Using Virtual Classrooms: Student Perceptions of Features and Characteristics in an Online and a Blended Course

Michele A. Parker
Assistant Professor
Department of Educational Leadership
Watson School of Education
The University of North Carolina at Wilmington
Wilmington, NC 28403 USA
parkerma@uncw.edu

Florence Martin
Assistant Professor
Department of Instructional Technology, Foundations, and Secondary Education
Watson School of Education
The University of North Carolina at Wilmington
Wilmington, NC 28403 USA
martinf@uncw.edu

Abstract

Virtual classrooms are online environments that enable students and instructors to interact as if they were face to face in a classroom. In this study, the researchers compared the perceptions of 57 undergraduate students who used the virtual classroom in a fully online and a blended education course. Students in the fully online course rated the virtual classroom features and characteristics higher than students in the blended course. There were statistically significant differences for 9 out of the 16 features that were investigated. Three of the four characteristics were statistically significant. Instructors can integrate this information in their course design and delivery to ensure that students benefit from a rewarding learning experience.

Keywords: e-learners, virtual learning community, virtual classroom, instructional design, technology

Introduction

The growth in online enrollment has exceeded the overall growth in higher education tenfold. Based on the responses from 2500 colleges and universities, the Sloan consortium survey reported that 3.9 million (over 20%) U.S. higher education students were taking at least one online course in the fall of 2007. Over 80% of these students were taking online courses at the undergraduate level (Allen & Seaman, 2008). In fact, online instruction is rapidly gaining acceptance as an alternative and a supplement to traditional classroom instruction (Arbaugh, 2000a). Today, learners have choices about how and where they can spend their time learning (Greenhow, Robelia & Hughes, 2009). As Clark and Gibb (2006) state "new technologies have changed the educational landscape by creating a variety of digital learning environments and platforms; classrooms that may be physical, digital, or a combination of the two, and instruction that can be synchronous or asynchronous (p. 768)."

Technology such as the virtual classroom is becoming increasing popular (Flatley, 2007; Gilmore & Warren, 2007; Arbaugh, 2000a; Arbaugh, 2000b). Virtual classrooms are online environments that enable students and instructors to communicate synchronously using audio, video, text chat, interactive whiteboard, application sharing, instant polling etc. These features enable faculty and students to interact as if they were face to face in a classroom. Participants can talk to each other, view each other through a webcam, use emoticons, and work together in break out rooms. Some of the virtual classrooms on the market today are Elluminate, Adobe Connect, Webex, Centra, and Horizon Wimba. Freeware versions of

the virtual classroom include DimDim and Wiziq. The interactive nature of the virtual classroom addresses the main challenges found in distance education, namely student involvement and participation (Arbaugh 2000a; Webster & Hackley, 1997; Alavi, Wheeler, & Valacich, 1995). Advantageously, the virtual classroom can be used in online and blended instructional delivery.

Currently, most of the literature on virtual classrooms is descriptive and focuses on practice (Halper, Kelly, & Chuang, 2007; Gilmore & Warren, 2007; Grosjean & Sork, 2007; Flatley, 2007; McKinnie, 2008; Anyanwu, 2003). The paucity of research on the virtual classroom focuses on MBA students (Arbaugh 2000a, Arbaugh 2000b). The purpose of this study is to compare undergraduate's perceptions of the virtual classroom in an instructional technology course, in education, which is taught online and in a blended format. More specifically, the researchers examine the student's perceptions of the features (e.g., whiteboards, text chat) and characteristics (i.e., interactivity, synchrony, usefulness and ease of use, and sense of community) of the virtual classroom. Competitive pressures and stakeholder expectations will continue to drive the push for more technologically sophisticated online courses into the foreseeable future (Arbaugh, 2000a). Research on the virtual classroom is necessary to help identify which contexts are most suitable for this technology.

