

A Comparative Study of Campus Portal User Acceptance: Student and Faculty Perspectives

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Introduction

Portals are gateways to information resources and different kinds of services. They are enjoying expansive use in all sorts of organizations. From corporations to educational institutions, organizations are striving to provide their constituents with prompt and reliable services through their Web portals. There is a general agreement in the literature on the concept of a portal (Abuhamdieh, 2003; Murray, 1999; Shilakes & Tylman, 1998; Smith, 2004). It means a web site that integrates and concentrates information resources. The audience could be limited to a particular group, such as auto mechanics, physicians, chemists, students and educators (vertical portals), or it could be open to everyone, such as the popular search engines and categorization Web sites (Google, Yahoo!, and Excite) (horizontal portals) (Eudes, 2005).

The uniqueness and recent use of portal systems, and the wide array of constituents they serve, along with the different kinds of challenges they bring invites a closer examination of their acceptance and use. Few studies have provided a detailed examination of these kinds of portals in terms of their user acceptance, and their most used features (Carter & Bélanger, 2005; Li & Wood, 2005). The focus of this study is a campus portal designed for educational institutions, and explores these factors in specific based on the Technology Acceptance Model (TAM) (Davis, Fred D., 1989; Venkatesh, Morris, Davis, & Davis, 2003).

More specifically, this study explores the reasons behind the response to a campus portal from its prospective users: students and faculty. Both groups were asked about their perceptions and use of the portal through a multipart survey. The theoretical framework used to formulate the study questions and construct the survey is based on the Technology Acceptance Model (Davis, Fred D., 1989; Venkatesh et al., 2003), and earlier studies of specific online distance education modules (King, 2001; Morley & LaMaster, 1999; Sanders & Morrison-Shetlar, 2001). Specifically, the study aims to answer the following questions. What are the use patterns

of the portal's modules by students and faculty? How do faculty and students perceive the portal and its modules in terms of easiness of use and usefulness? Are faculty and students congruent in such perceptions?

The next section presents earlier studies that examined different kinds of portals, and the contributing factors to their acceptance or rejection. This is followed by the methodology, which briefly describes the portal examined and its modules, the survey instrument, and the sample. Results analysis and discussion, and the study's conclusions and future recommendations conclude the paper.

Literature review

Earlier research on portals focused mostly on the factors contributing to their acceptance, and relied mostly on the TAM in explaining users' portal acceptance (Carter & Bélanger, 2005; Dias, 2001; Heijden, 2003; Holsapple & Sasidharan, 2005; Kakumanu & Mezzacca, 2005). Few studies examined a particular portal (Abuhamdieh, 2003); most examined a category of portals, such as e-government portals (Carter & Bélanger, 2005) or educational portals (Li & Wood, 2005); or examined portals as means of creating, sharing, and transferring knowledge (Hall & Graham, 2004; Neumann, O'Murchu, Breslin, & Decker, 2005).

Different studies define portals from different angles, depending on the primary features they possess. For example, portals are viewed as collections, concentrations, or amalgamation of software and services (Shilakes & Tylman, 1998), or as a single entry point or a gateway to information resources (Abuhamdieh, 2003). A more comprehensive definition views portals as "an infrastructure providing secure, customizable, personalizable, integrated access to dynamic content from a variety of sources, in a variety of source formats, wherever it is needed" (Smith, 2004, p. 94). This definition highlights some of the basic and important features of portals, such as their customizability, security, and personalization, and stresses their function as an entry point to information resources and services. It is also important to note the

Abstract

This study examined campus portal module use patterns and its user acceptance. A random sample is collected and the Technology Acceptance Model (TAM) is used to explore student and faculty perceptions of the portal's ease of use and usefulness. These perceptions are contrasted to find any significant differences between the two groups. Study results reveal that students and faculty exhibit different attitudes and use patterns for the portal and its modules. Students were more receptive of the portal, and generally used its modules more often than faculty. Student and faculty attributions to these perceptions and use patterns are discussed. Study limitations and suggestions for future research are presented.

