A Case Study on the Adoption and use of Synchronous Virtual Classrooms

Florence Martin, Michele Parker and Beth Allred
Watson School of Education, University of North Carolina, Wilmington, North Carolina USA
martinf@uncw.edu
parkerma@uncw.edu
allredb@uncw.edu

Abstract: This is a case study of faculty adoption and use of Horizon Wimba Virtual Classroom in online courses at a Southeastern University in the United States.. The purpose of this case study was to explore faculty adoption and use of Horizon Wimba in their online courses. This inquiry is based on Yen et al. (2010) adoption factors (organizational, social, personal and technological) and the features of the virtual classroom. The research questions are 1) What factors and features influence faculty adoption of the Wimba Virtual Classroom? 2) How do faculty rate the Wimba Virtual Classroom using the characteristics of innovation? 3) How do faculty classify themselves using Roger's model of diffusion of innovation? 4) How do faculty use the Wimba Virtual Classroom in their teaching? Roger's diffusion of innovation was used as the theoretical framework for faculty adoption of virtual classroom. In the Fall of 2010, faculty were surveyed and interviewed about their decision to adopt and use Wimba. This case study provides meaningful information for administrators interested in promoting technology enhanced learning on their campuses and for faculty considering adoption.

Keywords: virtual classroom, synchronous, online learning, technology adoption

1. Introduction

Distance education operations have evolved through generations (Taylor, 1995) where a variety of technologies have been used. The Correspondence Model based on print technology; the Multimedia Model based on print, audio, and video technologies; the Tele-learning Model, based on applications of telecommunications technologies to provide opportunities for synchronous communication; and the Flexible Learning Model based on online delivery via the Internet are four generations described in the Taylor Model. A fifth generation, the Interactive Learning Model, includes two-way interactive audio/video desktop conferencing, virtual classrooms, web2.0 tools, and mobile technology. As a result of the rapid technological change a growing number of institutions have adopted internet-based course delivery (Liaw, Huang & Chen, 2007) and have invested heavily in technology (Trentin, 2006; Yohon & Zimmerman, 2006). Massy and Zemsky (1995) conclude that higher education cannot become more productive or hold costs down unless colleges and universities embrace technological tools for teaching and learning. Yet, some faculty members embrace technology while others resist. In the 21st century, it is imperative for faculty to adopt technology for instructional purposes.

The purpose of this case study was to explore faculty adoption and use of Horizon Wimba in their online courses based on Yen et al. (2010) adoption factors (organizational, social, personal and technological) and based on different features of the virtual classroom. In the next section, we review the literature on diffusion of innovation, and on the factors that impact technology adoption by faculty. We then focus on the online synchronous and asynchronous technology and finally review research on virtual classrooms specifically focusing on Horizon Wimba.

1.1 Diffusion of innovations

Numerous studies have examined the faculty adoption of technology in their teaching (e.g., Dewan, Ganley, & Kraemer, 2010; Norton & Bass, 1987). In many adoption studies, the Concerns-Based Adoption Model (Hall & Hord, 1987) and Rogers' Diffusion of Innovations Theory (Rogers, 2003) have been used to investigate this phenomenon. The Concerns-Based Adoption Model examines the process of adopting innovations (Sherry & Gibson 2002) while the Diffusion of Innovations Theory incorporates the adoption *and* the diffusion of an innovation. Diffusion of Innovations is a theory of how, why, and at what rate new ideas and technology spread. Rogers (1995) defines an innovation as an idea, practice, or object that is perceived to be new by the

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individual, and diffusion as the process through which an innovation is communicated through certain channels over time among the members of a social system. Rogers' (1995) theory of diffusion of innovations provides a theoretical framework for analyzing technology adoption patterns.

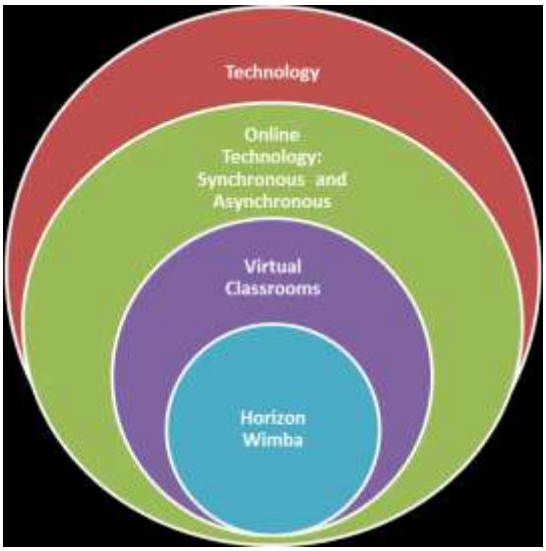

Figure 2: Technology adoption by faculty

According to Rogers (1995), individuals in a social system do not adopt an innovation at the same time; a certain percentage of individuals are relatively earlier or later in adopting a new idea. Based on the *innovativeness* criterion, the degree to which an individual is relatively earlier in adopting new ideas than other members of a social system, the distribution of various adopter categories forms a normal, bell-shaped curve that illustrates Innovator (2.5%), Early Adopter (13.5%), Early Majority (34%), Late Majority (34%), and Laggards (16%)

Rogers (1995) states that relative advantage, compatability, complexity, trialability and observability influence an individual's decision to adopt or reject an innovation. Relative advantage is how improved an innovation is over the previous generation. Compatibility is the level by which the innovation has to be assimilated into an individual's life. Complexity is how likely it is to be adopted by an individual based on how difficult it is to use. If the innovation is too difficult to use, an individual will not likely adopt it. Trialability determines how easily an innovation may be experimented with as it is being adopted. Observability is the extent that an innovation is visible to others. An innovation that is more visible will drive communication among the individual's peers and personal networks and will in turn create more positive or negative reactions.