Horizon Wimba Virtual Classroom

The Horizon Wimba Virtual Classroom is a live, virtual environment with audio, video, application sharing, and content display. MP4 capabilities provide the option for students to download the Wimba archives in either an MP3 or MP4 audio file format. This makes it possible for the archive to play on devices that can support these audio file formats. The design of the Wimba Virtual Classroom is grounded in pedagogy and andragogy. Pedagogy is teacher-centered and the students are dependent upon the teacher for all learning. This has been the prevailing learning model in education since the 19th century (Frisolli, 2008). In contrast, andragogy is learner-centered and was designed with the adult learner in mind. It is assumed that adult learners have experiences to contribute and can actively participate in their own learning (Knowles,1984).

The term *distance education* was given to the form of instruction that was available to the students by videoconferencing and interactive television in the mid-1980s. Currently, distance education is almost synonymous with the term online education. Though students prefer the asynchronous aspects of online education which gives them the flexibility in time and place, very few studies have proved that asynchronous delivery is a better option than synchronous delivery (Bernard et al, 2004). With the new technologies being able to provide two way interactivity, the online courses with a synchronous component might facilitate student learning (Machtmes & Asher, 2000). This study examines the synchronous aspects of online education which gives the students flexibility in place, but not in time.

Wimba Virtual Classroom Features

Wimba is a provider of collaborative learning software applications that bring human interaction into the virtual classroom through facial expressions, vocal intonations, hand gesticulation, and real-time discussion (Wimba, 2009a). The features of Horizon Wimba's Virtual Classroom are grouped into three categories based on their application: (1) discussion and interaction are facilitated by breakout rooms, emoticons, chats, videos, presentations, polls, quizzes, and surveys (2) instruction and reinforcement are implemented through the electronic whiteboard, application sharing, and the content area (3) classroom management tools include the ability to upload and store documents, an auto-populated participant list, usage details, and archive options. The software can be integrated into course management systems such as Blackboard. Additionally, it is accessible to the hearing impaired and there is a telephone number for participants to dial-in (Wimba, 2009b).

Flatley (2007) further describes the features within the Wimba Virtual Classroom. For instance, participants can chat with the speaker as well as other students privately or in the main room. Since students may participate in private chats off topic, the presenter can disable private chats. In addition, participants can provide feedback to the presenter by signaling the presenter to proceed, slow down, or stop. Participants can switch to a full screen view of the presentation at any time and can view a list of who is in attendance and their actions. Gilmore and Warren (2007) elaborate on Flately's description by stating that students can have 'real time' discussions by typing their contributions into an on-screen dialogue box. Wimba (2009a) explains that conversations can also occur using a microphone. In either case, these electronic 'conversations' can be recorded verbatim by the software (Gilmore & Warren, 2007).

Albeit outside of the Virtual classroom, Barnes, Perziosi, and Gooden (2004) examined students preferences of eight online course delivery methods, which are relevant to this study: (a) bulletin board (text-based forum for discussion and questions; asynchronous); (b) case studies (written assignments submitted via email); (c) chat room (text-based real-time discussions with students and professor); (d) exams submitted on line; (e) lecture (text-based lecture notes posted on bulletin boards); (f) PowerPoint presentations (available online or for downloading); (g) web site links; and (h) written research papers/projects (submitted via email). There were statistically significant differences among the course delivery methods. Notably, PowerPoint presentations, online lectures and chat room discussions were among the least preferred instructional methods. Further study is needed to learn about student preferences within the Virtual Classroom. Instructors can incorporate this information in their course design and delivery to ensure that learners benefit from a rewarding learning experience.

Virtual Classroom Characteristics

The features of the virtual classroom promote interactivity, synchrony, usefulness and ease of use, and sense of community (Arbaugh, 2000a). These characteristics are explained within this learning context.