Keywords: web portals, bulletin boards, student and faculty attitudes

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difference between a **portal** and a **module**. A module is an integral part or component of a portal, such as email, Bulletin Boards, news, announcements, calendar, e-groups, and others. A portal can contain one or more modules, in addition to several other Web pages and links to other Web sites and portals.

There are many kinds of portals that are categorized according to different criteria, such as the operating environment (public, corporate, campus), and the main purpose or function (information/content, collaborative, expertise, and knowledge portals) (Murray, 1999). Public portals, such as my.yahoo.com or my.excite.com, serve a general audience. Corporate and campus portals serve a more targeted audience, the first relating to a corporation and its customers, suppliers, and other stakeholders, while the latter serves students, faculty, and staff in educational institutions. Hence, for these portals to be used, their user acceptance is of critical importance.

Many studies that explored technology acceptance and use relied on the constructs developed by the Technology Acceptance Model or TAM (Davis, F., 1986; Davis, Fred D., 1989; Venkatesh et al., 2003). The two most relevant factors explaining a system's acceptance and use, according to this model, are user's perceived ease of system use and perceived system usefulness (Davis, F. D., Bagozzi, & Warshaw, 1989, 1992).

Other studies examined additional factors beyond ease of system use and usefulness, such as system adaptability (Kakumanu & Mezzacca, 2005), convenience (saving time and effort), empathy (personal attention and caring), information quality, fun, reliability, responsiveness (help and support) (Kuo, Lu, Huang, & WWu, 2005), playfulness and satisfaction with a Web site (Lin, Wu, & Tsai, 2005), Web site enjoyment, visual appeal (Heijden, 2003), trustworthiness in the B2C e-commerce domain (Holsapple & Sasidharan, 2005), and user demographics, such as age and gender (Large & Beheshti, 2005).

In a comprehensive study on campus or educational portals, Li and Wood (2005) surveyed 34 higher education institutions in the United States about their portal adoption and use. Approximately half of the institutional respondents (47%) indicated that they had already implemented a campus portal, and the remaining 53% indicated they would in one or two years. In addition, half of the respondents indicated that their portals are horizontal, and 25% have vertical portals (Blackboard, and WebCT).

A majority of the respondents, or 75% used Campus Pipeline software package from SunGard Higher Education Company (<http://www.sungardhe.com/>) and the remaining 25% used other software packages, such as Oracle, and Blackboard. These portals served students, faculty, and staff. IT departments control and serve most of these portals on campuses.

Most of the services rendered by these portals were used, such as the online course catalogue, campus news and announcements, grades, registration of online classes, email, access to other vertical portals, and the university directory. The deployment and maintenance challenges were mostly related to the integration of other university applications into the portal, implementation of a single log-on scheme, and security and lack of acceptance. Relatively few of these institutions actually evaluated their portals (25%), and those who did reported that their portal customers (students and faculty) actually rated the portals as OK. About half of the respondents indicated that they are considerably satisfied with the portal, one third were moderately satisfied, and the remaining were either highly or little satisfied.

Carter & Bélanger (2005) explored the factors contributing to the use of government portals, or e-government services. They drew constructs from the Technology Acceptance Model, Diffusion of Innovation theory and web trust models. They found that perceived ease of use, compatibility, and trustworthiness are the most important factors predicting the use of e-government services. This supports the findings of the other portal studies presented earlier.

In addition to using portals as gateways to information resources, they are used as means to store, share, and transfer knowledge through many diverse components and modules that these systems contain, such as e-bulletin boards (eBB), email, and chat modules (Hall & Graham, 2004), and virtual communities to improve employee's skills (Neumann et al., 2005). These modules are especially valuable for organizations that rely on them for online collaboration and communication, where the use of portals reflects positively on a project's objectives of reducing completion time, enhance decision making, and improve reliability and productivity (Fernandes, Raja, & Austin, 2005)

Conforming to their new functionality as online service integrators, higher education institutions also incorporated units and capabilities that once had their own access Web site, such as the library, into their portals. Many libraries require authorized access to use their services,

and since the portal requires authenticated access before any service is rendered, it is logical to do such integration (McGeary, 2005). Additionally, this arrangement facilitates remote access to library services, since logging on to the portal acts as a proxy for users who will be qualified as legitimate authenticated users.

