness and their perception of it and the BB module used in it as a valuable educational medium. Their feeling of the friendliness of the portal reinforces their perception of the educational value of the portal and the BB module. Indeed, participants on the BB expressed delight when a question about an assignment was answered by another BB participant.

The negative relationship between the perception of the easiness of using the portal and the need for training to use it is straightforward. Students saw the portal as an easy to use system and thus they did not feel the need for any training to use it. The navigation buttons and links on

TABLE 1
CORRELATIONS TABLE BETWEEN THE VARIABLES EXAMINED IN THE RESEARCH

Age	1.00													
Instructor encouragement		1.00												
Trouble logging in			1.00											
Like using computers				1.00										
Portal is friendly					1.00									
Portal is important		.394**				1.00								
Training required					-.286**	.299**	1.00							
Portal is useful		.245*			.613**	.306**		1.00						
Student participation							.357**		1.00					
Portal valuable educ Medium	.299**				.535**			.664**		1.00				
BB on portal valuable	.285*				.473**	.388**		.585**		.742**	1.00			
BB use on the Web						.279**	.233*		.243*			1.00		
Like using BB on portal	.235*	.259*			.483**	.541**		.595**		.655**	.812**		1.00	
Portal complicated			.273**	.220*	.262*	-.213*	-.705**		.321**					1.00
Variables	Age	Instructor Encourage-ment	Trouble logging in	Like using computers	Portal is friendly	Portal is important	Training required	Portal Is useful	Student Participa-tion	Portal valuable educ medium	BB on portal valuable	BB use on the web	Like using BB on portal	Portal comp-licated

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed)

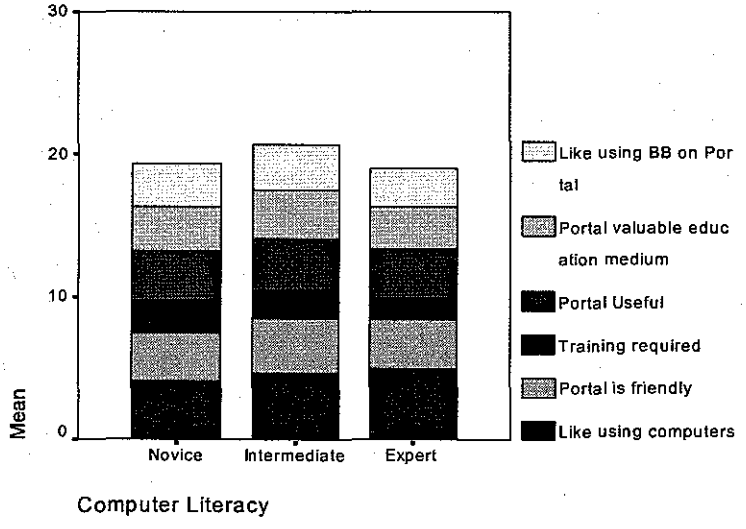
TABLE 2
ANOVA STUDENT LIKE PARTICIPATION AND STUDENT LEVEL

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.237	4	3.309	3.499	.011
Within Groups	84.178	89	.946		
Total	97.415	93			

TABLE 3
ANOVA STUDENT COMPUTER EXPERIENCE AND OTHER VARIABLES

		Sum of Squares	df	Mean Square	F	Sig.
Like using computers	Between Groups	3.083	2	1.542	4.944	.009
	Within Groups	28.374	91	.312		
	Total	31.457	93			
Portal is friendly	Between Groups	13.898	2	6.949	16.041	.000
	Within Groups	39.421	91	.433		
	Total	53.319	93			
Training required	Between Groups	6.237	2	3.119	3.348	.040
	Within Groups	84.752	91	.931		
	Total	90.989	93			
Portal Useful	Between Groups	10.912	2	5.456	6.692	.002
	Within Groups	74.195	91	.815		
	Total	85.106	93			
Portal valuable education medium	Between Groups	6.719	2	3.360	5.031	.008
	Within Groups	60.770	91	.668		
	Total	67.489	93			
Like using BB on Portal	Between Groups	5.533	2	2.767	3.305	.041
	Within Groups	76.169	91	.837		
	Total	81.702	93			

FIGURE 2
DIFFERENCES IN STUDENT PERCEPTIONS OF SEVERAL VARIABLES ACCORDING TO THEIR COMPUTER LITERACY LEVEL



the system are clear and easy to follow, which seems to be well perceived by the students reflecting on the lack for the need for training to use it.