Interactivity

It is widely agreed upon that interaction must be designed into instructional programs and that it is a vital component of online learning (Northrup, 2002). Although different conceptions of interactivity exist, Northrup (2002) summarizes interaction as engagement in learning. In the virtual classroom, students can interact with each other, with instructors, and online resources. Both instructors and students can act as facilitators and provide support, feedback, and guidance during live interaction (Khan, 2000). Dirckinck-Holmfield et al. (2004) and Arbaugh (2000b) highlight the importance of designing virtual communities to enable different patterns and types of interaction, for example, active participation and quieter periods of reflection. These types of interaction are feasible among participants in the virtual classroom (Arbaugh, 2000b). However it is unknown whether students in an online or blended course perceive more (or less) interactivity using this instructional method.

Synchrony

Gillmore and Warren (2007) describe synchronous technologies, as ones that *"*connect users at the same time, with each participant needing to be 'logged in' to the software to exchange electronic messages with one another as if they were exchanging words in a face-to-face setting (p. 585)." Students in online courses are used to asynchronous technologies (e.g., e-mail, websites, and discussion boards), which require more independence (Dumont, 1996). However asynchronous technologies can be taxing if students feel obligated to be online all the time. Students have found balance in setting a routine schedule to participate in online activities (Allan, 2007), which may be extended and facilitated by the use of the virtual classroom even though it requires time synchronization. While existing literature does not focus on perceptions of synchrony within the virtual classroom, several researchers have examined how synchronicity and asynchronicity affect student achievement, attitudes, and retention. They concluded that asynchronous instruction is more favorable in terms of student outcomes than mediated synchronous or traditional instruction (Bernard, et al., 2004; 2009). Bernard et al. (2004) asserts that knowing the influence of patterns, such as synchronous and asynchronous communication, can guide instructional design when instructors have choice. Therefore we seek to understand student perceptions of synchrony in the virtual classroom in both online and blended courses.

Usefulness and Ease of use

Usefulness is the functionality of the technology, whereas ease of use is how simple it is to become skillful in using the technology. Arbaugh (2000a) suggests that perceived usefulness and the perceived ease of use of a technology influences one's beliefs and attitudes toward that technology. In his article on meaningful web-based learning environments, Khan (2000) indicates that well-designed course "interfaces can anticipate learner's needs and satisfy the learner's natural curiosity to explore the unknown. This capability can greatly reduce students' frustration levels and facilitate a user-friendly learning environment" (p. 30). Khan acknowledges that access may be hampered by typical problems related to servers such as connection refusal. Students in online or blended courses may view the utility and ease of use of the virtual classroom differently, which has implications for instructional design and method, as well as learning.

Sense of Community

The development of virtual learning environments is based on the belief that learning should happen within communities (Allan, 2007). Hence, sense of community focuses on the students' experience and their relationship with each other in the virtual classroom. Four elements are essential for a sense of community - membership, influence, integration and fulfillment of needs and shared emotional connection (McMillan & Chavis, 1986 as described in Arbaugh, 2000a). In support of this, Ardichvili (2008) asserts that "people tend to actively contribute to online communities when they perceive that this enhances their professional reputations, and when they feel strong commitment to the community … (p. 544)." Identifying student's sense of community in online and blended courses may lead to adjustments that increase the effective use of the virtual classroom and learning outcomes.

Online versus Blended Course Delivery

Sloan consortium describes an online course as one in which 80% or more of the content is delivered online. Typically online courses have no face-to-face meetings Courses in which 30 to 79% of the content is delivered online are considered blended or hybrid (Allen & Seamen, 2008). Numerous scholars have compared online and blended learning (Means, Toyoma, Murphy, Bakia, Jones, 2009). In a recent meta-analysis, three studies on different courses found no significant differences between online and blended courses (Keefe, 2003; Porier & Feldman, 2004; Campbell, Gibson, Hall, Richards, & Callery, 2008) in terms of course performance. A drawback of these studies is that they did not control for instructional content for the various delivery methods. Despite this limitation other researchers have reported similar results (Caldwell, 2006; Scoville & Buskirk, 2007; McNamara, Swalm, Stearne, & Covassin, 2008). Yet, there may be circumstances in which there are differences based on course delivery. The virtual classroom may be one of these instances.