In summary, portals in general settings, such as campus, government, and corporate environments were evaluated, but few studies examined in greater detail a single portal in terms of its use patterns and user acceptance. This study aims to advance our understanding of portal technology acceptance in an educational institution. Since one for the facets of the portal is a communication medium, the study further examines the BB module as a voluntary two-way, push and pull (Kendall & Kendall, 1999) means of reaching other students and faculty.

Methodology

The study used a survey instrument for data collection, and the ANOVA statistical analysis was used on interval data to uncover any differences between faculty and student attitudes and portal use patterns. For nominal data, the Chi square test was used. The authors believe that the use of the survey instrument approach is an appropriate venue to collect data from users of portal systems, because users can express their opinions and perceptions about system ease of use and usefulness on an interval scale, which is well captured by a survey instrument.

The survey instrument was developed based on several earlier studies (King, 2001; Morley & LaMaster, 1999; Sanders & Morrison-Shetlar, 2001). In addition, the constructs developed to measure user technology acceptance are based on the TAM model (Davis, F., 1986; Davis, Fred D., 1989; Venkatesh et al., 2003), which are the user's perceptions of technology ease of use and usefulness. After the questionnaire was developed, several faculty members who used the portal and were interested in its implementation reviewed it. Several questions were added, and ambiguous ones were either clarified or removed. A pilot study involving fifteen faculty members and students was conducted to test the survey's clarity, completion time, and questionnaire face validity. Additional modifications to the survey were made to enhance its clarity and readability.

The survey was divided into three parts and two versions, one for the faculty and another for the students, and contained 26 questions.

Both versions were identical, except for two extra questions for the students that inquired about their living location and their educational attainment. The first part inquired about the demographic variables of the participants, such as age, gender, and student level. The second part inquired about participants' use of computers in general and the portal system in particular, including usage for entertainment, education, general information, communication, and other uses. In addition, this part asked participants to rate their computer literacy at one of three levels (novice, intermediate, and expert, with examples for each level). The third part inquired about the participants' attitudes towards using the portal system in general and the BB module in particular to be answered on a five-point Likert-type scale, ranging from strongly agree to strongly disagree.

The survey was published on the Web for easy access. A random sample of 2400 students (25% of student population) and 400 faculty members (90% of the faculty population) was selected. Two hundred and nine (9%), students, and 42 (10.5%) faculty members responded, for a total of 251 responses (9%) of the sample. Respondents were given about three weeks to log on to the survey Web site. Table 1 shows the survey questions and the constructs they measure. Using the portal, and the BB module in particular, required users to engage in several steps, such as logging in, navigating to the needed module or page, viewing the module, and choosing the functionality needed for use (for example, responding to a post, reading a threaded discussion, uploading material, and so on). Thus the survey questions focused on the portal and the BB user acceptance in particular. Other modules incorporated in the portal, such as news and announcements, do not involve any user action beyond viewing them if only headlines are needed, or a further click if details are sought.

Survey question	Construct measured
Q.17, Q.19, Q21	Portal easiness of use
Q.20, Q24	Portal usefulness
Q.25	Bulletin board usefulness
Q.26	Bulletin board easiness of use

Table 1 Survey questions and constructs measured tabulation

Survey administration

The survey was put on the Web for easy access. Users were asked to log on to the survey site and answer the survey questions, which take about 5 to 7 minutes to answer. The survey had a greeting section that instructed the respondent on how to answer the survey, and allowed the respondent to indicate whether they were a student or a faculty member. Based on their answer, the appropriate survey questions were displayed. When the respondents finish answering the survey, they clicked on the submit button at the bottom of the page, after which they are taken to a thank you message that contained a link to an email address so that respondents could communicate any comments or concerns they may have had while responding to the survey.

