An Exploratory Study of the Effects of Gender on Student Learning and Class Participation in an Internet-Based MBA Course

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1 AUTHOR:

J.B. Arbaugh
University of Wisconsin - Oshkosh
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J. B. Arbaugh
University of Wisconsin Oshkosh, USA

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Abstract *Internet-based instruction is gaining acceptance as an alternative to the traditional classroom setting. However, since it is a relatively new means of communicating knowledge, research on its effectiveness is still in its infancy. This means that questions that have been thoroughly studied for traditional classrooms may need to be revisited for internet-based courses. One question is: Do men and women have differing levels of learning and participation in an internet-based course? In an initial attempt to answer this question, this study reports on the results of comparing men and women in an asynchronous MBA course. There were no significant differences in learning, and moderately significant differences in class participation. Men reported more difficulty interacting in the course, and interaction difficulty was a significant predictor of class participation. The article concludes by using the findings to provide implications and recommendations for institutions seeking to develop internet-based courses and programs.*

Introduction

Internet-based instruction is gaining acceptance as an alternative and a supplement to traditional classroom instruction for management education (Alavi et al., 1997; Rahm and Reed, 1997). Since the delivery of education via the internet is a relatively new phenomenon, further research is needed to make definite conclusions on whether internet-based courses are an effective and appropriate means for disseminating knowledge and information (Hiltz and Wellman, 1997; Rahm and Reed, 1997). This research needs to consider several variables, among which are type of course, technology applications (hardware, software, ISPs, etc.), pedagogical approaches, instructor characteristics, and student characteristics (Dede, 1991; Thach and Murphy, 1995). One student characteristic that has received increasing attention in other studies of technology adoption is gender.

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While gender effects on attitudes toward PCs and usage has been studied thoroughly (Dyck and Smither, 1994; Gattiker and Hlavka, 1992; Maurer, 1994; Whitely, 1996, 1997), whether there are gender effects on on-line communications is just beginning to receive attention (Gefen and Straub, 1997).

While empirical study of gender effects on internet-based communication is a relatively new research stream, there is anecdotal and theoretical evidence that suggests men and women conceptualize and use the medium differently. Prior researchers have argued that men see cyberspace in general and internet-based education in particular as a way to provide education to the masses more quickly and at less cost. This research suggests that men also communicate via the medium in a competitive mode, either elevating their own status or lowering that of others. On the other hand, it has been suggested that women see cyberspace as a means to develop increased collaboration and support networks for increasing learning and communication of the entire group (Brunner, 1991; Canada and Bruscha, 1991; Gefen and Straub, 1997; Herring, 1996). If these observations are accurate, they may have significant implications for how a business school should develop and deliver internet-based courses. If the courses were designed to promote collaboration, they could be an effective tool for reversing declining enrollments of women in MBA programs (MacLellan and Dobson, 1997).

This article reports on a study that examined gender effects in internet-based courses. The remainder of the article is divided into three sections. The first section reviews literature on technology and gender differences in education to develop a theoretical perspective on the influence of gender in internet-based courses. The second section reports the results of testing that perspective with an asynchronous MBA course at a Midwestern US university. The third section identifies implications and recommendations for business schools based on the study's findings.

Literature Review

Theoretical Perspectives on Internet-Based Education

Because internet-based instruction is relatively new, it has received limited research attention (Frost and Fukami, 1997; Leidner and Jarvenpaa, 1995). While there is some anecdotal evidence that internet-based instruction may enhance the classroom environment and support student learning (Dumont, 1996; Frand and Broesamle, 1996; Partee, 1996), there is a paucity of empirical research in the management education literature that supports this conclusion (see Hiltz and Wellman, 1997, for examples). However, the information systems and technology adoption literature suggest that as technology for navigating and communicating via the internet has advanced, it also has increased the ability of people to collaborate electronically (Chidambaram, 1996; Townsend et al., 1998; Warkentin et al., 1997). These advances have helped move electronic group interaction from being almost exclusively task oriented (Fussell and Benimoff, 1995; Hiltz et al., 1986; Kiesler and Sproull, 1992) to allowing groups also to develop socio-emotional intimacy (Chidambaram, 1996; Kinney and Panko, 1996).