Students who perceived the portal as a valuable educational medium as well as the embedded BB module, and who liked using the BB on the portal found the portal to be useful. This is an expected and logical correlation between these variables as the students benefited from using the portal and the BB module.

The perception of the portal as a whole to be a valuable educational medium is significantly correlated to the perception of the BB module in it to be a valuable educational medium as well. This relationship between the whole and the part is important because it points to the fact that details in building a system are important. It is critical to have a useful and functional system in order for it to be used.

The ANOVA analysis in table 2.0 reveals that the gender factor does not make a difference in students' attitudes towards the portal or the embedded BB module. However, student level at school makes a difference if the students prefers to participate in class discussions or not. Sophomores are closer to not wishing to participate in class discussions than the other student groups (freshmen M = 2.71, SD = 1.38; sophomores M = 3.5, SD = 1.05; Juniors M = 2.24, SD = .97; Seniors M = 2.14, SD = .79). There are a number of factors that affect student participation in class, such student personality, instructor encouragement, and class atmosphere. Determining which of these factors affects student participation in light of using a BB is suggested for future research.

Student computer experience makes a difference in many variables examined, including student's attitudes towards using computers, their perception of the portal friendliness, their perception of any training required to use the portal, portal usefulness, their perception of the portal as a valuable educational medium, and their attitudes towards using the BB module on the portal. Figure 2.0 displays these differences in a stacked bar chart.

Expert computer users had a more favorable attitude towards using the computer (M = 4.75, SD = .50) than the novice computer users (M = 4.08, SD = .76), which is a logical and expected result. Expert users have more skills and knowledge in using computers that makes their experience more enjoyable and less frustrating than that of novice users.

An interesting finding is that intermediate users found the portal friendlier (M = 4.09, SD = .61) than novice users (M = 3.23, SD = .83) and expert users (M = 2.75, SD = .96). One explanation of this finding is that the portal is designed for users with average knowledge of computers. Novice users might find it a little more difficult to find their way around the system, especially at the beginning, and expert users expect much more features from the system which it did not have according to their perspective.

Although there is a difference between students' perceptions as to the need for training to use the system according to the computer literacy level, the average student response pointed to the lack of the need for training to use the portal. Novice users saw the need for training to use the system (M = 2.62, SD = 1.19) slightly higher than intermediate users (M = 1.94, SD = .92), and expert users (M = 1.5, SD = 1).

Another interesting finding is that intermediate users found the portal more useful (M = 3.79, SD = .86) than novice users (M = 3.31, SD 1.03) and expert users (M = 2.25, SD = 1.86). Expert users expect more functionalities and features from the portal system and novice users need more time and effort to familiarize themselves with the system before they can gain any benefits from it.

Intermediate users perceived the portal as a valuable educational medium (M = 3.62, SD = .81) more then the other two groups, especially expert users (M = 2.5, SD = 1.0). It is apparent that intermediate users are learning more through using the portal after they have gained more experience on how to use its different features, and they feel they have still to learn by using it.

Expert users can go beyond the portal to gain knowledge that contributes to their learning, thus they see the portal as a less valuable educational medium than intermediate users. Consistent with this view is the perception of the intermediate users that the BB module on the portal is more of a valuable educational medium (M = 3.61, SD = .91) than expert users (M = 2.75, SD = 1.71).

The findings of this research contradicts that of Sanders, and Morrison-Shetlar (2001) in that student gender variable is independent of students' attitudes towards the portal and the BB module used on it, while computer experience level did make a difference. Although Morley and LaMaster (1999) used WebCT as the module under investigation to assess student system use, the portal examined in this research has many of the functionalities

of the WebCT system, and the variables that they found contributed to student under utilizing WebCT (system complexity, training required and trouble logging in) were independent of student attitudes towards using the portal system in this research.

Also, the results of this research support that of Sulaiman and Meadows (1991) in emphasizing the necessity to identify the needs of the students in particular and users in general when designing a BB module or a portal system. Matching user needs with a functional system that takes these needs into consideration could mean the difference between system utilization or system under-use and redundancy.