Study Results

The SPSS package was used to perform the data analysis. ANOVA (Analysis of Variance), and homogeneity of sample groups means were the statistical models used to perform the analysis. Simple ratios were calculated to get a 'feel' of the data. The sample demographics tilted towards females for students, and males for faculty. The students have an average age of 22.88 years old, divided between 86 (41.1%) males and 123 (58.9) females. Faculty, on the other hand, have an average age of 47.86 years old, divided between 24 (57.1) males, and 18 (42.9) females, as shown in table 2. Twenty seven percent of the students live on campus, and more than half, or 55.4%, live off-campus (the remaining 17% did not indicate where did they live). Living off-campus gives students more incentive to use the portal to access the university resources they need, especially if they are registered in distance education classes.

The survey shows interesting differences and similarities in the portal modules use patterns among students and faculty members. While 26.2% of faculty members used the portal for email, the ratio rises up to 69% for students (table 3). Twelve percent of the faculty used the BB module on the portal, but more

	Male	Female	Total
Students	86 (41.1%)	123 (58/9%)	209 (100.0%)
Faculty	24 (57.1%)	18 (42.9%)	42 (100.0%)
Total	110 (43.8%)	141 (56.2%)	251 (100.0%)

Table 2 Student/Faculty gender cross tabulation

than 39% of students used that module. It is clear that students relied more on using the portal for communication than faculty members did. Differences between faculty and students in the use of the news and distance education modules were less evident. In addition, faculty received announcements using internal emails or memos, thus they relied less on the portal for that purpose. To statistically measure any differences, the Chi square test was used and results are shown in table 4.

Only statistically significant differences are shown in table 4. Chi square tests affirmed the use pattern differences between students and faculty of the email, BB, and announcements modules.

Table 5 presents the mean responses of faculty to the questions measuring their perceptions of ease of use and usefulness for the portal collectively and the BB's module specifically. Faculty viewed the portal as somewhat easy to use and somewhat useful (M = 3.0079, SD = .91209; and M = 3.0238, SD = .97501). Their perceptions of the BB module's ease of use and usefulness were less positive (M = 2.67, SD = .954; and M = 2.98, SD = 1.070) respectively. Figures 1 and 2 graphically depict users' ease of use and usefulness perceptions for the portal and the BB module.

Table 6 shows the mean responses for students' perceptions of the portal and BB's module easiness of use and usefulness. Clearly, the averages were much higher for students than faculty on all measures (M = 3.8644, SD = .73759; and M = 3.4880, SD = .883413) for portal ease of use and usefulness, and (M = 3.13, SD = .991; and M = 3.31, SD = .962) for BB ease of use and usefulness, respectively.

	Email	Bulletin board	News	Announcements	Distance ed.
Students	144 (68.9%)	82 (39.2%)	45 (21.5%)	91 (43.5%)	38 (18.2%)
Faculty	11 (26.2%)	5 (11.9%)	7 (16.7%)	6 (14.3%)	10 (23.8%)

Table 3. Student/Faculty module use cross tabulation

These numbers are illustrated in figures 3 and 4, which show a clear skewness to the right on both measures.

To examine the presence of any significant difference between students and faculty in their attitudes towards the university portal or its BB module, the ANOVA model was used. However, before the ANOVA model could be used, its assumptions should be verified. Three conditions should be checked to assure that the ANOVA test is properly used: sample randomness, homogeneity of variances, and normalcy of population distribution. The sample used in this study was randomly selected from the population of students and faculty members. The populations investigated in this study are fairly large (close to 14,000 members), thus it is safe to assume that the population is normally distributed. Finally the variances between the means in the samples are expected to be equal or homogeneous. A homogeneity test was performed on the data and the hypothesis that the means are equal in the sample is not rejected.