These empirical findings provide increasing support for previously developed theoretical perspectives on fit between learning mode information technology.

Several authors have pointed out potential opportunities for collaborative interaction in cyber-education (Cole et al., 1994; Dede, 1990, 1991; Dumont, 1996). One of the most comprehensive theoretical arguments in favor of using virtual classrooms for collaborative learning was presented by Leidner and Jarvenpaa (1995). These authors argued that features such as networked group software and electronic mail encourage more student-to-student interaction in both synchronous and asynchronous settings, and therefore best support cooperative models of learning. In contrast, using the internet only to provide access to printed information and/or databases would best support the constructivist model of learning, where each individual is responsible for his or her own knowledge construction.

The findings also support the notion that the electronic classroom may be better served by a collaborative model of instruction rather than the traditional lecture model (Alavi et al., 1997; Leidner and Jarvenpaa, 1993, 1995). The conclusions of other authors on distance education also suggest that the lecture model may not be as effective in virtual classrooms as it is in physical ones (Ahem and Repman, 1994; Gibson and Gibson, 1995; Plater, 1995; Thach and Murphy, 1995). Two of the major reasons for this are the opportunity for information overload and the dynamism of the medium. Previous studies of electronic classrooms contend that the volume of text-based material can be overwhelming (Atkinson and Kydd, 1997; Dumont, 1996; Hiltz and Wellman, 1997). In this setting, merely placing lecture notes on top of the 'pile' of linked documents would not be very helpful. Also, since the medium is considered to be a non-linear vehicle for instruction (Leidner and Jarvenpaa, 1995), students can supplement course material by incorporating the results of their own web searches and personal experiences into the classroom setting at their convenience. This is different from the typical physical classroom where the instructor must acknowledge the students before they can contribute to the class discussion.

Gender, Management Education and the Electronic Classroom

Based on studies of gender differences in communication and technology usage, encouraging collaboration in internet-based courses may be quite favorable to women. Previous studies of differences in communication patterns between men and women have found that men tend to communicate on the basis of social hierarchy and competition, whereas women tend to be more network-oriented and collaborative (Kilbourne and Weeks, 1997; Tannen, 1995). These differences have been evident in MBA programs, where curriculum, classroom conduct, and culture have been structured to be more supportive of male communication patterns (Sinclair, 1995). These structural and cultural barriers have been mentioned as a partial cause of the recent decline in female enrollments in MBA programs (MacLellan and Dobson, 1997; Simpson, 1995). Therefore, a collaborative internet-based environment could be used to help reverse this decline.

These findings on gender differences in communication patterns recently have been extended to electronic communication technology. Gefen and Straub (1997) found that women in the workplace setting perceived email to have a higher social presence and to be more useful than men did, while men found email to be easier to use. Therefore, they inferred that women use email to form more interactive

and context-building exchanges, since women seek to build a cooperative context, whereas men focus more on message content. Another aspect of electronic communication that favors women is that the medium lets everyone speak equally, instead of one person dominating a conversation (Finley, 1992; Strauss, 1996), which tends to be more consistent with female discourse patterns (Tannen, 1995). As a result, the social cues and presence that may favor male participation in classroom discussion are diminished in an electronic format (Rice, 1984; Sproull and Kiesler, 1991). This suggests that men would find electronic communication easier to use for information dissemination, but more difficult to use for interaction among students or co-workers.