Purpose of the Study

As Cook and McDonald (2008) caution, frequently educators seek to use e-learning because of a new technology, rather than because the technology enhances instruction. They reiterate the need to critically consider "learning goals and objectives and then determine whether the e-learning environment could contribute; and if so, what modality or combination of modalities would be most appropriate" (p. 18). To address this claim, the researchers examine student perceptions of the virtual classroom in online and blended classes. The questions were

1. Do student's perceptions of virtual classroom features differ based on course delivery (online vs. blended)?

2. Do student's perceptions of interactivity, synchrony, usefulness and ease of use, and sense of community differ based on course delivery (online vs. blended)?

Method

This study was conducted at a Southeastern university in the United States. In the fall of 2008, 101 undergraduates enrolled in an instructional technology course were asked to complete a questionnaire. Fifty-seven students participated, which resulted in a 56% response rate. SPSS 16 was used to conduct the analyses. Independent samples t-tests, and an alpha level of .05, were used to determine whether or not there were significant differences between the online and blended classes, in terms of student's perceptions of the virtual classroom.

Participants

One percent of the participants were 18 years of age and younger, 73.7% of the students were between 19-24 years, 14% were 25-31 years old, and 10.5% were 32 or older. Ninety-one percent of the students were female and 8% were male. Information on race/ethnicity was not collected due to the limited number of minorities enrolled in the course.

Online and Blended Class Descriptions

Students in five sections of an instructional technology course were involved in this study. Two of the sections were fully online and three sections were blended. In the online format, the entire course was delivered completely over the internet; students did not meet face to face. In the blended format, students met predominately face to face and met online on specified dates. In both the online and blended courses, students used the Wimba virtual classroom four times during the semester for similar content. The instructional technology sections were taught by three different instructors (one instructor taught two blended sections, another instructor taught two online sections, and one instructor taught an

online section). Each instructor received the same training on how to use Wimba. They conversed prior to the study to ensure the same features were used within the virtual classroom. The characteristics of the virtual classroom were the same across sections.

Course Content

The course provides potential education majors with an overview of the key terms in instructional technology and examples of how to integrate technology into K-12 education. The course material is divided into eight topics, which include integrating educational technology into the curriculum; communication via the internet; application software and productivity tools, and hardware for educators. The textbook used for the course is Teachers Discovering Computers, Integrating Technology and Digital Media in the Classroom (5th Ed.) by Gunter, Shelly, and Cashman. Each section required the same text and assignments.