In addition to the variables of portal and BB ease of use and usefulness, other related variables were included in the analysis. These include trouble logging into the portal, and the perception of the importance of the portal. As the ANOVA analysis in table 7 shows, there were significant differences between faculty and students on a number of variables. These include the perceptions of the portal's ease of use ($F = 43.378, p < 0.00$), perceptions of portal usefulness ($F = 10.216, p < 0.00$), ability to logon to the system ($F = 4.16, p < 0.04$), perceptions of the portal's importance ($F = 20.74, p < 0.00$), perceptions of the BB's usefulness ($F = 3.96, p < 0.05$), and the perceptions of the BB's ease of use ($F = 7.87, p < 0.00$).

The results of the statistical analysis show interesting differences between students and faculty in their perceptions of the university's portal and the embedded BB module (table 8). Students perceived the portal and the BB as easy to use and useful more than faculty did. However, students had more difficulty in logging into the portal. What is interesting to note is that both groups did not see the portal as an important educational medium.

Discussion

This study set out to answer three questions about student and faculty experiences with, and attitudes towards, a portal system that included many features, among the most important of which are the BB, news, announcements, and distance education modules. The study found

Student/Faculty	Value	Asymptotic Significance < 0.05
Portal email	27.009	0.000
Portal BB	11.534	0.001
Portal announcements	12.623	0.000

Table 4 Chi Square values for student/faculty and portal use

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Portal easiness	42	1.00	4.67	3.0079	.91209
Portal usefulness	42	1.00	5.00	3.0238	.97501
BB easiness to use	42	1	5	2.67	.954
BB usefulness	42	1	5	2.98	1.070
Valid N (listwise)	42				

Table 5 Descriptive statistics for faculty answers to portal and BB easiness of use and usefulness

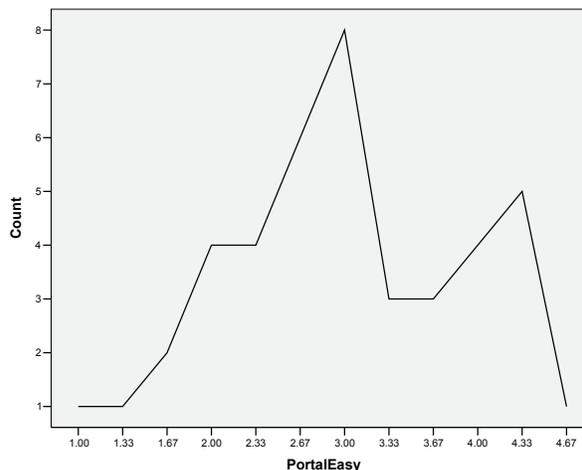


Figure 1 Faculty portal usefulness perceptions graph

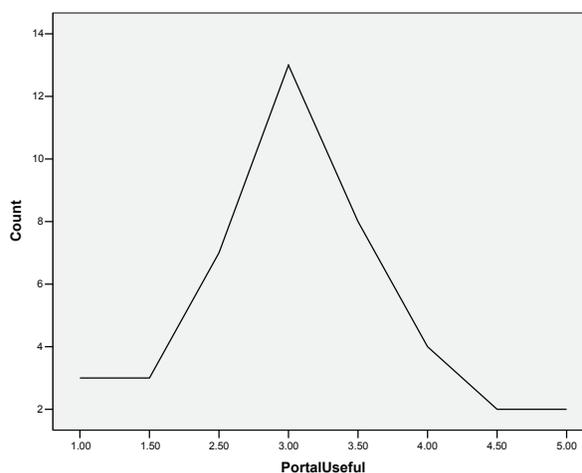


Figure 2 Faculty portal ease perception graph

that some of these modules are used much more extensively, such as email and announcements, than are others. It also found that students and faculty had significant differences in their perceptions of the portal and the BB module's ease of use and usefulness. Students manifested higher levels of acceptance of the portal and the BB module, although they experienced portal access difficulties, and had less favorable impression of the importance of the portal as an educational medium.