Prior research also suggests that internet-based courses have the potential to be a much friendlier environment for women than earlier studies of gender and computing technology predicted. Earlier studies found that women tended to have more negative attitudes toward computing and technology than men did (Canada and Brusca, 1991; Ogletree and Williams, 1990), but recent studies show these attitudes are changing. Three of the main reasons for this shift in attitudes are age, experience, and ownership. Recent studies have found that while gender differences toward computer usage may exist among school age children, they tend to disappear once people are old enough to enter the workplace (Kraut et al., 1996; Whitely, 1997). As computer usage has become commonplace, women have gained more experience with computers, thereby reducing their general level of anxiety toward them (Dyck and Smither, 1994; Maurer, 1994; Thompson et al., 1994). When the experience is supplemented with training, differences in anxiety and performance disappear (Colley et al., 1994; Torkzadeh and Koufteros, 1993). Lastly, as computers have become more affordable with the advent of the sub-$1000 PC, the percentage of US households that own a computer has risen to around 45 percent (Burrows et al., 1998). Prior studies also have shown that if a user owns a computer, gender differences in attitudes toward computers and self-efficacy in using computers become negligible (Houle, 1996; Gattiker and Hlavka, 1992). This implies that women will have more access to computers at home, thereby increasing their confidence in using them. As their confidence increases, so could their ability to perform in the collaborative internet-based classroom.

Background for the Study

This combination of a favorable fit between communication style and technology applications and diminishing negative attitudes toward computers suggests that women may find the electronic classroom a more welcoming 'place' than the traditional classroom. Therefore, it is likely that we would see significant differences in the conduct and performance of men and women in the electronic classroom. The following section discusses specific areas that will be examined in the study.

Student learning. A primary area in which we might see gender-based differences is student learning. A number of studies suggest that there is no difference in student learning when distance education settings are compared to traditional classrooms (Alavi et al., 1995; Barnard, 1992; Dumont, 1996; Frand and Broesamle; 1996; Gibbons, 1989; Hiltz and Wellman, 1997; Ramarapu et al., 1997; Stork and

Sproull, 1995; Wetzel et al., 1994). However, these studies primarily have examined other distance learning media, such as compressed video, and they did not specifically examine the impact of pedagogical approaches (Hiltz and Wellman, 1997; Russell, 1997). Based on the literature review, class format and nature of course assignments can be expected to play a significant part in determining whether there will be gender-based differences in learning in the electronic classroom. Given the differences in how the genders perceive and use the medium (Gefen and Straub, 1997; Herring, 1996), an internet-based course designed in a collaborative format should favor women.

Class participation. Based on the literature review, another area in which we might see gender differences in internet-based courses is student participation in class discussion. Student involvement and participation have been noted to be crucial in studies of various distance education formats (Alavi et al., 1995; Catchpole, 1993; Leidner and Jarvenpaa, 1993; Webster and Hackley, 1997). The differences in participation may occur for a variety of reasons. The limits on face-to-face interaction reduce participants' social presence, thereby diminishing traditional social cues for participation (Rice, 1984; Sproull and Kiesler, 1991). This helps to make participation more equal across participants (Dede, 1990; Hiltz et al., 1986; Strauss, 1996). Since previous studies of gender communication and technology usage have found that women tend to be more adversely affected by the social cues associated with traditional and video classrooms (Armstrong-Stassen et al., 1996; Tannen, 1995; Corston and Colman, 1996), it is likely that they would participate more in an electronic classroom. This is supported by recent research showing that women perceive electronic communication to have a higher social presence than men do (Gefen and Straub, 1997). If the electronic classroom is set up to encourage collaboration, the fit between technological medium usage style (Brunner, 1991; Herring, 1996) and class format (Leidner and Jarvenpaa, 1995) should favor the increased participation of women even further.

Another factor that may influence the level of participation is the perceived difficulty of interacting with other participants. Perceived ease of use has been been well established as a variable that determines whether users adopt a particular technology (Davis, 1989; Davis et al., 1989; Thompson et al., 1994). While previous studies have found that men find electronic technology easier to use (Gefen and Straub, 1997), the importance of context also must be considered when examining its effects on internet-based courses. If electronic communication is used merely to disseminate information, as would be the case in objectivist or competitive environments, then it would be a better fit for men, based on how they tend to use the medium (Brunner, 1991; Hiltz et al., 1986). But if the medium is used for collaborative efforts, it would be a better fit for women (Herring, 1996; Kilbourne and Weeks, 1997).