Students' computer use experience evidently plays an important role in accepting and using campus portals and BB modules employed within them. This implies that instructors should take into consideration students' experience when asking them to use campus portals and any modules built into them. Students with high level of expertise could help other students in class, thus acting as mentors for students with weaker computer experience, and novice students should be encouraged to ask and use the system to overcome any psychological hurdles that could deter them from active computer participation.

CONCLUSIONS

The findings of this research point to the importance of determining the targeted audience when designing BB modules and portal systems for student use. Students at different educational levels and at different computer literacy statures have different needs and expectations from a portal system or a BB module. The design aspects of the portal system or any of its components are very important factors, because perceived system usefulness is correlated to perceived system friendliness, which ultimately affects system use.

Despite the fact that this research did not detect the role of the instructor as instrumental in encouraging students to use the BB module or the portal system, it is a necessary factor and should not be overlooked. Instructors could at least introduce the system to the students, and students could take the responsibility of using the system afterwards.

RESEARCH LIMITATIONS AND RECOMMENDATIONS

Generalizability is one of the drawbacks of this research. A convenient sample of 94 students in three classes is drawn in a Midwestern university, and the system examined is especially designed for this institution, thus the results could not be generalized to other universities or systems. However, BB modules share a lot of similarities, and this research examines the attitudes of students towards using this module and the system that contains it, thus providing an idea of how students in one educational institution might respond or react to it.

It is recommended that a wider sample be taken from an institution to incorporate wider audience and that the sample be random to enable generalizability. Also, other variables could be included to further examine their role and effect on student learning and attitudes towards using Web enabled instructional systems. There are a number of factors that affect student participation in class, such student personality, instructor encouragement, and class atmosphere. Determining which of these factors affects student participation in light of using a BB is suggested for future research.

The research participants provided several anecdotal recommendations pertaining to the portal and the BB systems. The following is a summary of these recommendations:

A. recommendations pertaining to the portal system

1. Increase the time allotted for every session because 15 minutes is not enough for a single session connection.

2. Increase portal connectivity with other information systems in the university relevant to student academic and extra curricular activities.

B. recommendations pertaining to BB modules

1. Launch an awareness campaign about the BB and encourage instructors and students to use it. The increased number of participants will enrich the BB with the different individual experiences accompanying their participation.

2. Assign segment moderators on the board to insure that questions and enquiries are answered.

3. Instructors must initiate and encourage BB and portal use. Instructors influence students and their recommendations are considered by students.

4. Improve BB system speed, slow boards deflect participation.

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REFERENCES

Cartwright, A. (2000). "Blackboard Experience of a Chemistry Teacher." *Journal of Chemical Education* 77(6): 699.

Cole, R. Chemistry (2000). "Teaching, and WebCT." *Journal of Chemical Education* 77(7): 826-827.

Collins, M. (1998). "The Use of Email and Electronic Bulletin Boards in College-level Biology." *The Journal of Computers in Mathematics and Science Teaching* 17(1): 75-94.

Dabbagh, N, and Schmitt, J. (1998). "Redesigning Instruction Through Web-based Course Authoring Tools." *Educational Media International* 35(2): 106-110.

Forman, J., and Wimayer, S. (2000). "How On-line Course Management Systems Affect the Course." *Journal of Interactive Instruction Development* 13(2): 16-19.

Hutchins, H. (2001). "Enhancing the Business Communication Course Through WebCT." *Business Communication Quarterly* 64(3): 87-94.

Jaffe, J., Lee, Y., Huang, L., and Oshagan, H. (1999). "Gender Identification, Interdependence, and Pseudonyms in CMC: Language Patterns in an Electronic Conference." *Information Society* 15(4): 221-234.

King, K. (2001). "Educators Revitalize the Classroom 'Bulletin Board': A Case Study of the Influence of Online Dialogue on Face-to-face Classes from an Adult Learning Perspective." *Journal of Research on Computing in Education*. 33(4): 337- 354.

Marwick, A. (2001). "Knowledge Management Technology." *IBM Systems Journal* 40(4): 814-830.