The first question inquired about the use patterns of the portal's modules by students and faculty. Table 3 in the results section shows that students used the email module most, followed by the announcements, the BB, the news, and lastly, distance education. Every student is required to have an email address and has a mailbox accessed from the portal. Faculty can send out mass emails to all students who are registered in their classes. Students find faculty emails through the portal and use it to reach them. Thus email is an important means of communication between students and faculty, and as the data shows, it is actively used by both groups for communication.

It is important to note that email is a 'two way' communication medium, where information is both pushed and pulled (Kendall & Kendall, 1999). This is also true for the distance education and BB modules. News and announcements, on the other hand, are push technologies, where information is sent in one way, from source to destination. Announcements are mostly related to events on campus, thus they are used more often than the news module, which includes news pieces collected from different Web news sources.

The second study question inquired about student and faculty perceptions of the portals' and BB's easiness of use and usefulness. The BB module received further special attention in this study because it is a voluntary medium for communication between students and faculty, and between students themselves. It is also an asynchronous two-way communications medium that allows participants to view earlier posts by other users related to a particular subject (threaded discussions).

Table 5 shows the mean responses of perceived ease of use and perceived usefulness of the portal and the BB module by the faculty. Faculty viewed the portal as somewhat easy to use and somewhat useful; however, they had a less favorable reception for the BB module. The survey allowed for additional comments that provide some insight into these perceptions.

Descriptive Statistics					
Portal easiness	209	1.33	5.00	3.8644	.73759
Portal usefulness	209	1.00	5.00	3.4880	.83413
BB easiness to use	209	1	5	3.13	.991
BB usefulness	209	1	5	3.31	.962
Valid N (listwise)	209				

Table 6 Descriptive statistics for student answers to portal and BB easiness of use and usefulness

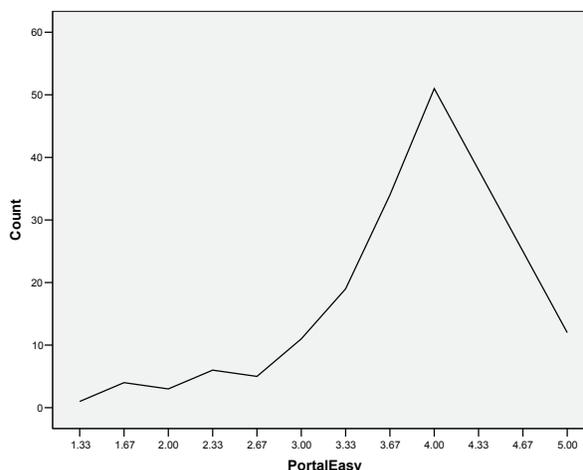


Figure 3 Students portal easiness perceptions graph

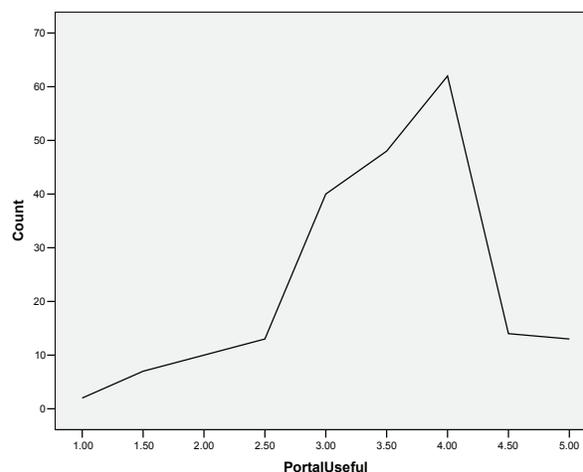


Figure 4 Student portal usefulness perceptions graph

Many expressed their frustration with using the portal and many of its modules. For example, the system session time-out (15 minutes) was perceived as too short. In addition, the email and BB modules did not work for some faculty members, and the lack of some needed features resulted in the abandonment of the portal's use altogether. Others complained from