Methods

Class Section Description

The class section used for this study was conducted over an 8-week period during summer 1997. The course used in the study provided MBA students with an initial

overview of the key terms and concepts of Strategic Management. Since the MBA program at this university primarily targets working professionals, it was expected that most students could apply these terms and concepts directly to their work situation, which, in turn, would provide material to generate class discussions. Therefore, structuring the course in a small group discussion-based format allowed the students to be co-producers of course content and learning (Lengnick-Hall and Sanders, 1997) and created a collaborative environment in the course.

The class had 27 students (14 men, 13 women). Approximately half the class had undergraduate degrees in business (6 men, 7 women) and five men had degrees in engineering. The other students had undergraduate degrees in computer science (1 man and 1 woman), the physical sciences (1 man, 3 women), liberal arts (2 women), or education (1 man). The industries represented in the class were insurance and financial services (4 men, 4 women), general manufacturing (3 men, 2 women), paper products (2 men, 2 women), health care (1 man, 2 women), electric utilities, consulting, government, and education (1 each). There were two full-time students in the course (1 man, 1 woman). The overwhelming majority of the class was in professional or technical positions (11 men, 8 women) with six others in managerial positions (2 men, 4 women).

The class physically met together twice. The first meeting was at the beginning of the course, and consisted of web site training, a course overview, and a pre-test on course content. The second meeting was at the end of the course, and participants gave feedback on their experience, turned in their final assignments, and took a post-test. Between these two meetings, the course was administered via the web site using LearningSpace software.

Derived from the Lotus Notes platform, LearningSpace uses five sectors to simulate the classroom experience: (1) Schedule; (2) MediaCenter; (3) CourseRoom; (4) Profiles; and (5) Assessment Manager. The Schedule sector served as a 'Table of Contents' for the course. The instructor placed the course schedules and class assignments in this sector. Items such as lecture notes, discussion questions, and the course syllabus were placed in the MediaCenter sector. The MediaCenter was a shared knowledge base that stored articles, book chapters, abstracts and summaries, and multimedia presentations. Class 'discussion' was held in the CourseRoom, an interactive environment that allows participants to work in teams and discuss course material with the entire class. The CourseRoom allows this dialogue to be conducted on-line, asynchronously, or by using a combination of these approaches. This sector allows collaborative learning to take place. The Profiles sector contained participant descriptions including contact information, education and experience, and personal information. The instructor can use the Assessment Manager to give multiple choice, true or false, and short answer examinations, but it was not used in this study to control for testing effects. Since the course was a pilot in the university's MBA program, and to compensate for varying levels of student technological access and expertise, the course web site was kept as simple as possible by using only text-based materials. Course presentations and other multimedia were distributed in paper form at the first meeting.

The instructor divided the course material into six topic areas and developed discussion questions for each topic. The pattern of discussion was established using a three-step process. First, the class was divided into smaller groups to discuss a set of assigned questions and to develop answers for the questions. Then the groups

presented or posted those answers so that the entire class could discuss them further. The instructor altered the group composition for each topic area in both class sections. Finally, the entire class discussed and responded to the answers presented by the small groups.

Topic area discussions in the class were conducted with a time window of approximately 7–10 days. Within this time period, 3–5 days were allocated for small group discussions, after which the student groups posted their answers to the class web site. These small group discussions were conducted in the CourseRoom and were made private to the small group by the instructor using the software's customizing features. Students began their discussions by doing a 'cut and paste' of their assigned discussion questions from the MediaCenter and posting them as a 'Start Discussion' item within their group's work area. The students would then respond to the questions by creating a 'comment' statement to the original discussion item by clicking on a 'comment' icon and then typing their response on a newly created form. LearningSpace would then store each of the comments to an original discussion item and any comments to those comments with the most recent comments being displayed last. Students could then track the flow of comments to an original discussion by clicking on a window on the original discussion item that the software created once someone responded to a discussion item. The instructor assigned a person within each group to synthesize the group's discussion and post it on the web site. Each student had that responsibility once during the course.