Procedures and Data collection

Instructors were trained to lead an effective virtual classroom session, through University and School based workshops. Prior to this study, each instructor had taught in the Wimba Virtual classroom. During the fall of 2008, students were introduced to the virtual classroom during one class session. The students became familiar with the interface which comprises the content frame, the presenter console, text chat area and the participant area. They learned how to use the microphone to talk to the instructor and students, to send text messages to the instructor and other students in the class, to respond to the polling questions, to raise their hands and to use emoticons. Figures 1 and 2 show screenshots of these Wimba features.
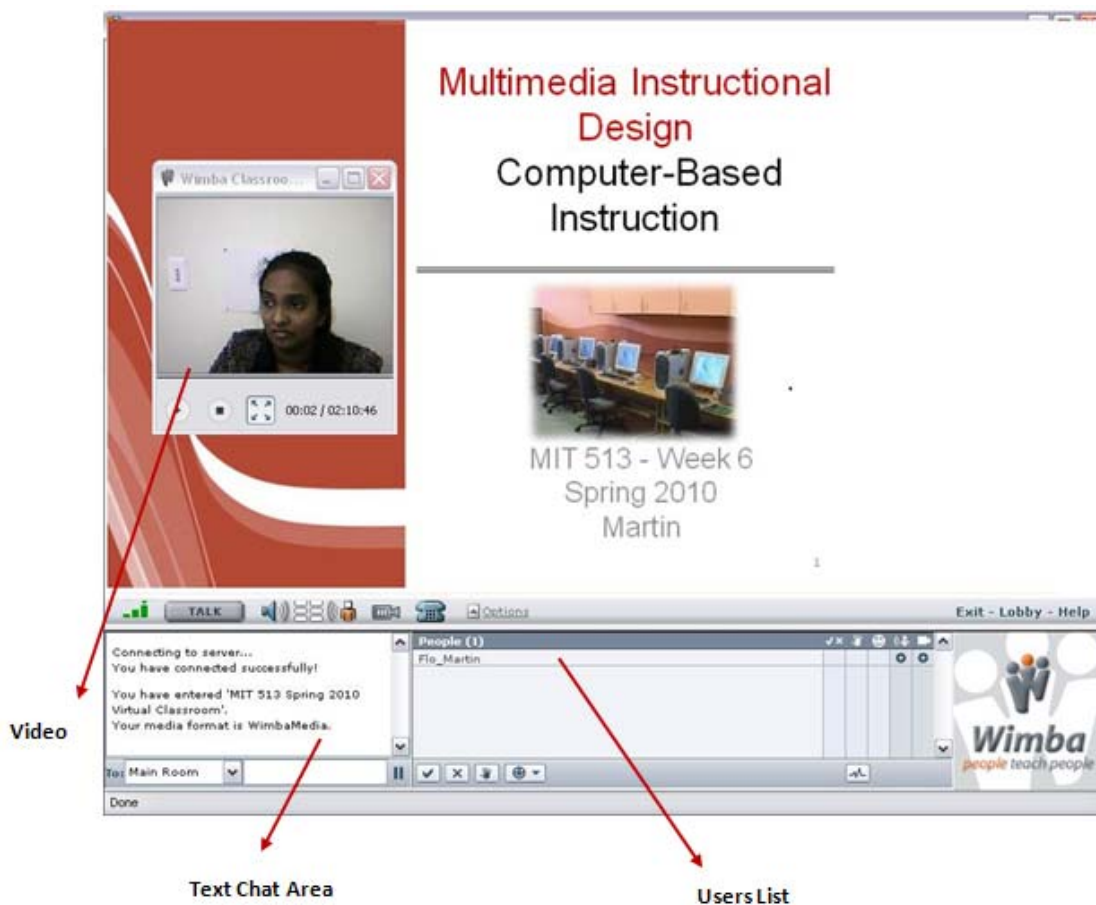

Figure 1. Screenshot of Wimba Virtual Classroom

Figure 2. Screenshot showing Interaction options

Toward the end of the fall semester, a questionnaire was administered electronically using SurveyMonkey ©.The researchers sent an email with a hyperlink to the survey and a brief message about its purpose. Students were informed that their participation was voluntary, not connected to their course grade, and that the survey was anonymous. The survey was available for a three-week period, and during this time, two email reminders were sent.

Instrument

The survey consisted of two sections that used a 4-point Likert scale (4=strongly agree, 1=strongly disagree). In the first section students were asked to respond to the question "What features of the Virtual Classroom were beneficial in your learning?" They were given 16 statements about the features. In the second section, students were asked to rate their virtual classroom experience. There were 23 items grouped in four categories, which represent the characteristics interactivity, synchrony, usefulness and ease of use, and sense of community. Scales were formed by adding the scores of the items within each category. The total score was used to analyze the respective characteristics. Prior to administration, the survey was reviewed by a group of technology specialists to determine face and content validity. After data collection, internal consistency was used to establish reliability. Cronbach's alpha for the features of the Virtual Classroom was .92 and for each characteristic as follows: interactivity α =0.70, synchrony α =0.70, usefulness and ease of use α =0.76, and sense of community α = 0.77. The scales were on or above the recommended threshold (Nunnaly, 1978).

Results

There were 22 students enrolled in the fully online course and 35 students in the blended course. Seventy four percent of the students used the virtual classroom for the first time, 19.3% used the virtual classroom for 2-4 semesters, 5.3% had never used it before, and 1.8% used it for 5 or more semesters.