		Sum of Squares	df	Mean Square	F	Sig.
Portal ease of use	Between Groups	25.655	1	25.655	43.378	.000
	Within Groups	147.267	249	.591		
	Total	172.923	250			
Portal usefulness	Between Groups	7.537	1	7.537	10.216	.002
	Within Groups	183.696	249	.738		
	Total	191.233	250			
Trouble logging in	Between Groups	5.538	1	5.538	4.163	.042
	Within Groups	331.211	249	1.330		
	Total	336.749	250			
Portal is important	Between Groups	22.081	1	22.081	20.745	.000
	Within Groups	265.035	249	1.064		
	Total	287.116	250			
BB usefulness	Between Groups	3.809	1	3.809	3.962	.048
	Within Groups	239.378	249	.961		
	Total	243.187	250			
BB ease of use	Between Groups	7.637	1	7.637	7.871	.005
	Within Groups	241.582	249	.970		
	Total	249.219	250			

Table 7 Faculty/student perceptions ANOVA analysis

the many 'clicks' needed to reach a particular resource, such as a class's homepage, or the grade and attendance reporting modules on the portal. Difficulty in logging on to the portal was another hindering factor. The BB did not contain the features expected from a threaded discussion platform, such as the ability to perform a keyword search, or use avatars, which are standard features on open-source and commercial online BBs (distributed by PHPBB and vBulletin, respectively). Figures 1 and 2 graphically depict faculty's portal perceived ease of use and usefulness.

Students, on the other hand, had a different experience and perception of the portal and the BB module. Table 6 shows that students had a higher level of perceived portal and BB ease of use and usefulness. Students had fewer complaints about the portal, although they shared the inconvenience of the short time-out period. Despite the fact that more students used the portal's BB module than faculty did, the percentages are low, compared to a better-utilized system, where percentages are above 70%. Students who did not use the portal's BB attributed it to the lack of enough participants using that system. More importantly, they declared the lack of faculty support, encouragement, and participation in the BB module as the prime reason for not using it. Although instructors' participation and involvement is not a technical

pre-requisite to using the BB module, students viewed faculty's participation as a crucial catalyst for the BB module's use. Student's perception of the portal's ease of use and usefulness are shown in figures 3 and 4.

The third study question inquired about any significant statistical difference between students and faculty in their perceptions of the portal's ease of use and usefulness. One way ANOVA was used to test for these differences, and the results are shown in table 8. Students and faculty differed in their perceptions of the portal's ease of use ($F = 43.378$; $p < 0.00$), and usefulness ($F = 10.216$; $p < 0.00$), and the BB's ease of use ($F = 7.871$; $p < 0.00$) and usefulness ($F = 3.962$; $p < 0.05$). Although the BB module is an integral component of the portal, the danger of this confounding the results is minimized by the fact that the BB is only one of

	Faculty M (SD)	Student M (SD)
Portal easiness of use	3.00 (0.91)	3.86 (0.73)
Portal usefulness	3.02 (0.97)	3.48 (0.83)
Problems in logging in	3.17 (1.22)	3.56 (1.14)
Portal's importance	2.93 (1.02)	2.13 (1.03)
BB usefulness	2.98 (1.07)	3.31 (0.96)
BB easiness of use	2.67 (0.95)	3.13 (0.99)

Table 8 Mean response comparison between faculty and students

the many modules that the portal contains. In addition, faculty and students can use the portal and many of its modules without using the BB component. Furthermore, participants in this study responded to different questions about their experiences and perceptions of the portal and the BB module.