Then, approximately 3 days would be allotted for overall class discussion of the answers that had been posted by the group leaders. The procedure for this discussion was similar to the small group discussions except that subsequent comments could now be seen by the entire class. At the end of this 3-day period the instructor then summarized the overall discussion by identifying key themes developed through student–student and student–instructor interaction on the questions.

Measures

Student learning. Student learning was measured using 50-question multiple choice exams in a pre-test/post-test design. For the pre-test, approximately half the class took the course's final exam, and the remainder of the class took an exam whose primary difference was wording of the questions. All students took the same exam as a post-test.

Student participation. Studies of class participation in internet-based courses are extremely limited (see Strauss, 1996, and Taylor, 1996, for examples of participation monitoring). For the most part, available studies of participation and interaction in distance education formats have measured student perceptions of interaction and participation (Alavi et al., 1997; Webster and Hackley, 1997). In this study, student participation was measured by counting each student's comments during the six course modules on the LearningSpace CourseRoom log. The log was kept only for the full class discussion to avoid intruding into the natural flow of the small group discussions.

Interaction difficulty. Interaction difficulty was measured with a three-item instrument based on theoretical and empirical work from the distance education literature adapted for the internet-based management education environment (Dillon et al., 1991; Thach and Murphy, 1995). The three items were: (1) Student–instructor interaction was more difficult than in other MBA classes I have taken; (2) Interacting with other students and the instructor became more natural with each class session (this item was reverse scored); and (3) Student–student interaction was more difficult than in other MBA classes I have taken. Chronbach's alpha for the items was .79, which is in the acceptable range of reliability for exploratory research.

Data on age and grade point average also were collected for use as control variables, but there were no significant differences between genders on these variables. Descriptive statistics for these and other variables are shown in Table 1.

Results

Student learning

The pre-test and post-test scores for each group were compared using a 2 × 2 ANOVA. The results of this comparison are shown in Table 2. While the class as a whole demonstrated significant improvement in their post-test score ($F = 4.95$, $p < .05$), these differences were not significant when the class was grouped by gender. Accordingly, there also were no significant differences between the pre-test and post-test scores of the groups. In other words, although the course was conducted in a format which prior literature suggests would be more conducive for women, they did not outperform the men in the class. An explanation for this finding may be that while the course was conducted in a collaborative manner, the learning was operationalized using a competitive measure. However, since the class as a whole demonstrated a significant learning effect, another plausible explana-

Table 1 Descriptive statistics by gender for the internet-based class (SDs in parentheses)

Variables	Men (n = 14) m	Women (n = 13) m
Learning and control variables		
Age	29.43 (3.34)	31.31 (7.27)
Cumulative MBA GPA	3.77 (0.20)	3.70 (0.24)
Pre-test score	27.36 (2.98)	26.77 (3.94)
Post-test score	37.07 (3.36)	35.92 (3.99)
No. of class section comments by topic area		
Topic area 1	43	92
Topic area 2	58	89
Topic area 3	45	82
Topic area 4	60	74
Topic area 5	17	46
Topic area 6	24	61

Table 2 Analysis of variance of test scores by gender (SDs in parentheses)

Class section/group	Pre-test score	Post-test score	
Entire class (n = 27)	27.07	36.52	F = 4.95
	(3.42)	(3.65)	p < .05
Men (n = 14)	27.36	37.07	F = .97
	(2.98)	(3.36)	n.s.
Women (n = 13)	26.77	35.93	F = 3.41
	(3.94)	(3.99)	p < .10
Pre-test and post-test comparisons by gender	F = .19 n.s.	F = .66 n.s.	

tion may be that the comparison groups may be too small to demonstrate significant differences unless the differences are substantial.