Student's Perception of Virtual Classroom Features

Online students rated the feature "Viewing archived virtual classroom sessions" as the most beneficial (M=3.41). Ability to raise their hands (M=3.36) and use the polling feature to respond to questions (M=3.36) were rated as the second highest. The blended students rated the feature "Viewing desktop shared by my instructor and other participants" and "Viewing presentations posted by the instructor" as the most beneficial feature (M=3.00).

Students in the fully online course rated all of the virtual classroom features higher than students in the blended course. For example, online students rated the use of breakout rooms higher (M=2.64) compared to students in blended courses (M=2.43). Similarly, online students rated the polling feature more positive (M=3.36) than students in the blended course (M=2.80). There were statistically significant differences between the groups for 9 out of the 16 features that were investigated. Descriptive statistics, the test statistic and probability for each feature on the survey are listed in Table 1.

Table 1. Student's Perception of Virtual Classroom Features in Online and Blended Courses

	Online		Blended		
	M	SD	M	SD	t (Sig.)
View presentations posted by instructor	3.23	.61	3.00	.77	1.17(.25)
Using the whiteboard tools in class	2.77	.61	2.71	.67	.33(.74)
Reading messages from one or more members in text-based chat	3.14	.46	2.66	.73	2.76(.008)*
Posting or replying to a message in a text-based chat (one-to-many interaction)	3.18	.40	2.60	.74	3.41(.001)*
Interacting privately with one member of the synchronous text-based chat system (one-to-one interaction)	2.68	.65	2.37	.60	1.85(.07)
Talking to the others in the virtual classroom using the audio chat option	3.14	.71	2.26	.82	4.15(<.001)*
Asking the moderator questions during the virtual class session by raising my hand	3.36	.58	2.54	.89	3.85(<.001)*
Using the polling feature (yes, no) to respond to questions	3.36	.58	2.80	.72	3.09(.003)*
Expressing my feelings by using emoticons and other activity indicators	2.68	.78	2.49	.78	.923(.360)
Viewing archived virtual classroom sessions	3.41	.67	2.54	.85	4.05(<.001)*
Viewing the desktop shared by my instructor and other participants	3.23	.69	3.00	.80	1.01(.28)
Using the breakout room (group meeting room) in a virtual class session	2.64	.58	2.43	.66	1.22(.23)
Viewing websites loaded from within a virtual class session	3.00	.69	2.7	.61	1.47(.15)
Able to moderate a virtual class session	2.95	.65	2.51	.70	2.37(.02)*

* p<.05 indicates statistical significance

Student Perceptions of Virtual Classroom Characteristics

The online students rated "Virtual Classroom facilitated instructor to student interaction" and "It was easy to follow class discussion" as the highest (M=3.5) for the interactivity category. It reduced my travel cost (M=3.68) and it reduced my travel time (M=3.59) were rated the highest for synchrony. For usefulness and ease of use category, "It improved my performance" (M=3.18) and "it enhanced my effectiveness" (M=3.09) were rated the highest. They rated "I worked on my own for most of the projects" (M=3.24) as the highest for the sense of community category. On the other hand, the students in the blended course rated "Instructor frequently attempted to elicit student interaction" as the highest item (M=3.31). For the

synchrony category, students in the blended course rated "It helped me collaborate with peers without having to be in the same location" (M=2.66) the highest.

Online students rated their perceptions of each of the characteristics higher than students in the blended course. For instance, students in the online course rated interactivity higher (M=22.82) in comparison to students in the course that combined traditional and online instruction (M=19.77). The same trend exists with usefulness and ease of use, wherein the online students provided more favorable responses (M=15.32) than students in the blended course (M=13.26). Three of the four characteristics were statistically significant: interactivity; synchrony; usefulness and ease of use. In Table 2 descriptive statistics for every item and for the four characteristics are provided. The test statistic and the probability level for each characteristic are also listed.