Miller, J., Daly, J., Wood, M., Brooks, A., and Roper, M. (1996). "Electronic Bulletin Board Distributed Questionnaires for Exploratory Research." *Journal of Information Science* 22(2): 107-116.

Morley, L. and LaMaster, K. (1999). "Use Electronic Bulletin Boards to Extend Classrooms." *Journal of Physical Education, Recreation & Dance* 70 (6): 16-18.

Moschovitis, C., Poole, H., Schuyler, T., and Senft, T. (1999) *History of the Internet: A Chronology, 1843 to the Present.* Santa Barbara, CA: ABC-CLIO.

Novitzki, J. (2002). "Asynchronous Learning Tools in the Traditional Classroom- A Preliminary Study on Their Effect." *Journal of Informatics Education Research* 4(2): 51-67.

Patsos, M. (2001). "The Internet and Medicine: Building a Community for Patients with Rare Diseases." *The Journal of the American Medical Association* 285(6): 805.

Sanders, D, and Morrison-Shetlar, A. (2001). "Student Attitudes Toward Web-enhanced Instruction in an Introductory Biology Course." *Journal of Research on Computing in Education* 33 (3): 251-262.

Shaw, N., DeLone, W., and Niederman, F. (2002) "Sources of Dissatisfaction in End-user Support: An Empirical Study." *Database for Advances in Information Systems* 33(2):41-55.

Smeaton, A., and Keogh, G. (1999). "An Analysis of the Use of Virtual Delivery of Undergraduate Lectures." *Computers & Education* 32(1): 83-94.

Sulaiman, M., and Meadows, A. (1991). "The Design of Electronic Bulletin Boards." *Journal of Information Science* 17(4): 247-252.

Sweeney, J., and Ingram, D. (2001). "A Comparison of Traditional and Web-based Tutorials in Marketing Education: An Exploratory Study." *Journal of Marketing Education* 23(1): 55-62.

Tastle, W. and Russell, J. (2003) "Analysis and Design: Assessing Actual and Desired Course Content." *Journal of Information System Education* 14(1): 77-90.

Tillquist, J. (1996). "Participation on Electronic Bulletin Board Systems: An Empirical Analysis of Work Value Congruency." *Journal of Management Information Systems* 13(1): 107.

Wu, D.J. & Sun, Y. (2002). "Cooperation in Multi-agent Bidding." *Decision Support Systems* 33(3): 335-347.

APPENDIX

Survey questions used to collect the data for this research. These questions were put online for easy research participant access.

Q2. Age _____

Q3. Gender Female Male

Q4. My major is _____

Q5. I live On campus Off Campus

Q6. I use computers for (please check all that apply)
Fun _____ education _____ General Information _____ Communication (email) _____
Other (Please specify) _____

Q7. I am a Freshman Sophomore Junior Senior Graduate

Q8. The number of courses I am taking on campus this semester is

Q9. The number of courses I am taking off campus this semester is

Q10. The number of instructors of these courses who encourage me to use the message board on the Portal is

Q.11. I have used the Portal system Yes No

Q12. I rate my computer knowledge as
Novice (Use email, a word processing program)
Intermediate (Use Spread Sheet programs, little programming knowledge)
Expert (Build my own computers, build networks, expert in a programming language)

Q13. I use the Portal for (please check all that apply)
email Message Board Reading news Viewing announcements
Distance Education Other (Please specify)

Q14. I use the Portal
Once a week Few times a week (please specify) Less than one hour a day
1-2 hours a day More than two hours a day

Q15. I have trouble logging into the Portal
Always Often Sometimes Rarely Never

Please choose your level of agreement with the following statements.
Strongly Agree Agree Neutral Disagree Strongly Disagree

Q16. I like using computers

Q17. I think the Portal is friendly to use

Q18. Most of my instructors emphasize the importance of using the class's message board on the Portal

Q19. I think I need training to be able to use the Portal

Q20. I find the Portal useful

Q21. I think the Portal is complicated

Q22. I do not feel comfortable participating in class discussions.

Q23. I like using message boards on the Web other than the Portal

Q24. I think the Portal is a valuable educational medium

Q25. I think the message board system of the Portal is a valuable educational feature

Q26. I like to use the message board feature of the Portal