Student participation

Participation patterns for the genders are presented by module in the aggregate in Table 3 and per student in Table 4. These tables show that women, both collectively and individually, had consistently higher participation patterns than men. However, chi-square analysis of the class participation patterns (Table 3) revealed only moderately significant differences between the genders (χ^2 10.61, p < .06). Post hoc comparisons (Table 4) also revealed moderately significant gender differences in the comments made per student for the entire course, with significant differences in Modules 1, 5, and 6.

Table 3 Class participation patterns by Gender

	Class comments per module						
Class section/group	1	2	3	4	5	6	Total
Men (n = 14)	43	58	45	60	17	24	247
Women (n = 13)	92	89	82	74	46	61	444
χ^2 10.61							
p .06							
d.f. 5							

Table 4 Post hoc comparisons of comments by gender

	Mean class comments per student per module						
Class section/group	1	2	3	4	5	6	Total
Men (n = 14)	3.08	4.14	3.29	4.43	1.21	1.71	17.86
Women (n = 13)	7.07	6.61	6.23	5.54	3.54	4.69	33.69
F	4.90	1.65	2.30	0.49	3.93	5.12	3.38
p	.04	n.s.	n.s.	n.s.	.06	.04	.08

Table 5 Post hoc comparisons of interaction difficulty by gender

Class section/group	
Men (n = 14)	4.33
Women (n = 13)	3.28
F	4.18
p	.06

Gender, interaction difficulty and class participation

Table 5 shows the results of a t-test comparing the genders on interaction difficulty. Men scored higher than women, although the difference was not strongly significant (F = 4.18, p < .06).

Table 6 shows the results of a regression analysis incorporating gender, interaction difficulty, and the interaction of these variables. The results show strong support for interaction difficulty and moderate support for gender as predictors of class participation, but the interaction term was insignificant. These results imply that any explanation of the findings is tentative at best. The participation patterns suggest two different directions: men maintained a stable and moderate level of participation through most of the course, but that level dropped off at the end; whereas women had a high level of participation in the beginning of the course, dropped to a moderate level in the middle, and had a slight increase toward the end. This may be explained using theoretical prescriptions of how men and women see electronic communication. It could be that men, in their tendency to be more competitive, placed more emphasis on the competitive aspects of the course as the term progressed. They may well have opted to focus their time on exam preparation and the end-of-course project rather than on participation toward the end of the course. Conversely, women may have continued to value the collaborative environment established in the course and pursued it consistently after the novelty of the medium wore off (Gibson and Gibson, 1995). However, the comparatively small sample and the lack of consistently strong significant differences suggest that these topics require further study.

Table 6 Regression analysis of effect of gender and interaction difficulty on class participation

Dependent variable: Class participation	Model 1 (Gender only)	Model 2 (ID only)	Model 3 (Main effects)	Model 4 (Main effects and interactions)
Gender	15.84^{+}		9.77^{+}	44.54
Interaction difficulty		–7.25*	–5.88*	–1.36
Gender × ID				–9.15
Intercept	31.77**	53.12***	43.33**	23.73
r^2	.12	.18	.22	.28
F	3.38^{+}	5.28*	3.20^{+}	2.83^{+}
n = 27				

^{+}p < .10; *p < .05; **p < .01; ***p < .001

Discussion

Limitations

Before presenting conclusions and recommendations, the study's limitations should be noted. The most noteworthy limitation is the relatively small sample size. A larger sample probably would have produced more significant differences between genders. However, with concerns about information overload in internet-based courses (Dumont, 1996; Hiltz and Wellman, 1997; Warkentin et al., 1997), this limitation may have to be addressed by using multiple class sections rather than larger class sections to increase sample size.

A second limitation is the measure of learning. A single measure of learning may not completely capture the content and quality of student learning experiences, particularly since it has been suggested that learning experiences in internet-based courses are somewhat different than those in traditional classroom courses (Dumont, 1996). Also, a competitive learning measure such as exam performance probably does not completely capture the effects of a collaborative learning environment. This suggests that if collaborative methods of instruction are employed in internet-based courses, then both collaborative and competitive measures of learning should be used in future studies.