Table 2. Student's Perception of Virtual Classroom Characteristics in Online and Blended Courses

	Online		Blended		
	M	SD	M	SD	t-test
Course Interaction	22.82	2.89	19.77	8.87	3.17 (.002)*
VC facilitated instructor to student interaction	3.50	.51	2.83	.86	
VC facilitated student to student interaction	3.09	.53	2.66	.73	
I felt that the quality of class discussions were high in the virtual classroom	3.09	.87	2.54	.89	
I learned from fellow students in this class	3.09	.81	2.46	.74	
Instructor frequently attempted to elicit student interaction	3.45	.60	3.31	.68	
It was easy to follow class discussions	3.50	.60	2.69	.87	
My typing hindered me from text based chatting with my instructor and classmates**	3.09	.68	3.28	.57	
I could not talk freely because I could not see my classmates face to face **	3.00	.62	2.62	.91	
Synchrony	17.45	1.65	13.86	3.34	4.69 (<.001)*
It reduced my travel time to the campus to attend a face to face class*	3.59	.59	2.37	.94	
It reduced my travel cost*	3.68	.48	2.34	.87	
It helped me collaborate with peers without having to be in the same location	3.55	.51	2.66	.87	
I had bandwidth limitations	2.14	.64	1.94	.77	

I had technical problems	2.27	.88	2.17	.92	
The class was monotonous	2.23	.69	2.37	.73	
Usefulness and Ease of Use	15.32	2.25	13.26	2.72	2.97 (.004)*
It enhanced my effectiveness	3.05	.79	2.37	.77	
It improved my performance	2.95	.79	2.46	.82	
It was easy for me to become skillful in using the virtual classroom	3.18	.50	2.77	.69	
I found it easy to get the virtual classroom do what I want it to do	3.05	.65	2.69	.676	
I was not confident to use the technology**	3.09	.68	2.97	.82	
Sense of Community	10.95	1.00	10.63	1.06	1.16 (.253)
I felt isolated	2.00	.62	2.34	.873	
I did not feel a sense of belonging in the classroom**	3.04	.58	2.68	.76	
Not many collaborative activities**	2.68	.72	2.71	.67	
I worked on my own for most of the projects*	3.23	.429	2.89	.90	

* p<.05 indicates statistical significance
**Represents items that were reverse coded

Discussion

This study examined student perceptions of the "new" technology, the virtual classroom in an instructional technology course taught in online and blended formats. These results suggest that online courses may provide the best form of course delivery for instructors who use the virtual classroom. In this study the online students' comfort level on the use of technology seems higher than the students in the blended courses. This was evident in the results wherein online students rated the virtual classroom features higher than the students in the blended courses. This aligns with Coleman (2009) who reports that some of the reasons students enroll in online courses are because they provide anywhere anytime learning, increase student interaction, teach skills in using technology, and instructors are more approachable. Although students selected their mode of course delivery they did not know they were using the virtual classroom prior to enrollment. Each semester the instructional technology course is offered in various formats (online, blended, and face to face), which dispels the belief that students only enrolled in the blended option, even if they were technophobes, because there was no face to face alternative.

Students in the blended courses had the face-to-face context to interact with their classmates and instructors, whereas for the online students the synchronous virtual classroom was the only mode of live interaction with their peers and instructors. Interactive features such as the ability to use text-based and audio chat, polls, and raise one's hand were preferred by students in the online sections. Apparently, the virtual classroom facilitates instructor to student interaction and interaction among students more in the online sections than blended sections. This may be due to the reliance on web-based instruction and asynchronous activities that online students are accustomed to (Arbaugh, 2000b; Barnes, Perziosi, & Gooden, 2004). Additionally, the incorporation of nonverbal cues in the virtual classroom such as the emoticons make accomplishing interdependent, ambiguous tasks such as discussions and group projects less challenging (Bielman, Putney, & Strudler, 2000). As a result, interaction can be more meaningfully and can simulate contact in traditional settings (Arbaugh, 2000b).