Discovering that faculty had a lower level of portal and BB perceptions of ease of use and usefulness is very important because of the capacity of faculty as mentors and role models. Faculty act in a critical position of guidance for students (Catanese, Summer 1991; Ehrenberg, 1995; Rask & Bailey, Spring 2002). They provide the mentoring and leadership students need as they navigate the educational maze. If faculty emphasize the importance of a topic, or the use of a technology, it is expected to raise the interest and curiosity of most students. The reverse is also true. When a technology that is designed for educational purposes for both students and faculty is neither emphasized nor used by faculty, students are not as likely to have an interest in it or to have a high propensity to use it.

Students and faculty were asked about any problems they faced when they tried to access the portal's resources, and their perceptions of the importance or significance of the portal as an educational medium. Students expressed that they had more trouble logging into the portal, and they viewed the portal as not an important educational medium, despite the fact that they perceived it as easy to use and useful. This could be attributed to the de-emphasis and lack of use of the portal by faculty.

The results of this study coincide with the results of earlier studies on campus portals. For example, Li and Wood (2005) reported that many of the educational institutions they surveyed faced challenges in portal deployment and maintenance mostly related to the implementation of a single log-on system, security and lack of acceptance. Institutions that took the initiative to evaluate their portals found that at least one third of the faculty and students were not satisfied with its services.

This study also affirms the importance of the constructs of technology perceptions of ease of use and usefulness as prerequisites or antecedents for technology acceptance and eventual actual use (Venkatesh, 2000; Venkatesh et al., 2003). User acceptance of a technology necessitates the presence of both ease of use and usefulness from the perspective of the prospective user. The presence of one of these conditions is necessary, but not sufficient, for a technology's eventual deployment.

Conclusions

Portals are taking center stage in providing access to organizational informational resources. Because of the wide constituent base they serve, it is important to evaluate their acceptance and their use patterns. This study explored the use patterns and user acceptance of a campus educational institution portal. The study found that certain modules on the portal were used more often than others. In addition, the portal and one of its modules, the BB, had mixed perceptions of ease of use and usefulness from its users, students and faculty.

User acceptance could be positively influenced in several ways. One way would be to provide training sessions on either the whole portal or one or more of its modules. Online documentation is available in many instances for portal systems and their modules; however, during live training sessions immediate feedback from users about certain aspects of their experiences is much more valuable. User feedback is critical for any successful system implementation. It can expose any system over- or under-emphasis on particular aspects of the portal or its modules.

Special attention should be paid to faculty training and acceptance of portals, since they act as opinion leaders and role models for students. In fact, they are the ones who will demonstrate the use of portals to students, and the use of any particular module that they will subsequently use in their classes, such as BB or e-groups. Since faculty lie in a different age group than students (average age in this study was approximately 48 years old), and they have a different set of skills, experiences, and expectations, their acceptance demands special attention.

Portal implementation is a critical phase that carries the *first impression syndrome*. A feature-rich portal does not necessarily translate into user-friendliness or high use rate for the portal or its modules. *More is less* applies very well in these situations. Portal systems vendors aim to sell a full-featured package that will appeal to all institutions in a particular industry (educational, medical, governmental, commercial, and others), or pan-industries. Phased portal implementation and adding features as users' experiences grow and accumulate is favorable to a full implementation that could otherwise be perceived as overwhelming, and draw unintended negative reactions. In addition, problems in accessing a portal should be swiftly resolved and minimized whenever possible. Taken together and from all perspectives, system and users,

successful portal implementation can take an institution to a higher level of performance and service.

Study limitations and recommendations for future research

The generalizability of the results to other institutions, whether educational or commercial, is limited by the fact that this study was conducted in a single institution, and not across several institutions. The random sample approach taken mitigates this drawback; however, further studies should be inclusive of additional individual institutions. The response rate in this study is another limitation. Although 2800 emails were sent to faculty and students (2400 to students and 400 to faculty,) the response rate was about 9% from both faculty and students.

Future studies could take the action research and phenomenology qualitative approaches to closely follow portal implementations and document their most salient success aspect and implementation limitations. Feature-rich portals pose special challenges because they contain many modules that cater to different needs for different groups of users. Each individual module should have its own evaluation and fit examination within the complete module matrix.

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