Another limitation may be the interaction of course subject matter and format. The field of Strategic Management, with its debates on issues such as whether organizational capabilities or market competition best explain differences in company performance (Henderson and Mitchell, 1997), lends itself nicely to a collaborative learning structure. More technical courses may not lend themselves as well to this format. The course's positioning within the MBA program may also have influenced the findings. Many students taking the course were relative newcomers to the program; they may have been less willing to participate than if they had been in the program longer. Therefore, studies of other types of courses should be conducted to determine the generalizability of these findings.

Implications and recommendations

In spite of these limitations, there are several findings that can be used to identify ramifications and develop recommendations for business schools that are developing or seeking to develop internet-based courses and programs. First, there were no significant differences between men and women in learning and exam performance. While this 'non-finding' certainly needs to be replicated in future studies before definite conclusions can be made, it does provide initial evidence that men and women may be on equal terms in internet-based courses. Theoretical work suggests that the collaborative learning format is highly supportive of the use of asynchronous pedagogies (Alavi et al., 1997; Leidner and Jarvenpaa, 1995; Lengnick-Hall and Sanders, 1997), and the findings here provide preliminary support for that conclusion. This suggests that concerns about the lack of face-to-face interaction in asynchronous internet-based courses may be unfounded (Chidambaram, 1996; Hiltz and Wellman, 1997). These findings also support the contention of other researchers that traditional lecture-based approaches are

probably not appropriate for internet-based courses (Dede, 1991; Dumont, 1996; Webster and Hackley, 1997). This also suggests that contrary to the traditional MBA environment, where women often encounter sexism, male-dominated cultures and learning styles, and questionable career payoff relative to men for their efforts (Marks et al., 1997; Sinclair, 1995), the internet-based environment may place men and women on a more level playing field. A clear implication of this finding for business schools is that if internet-based courses are to be successful, collaborative learning should be an integral part of course pedagogy. Other researchers have suggested that pedagogical issues such as course design will be more important than technological competence in ensuring successful distance education courses (Ahem and Repman, 1994; Dede, 1991). Therefore, instructors of internet-based courses will need to design courses around collaborative learning rather than instructor-centered activities, and business schools should provide training in collaborative learning techniques and technology usage for their faculty to help them do so (Dumont, 1996).

A second noteworthy finding is the moderate support for the notion of enhanced female participation in class discussion in a collaborative internet-based course. While several studies have shown that experience with computing technology negates gender differences in attitudes toward computer usage (Dyck and Smither, 1994; Gattiker and Hlavka, 1992; Maurer, 1994; Canada and Bruscha, 1991), this finding runs counter to expectations predicted by previous technology studies (Kilbourne and Weeks, 1997; see Whitely, 1996, for a review). This may be explained, in part, by the fact that most participants in prior studies of computer usage tended to be traditional undergraduates, whereas part-time MBA students may display a different dynamic.

The differences in class participation may be explained best by considering feminist perspectives of distance education. While delivering education to more people across greater distance has been portrayed as a masculine view of distance education, the feminist perspective sees distance education as a means to connect people into networks that seek to achieve a common enterprise (Brunner, 1991). The course structure for this study certainly reflected this perspective. Also, with the lack of face-to-face contact, the rapport dynamic of communication may have been emphasized over the power dynamic, thus allowing the women more freedom and constraining the men from participating in the class discussion (Gefen and Straub, 1997; Kilbourne and Weeks, 1997; Tannen, 1995).