A majority of the virtual classroom characteristics that were examined were statistically different based on course delivery. In terms of synchrony, students in the blended course may have rated the virtual classroom lower because meeting during a specified time requires more structure, atypical of online instruction. They may have preferred activities that were asynchronous that add flexibility to the course (Barnes, Perziosi, & Gooden, 2004) as oppose to synchronous virtual meetings. At times synchrony may be hindered by connectivity issues and typing speeds, which can be problematic for students in either delivery format.

Although "sense of community" was not statistically significant, this does not imply that the virtual classroom does not foster community. In the instructional technology course, most of the projects were done individually, which might have led to the insignificant differences between the groups for sense of community. Learning a complex body of knowledge requires a sense of community (Schwen & Hara, 2004). The interactive nature of the virtual classroom, synchronous capability, usefulness and ease of use may promote a sense of community if the features are used effectively.

Higher ratings for the usefulness and ease of use of this technology by online students could be due to a myriad of reasons. One plausible explanation is that students in the online sections may be more acquainted with online technologies, which led to quicker acclimation in the virtual environment. On the other hand, technical problems and unfamiliarity with technology could have frustrated the students in the blended courses leading them to rate the virtual classroom technology lower. Additionally, students may have signed up for a [predominately] face to face course due to their comfort in more traditional learning environments and their lack of confidence in an online setting. The usefulness and easy to use of the technology will facilitate student's interest in e-learning. Students who use the virtual classroom are trained to use similar technology in their workplace (Dineen, 2005).

Due to the simplicity of the interface and features, even less technology savvy faculty may be inclined to use the software, which, in turn, will accelerate the use of the virtual classroom as an instructional medium (Arbaugh, 2000a). The design of the virtual classroom is consistent with recommended practices for adult and online learning: it reinforces the importance of classroom community, high quality instruction, organization, and flexibility in course delivery. New technologies encourage faculty to examine their teaching practices and content delivery, which can strengthen their pedagogy and student's learning experiences (Cook & McDonald, 2008). The virtual classroom may prove instrumental as it becomes widely adopted by institutions of higher education.

Limitations

This study identified the components of the virtual classroom software that learners recognized as helpful in the learning process, in online and blended sections of an instructional technology course. However there were several limitations. For instance the courses were taught by three different instructors, which may have resulted in teacher effects that affected the outcome (Slavin, 2007). Since the survey was administered during the semester while students were enrolled in the course, there is the opportunity for social desirability bias. Additionally, the survey was the sole form of measurement resulting in one source bias (Boardman & Sundquist, 2009). This instrument was created for this study and needs to be vetted prior to subsequent uses. For instance, survey questions can be inserted that address students comfort and prior experience with technology. This will help researchers determine if the students in different modalities are comparable in order to increase the validity of the conclusions. While there were 57 undergraduates, only 22 of these students were enrolled in the online sections. Hence, the results are not generalizable to other populations or courses.

Conclusions and Future Research

The findings suggest that students enrolled in the instructional technology sections taught online preferred the features and characteristics of the virtual classroom, when compared to their peers in the blended sections. Students in the online course perceived the virtual classroom more favorably than the other students, which may underscore the power of this innovative technology to transform course delivery, particularly through predominately electronic means. The virtual environment provided much desired interaction and synchrony. It may be necessary to use new instructional resources as alternative supports for student learning needs in online courses (Bernard et al, 2004).

The virtual classroom may be better suited to particular types of audiences or courses. Further research is necessary to determine if the findings of this study are replicable for this course. An expansion of this study can examine the use the virtual classroom across a variety of populations, levels (undergraduate and graduate) and disciplines (math, communication, etc). In addition, studies on the virtual classroom in

fully online environments can incorporate learning styles or personality. To strengthen the conclusions of future studies, the researchers suggest that the same instructor teach each class and that the groups have similar online class experience prior to using the virtual classroom. Once researchers have determined which course delivery method, disciplines, and levels are ideal for virtual classroom use faculty can use this information to design instructional methods to improve course effectiveness.

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