This finding suggests at least two implications. First, coordinating the collaborative classroom with a potentially different discussion dynamic supports the notion that internet-based courses should have fewer students, not more students (Dumont, 1996). This suggests that business schools attempting to use internet-based education to increase their enrollments may find it difficult to do so unless they allocate additional faculty and technology resources to these courses. If this is the case, an obvious recommendation for public institutions is that if external stakeholders seek greater development of internet-based courses (Dede, 1990; Rahm and Reed, 1997), then they must also be willing to provide additional resources to those schools. Whether a school is public or private, one thing is clear: unless the school is prepared to commit substantial resources to the effort, developing internet-based courses and programs is probably not a good idea. An

underfunded effort most likely will result in the perception of a lower quality product by students and other stakeholders.

Second, a collaboratively oriented internet-based course may be more supportive for women than the traditional MBA classroom. This implication generates several interesting marketing-oriented recommendations. Business schools may want to consider marketing the enhanced networking opportunities of internet-based courses rather than their convenience since internet-based courses, at least presently, appear to be more time consuming than courses in traditional classrooms (Dumont, 1996; Warkentin et al., 1997). These schools also may want to appeal to the superior perceived usefulness and more supportive environment of the medium as a way to attract more women to their programs. With the diminished social cues of the internet-based classroom, instructors also could attract more women to their courses by paying more attention to topics of particular concern to women in the workplace such as sexual harassment, work-life balance, and the 'glass ceiling' for senior management positions.

These two findings and their emergent implications also raise some interesting perspectives on the role of culture in MBA programs. As mentioned previously, these cultures have tended to be competitive and male-oriented. An interesting question for future consideration is whether a business school can create a collaborative on-line program while maintaining a traditional MBA culture in its classroom program, or must the classroom culture change before collaboration can be encouraged in the on-line environment? In other words, what is the interaction between educational medium and program culture? Future studies comparing on-line and classroom-based MBA programs should examine this question in further detail.

Last, but certainly not least, the finding receiving strongest empirical support is that interaction difficulty has a negative impact on student participation in internet-based courses. This finding supports the conclusions of the technology adoption literature: if a medium is not easy to use, it will not be adopted (Davis, 1989). The obvious implication for business schools is that to have successful internet-based courses, the courses must be as user-friendly as possible. This can be done in two ways. As already mentioned, schools should provide faculty training in both teaching methods and the most current technology. If this is not possible, then schools should provide adequate technical support so that faculty can focus on course content and pedagogy rather than technology issues. The second way to become user friendly is through investments in current hardware and software. As the novelty of internet-based courses wears off, students will expect a high quality educational experience (Gibson and Gibson, 1995). Slow computers, incompatible systems, and software that is difficult to use will not enhance student perceptions of quality. Therefore, business schools seeking to develop internet-based courses need to invest in servers and software to make the courses accessible at all times. Also, schools can help enhance quality by developing minimum hardware and software requirements for students taking these courses. If employers are encouraging their workers to take these courses, they also should be willing to provide equipment that meets these requirements. Without minimum hardware and software requirements, courses have to be designed for the student in the class with the oldest technology, which impedes students with more current systems.

Conclusion

Certainly, much more research needs to be done to determine both the most appropriate ways of teaching internet-based courses and what type of student and instructor function best in a virtual environment. The findings, implications, and recommendations presented here are intended to move future research toward that direction. With the expectation that nearly half of all corporate training will be conducted on-line by the end of the century (Herther, 1997), the potential market for internet-based courses is tremendous. And with the right approach, internet-based courses could be used to reverse declining female enrollments in MBA programs. However, without proper investments in training, pedagogies and technology to develop these internet-based courses, business schools risk lowering the perceived quality of their programs just to keep up with the crowd. For internet-based courses, business schools would do well to follow an approach common to growth-oriented entrepreneurs. First, identify where the specific opportunities are. Second, develop the strategy to take advantage of these opportunities. Third, get the resources to make it happen (Sexton and Bowman-Upton, 1991). Otherwise, business schools may spend a lot of money, only to get disgruntled students and a diminished reputation in return.

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Contact Address

J. B. Arbaugh, College of Business Administration, University of Wisconsin Oshkosh, 800 Algoma Boulevard, Oshkosk, WI 54901, USA. [email: arbaugh@vaxa.cis.uwosh.edu]