1.2 Adoption of technology by faculty

Multiple studies have investigated key factors responsible for faculty willingness to use technology in their teaching. These factors include organizational support, leadership, effective training and perceived usefulness and ease of use (Ajjan & Hartshorne, 2008; Choudrie & Dwivedi, 2005; Cushman & Klecun 2006; Frank et al., 2004). Funding, lack of equipment, lack of institutional support, disbelief of technology benefits, lack of confidence, and lack of time and knowledge were identified as the major obstacles to successful technology integration (Al-Senaidi, Lin & Poirot, 2009; Nelson & Thompson, 2005; Hardy, 1998; Lam, 2000).

It is important for faculty to see the perceived ease of use and usefulness of technology tools in their teaching practices (Ajjan & Hartshorne, 2008; Choudrie & Dwivedi 2005, Cushman & Klecun 2006; Frank et al., 2004) in order to adopt these tools. Teachers use technologies when they realize that it motivates student learning and improves instruction (Ajjan & Hartshorne, 2008). For technology adoption to be successful, instructors must be willing to change their role in the classroom from being a teacher to a facilitator and students must take responsibility for their learning (Hardy,1998). This change of teaching philosophy and methods focuses on student-centered teaching and constructivist teaching practices (Rakes, Flowers, Casey, & Santana, 1999). Ertmer, Gopalakrishnan, and Ross (2001) found that exemplary technology-using teachers exhibit more constructivist teaching practices. Successful integration of technology into the classroom depends on altering teachers' beliefs and philosophy concurrently. Personal factors such as attitude, interest, and training are

relevant for faculty adopting technology (Al-Senaidi, Lin & Poirot, 2009; Saade ´ et al., 2007). Faculty who are confident in their ability to handle technology tools are more likely to integrate these tools into their teaching (Hagenson & Castle, 2003; Al-Senaidi, Lin & Poirot, 2009).

1.3 Asynchronous and synchronous technology

Asynchronous and synchronous technologies may be used in online instruction. Asynchronous technologies are highly flexible and can be accessed anytime from anywhere, they include multiple forums such as chat rooms and e-mail services. They allow reflective and thoughtful thinking before responding. Synchronous technologies in the form of audio/video conferencing, like the virtual classroom, are less flexible in terms of time, but can be accessed from anywhere. They render immediate feedback, and allow multi-modality communication. They can remove information overload and require less time and effort to maintain social interaction (Moallem, 2006).

According to the literature (Author & Author, 2010, Brannon & Essex, 2001), there are advantages and disadvantages for synchronous and asynchronous technologies. The advantages to using synchronous technology include more content, psychological arousal, increased motivation, and more social interaction. Paige, Pauli, Sturm, and Fierstein (2011) list immediate feedback to students from instructors, reduced feeling of isolation and a sense of community with the learners as some of the advantages of synchronous interaction. In terms of disadvantages the focus is on quantity not quality, scheduling can be challenging, moderating large groups is difficult, and there is a lack of reflection time.

Asynchronous technology advantages are increased ability to process information, more time to comprehend and write messages, and richer content. Meanwhile the disadvantages are it is difficult to get discussions going with small groups, students feel isolated, the lack of immediate feedback, students not checking in often enough, and less social interaction (Branon & Essex, 2001; Hrastinski, 2008; Johnson, 2006).

Synchronous technologies can be incorporated into online courses for community-building or social learning, whereas asynchronous communication can be integrated for cognitive functions or objective obtainment. Research supports the inclusion of both asynchronous and synchronous technologies into online courses rather than using either one individually (Hrastinski, 2008; Johnson, 2006). Synchronous communication tools are better suited for discussing less complex issues, getting acquainted, or planning tasks. In contrast, asynchronous communication tools are better suited for reflecting on complex issues (Hrastinski, 2008). Instructors should choose the technology based on the objective or task being requiring of students. Synchronous technologies have become more popular as faculty value interactivity in their online courses (McBrien, Jones & Cheng, 2009; Rockinson-Szapkiw &Walker, 2009; Malik, 2010; Paige, Pauli, Sturm, & Fierstein, 2011).

1.4 Virtual classrooms

Virtual classrooms are online environments that allow 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 breakout rooms. Virtual classrooms enhance interactivity and the sense of community. The virtual classroom can be used in online and blended instructional delivery (Author & Author, 2010). Elluminate, Adobe Connect, and Horzion Wimba are some of the synchronous virtual classrooms that are prevalent in higher education whereas Webex and Centra are more commonly used in the corporate sector. Freeware versions of the virtual classroom include DimDim and Wiziq. Use of the virtual classroom is also known as web conferencing or e-conferencing in the literature (Rockinson-Szapkiw & Walker, 2009).

This paper focuses on the Horizon Wimba Virtual Classroom due to availability at the research site. Like other virtual classrooms and conferencing software, Horizon Wimba is a virtual environment with audio, video, application sharing, and content display. 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; and (3) classroom

management tools include the ability to upload and store documents, an auto-populated participant list, usage details, and archive options (Wimba, 2009).

1.5 Use of Horizon Wimba

Horizon Wimba was founded in 1998 and the company has exclusively been focused on education (Wimba, 2011a). Wimba is used in more than 40 countries in six continents (Wimba, 2011b). Wimba has made a difference in the way instructors teach and students learn (Author & Author, 2010). Some of the uses described by the developers of Wimba are a) deliver instruction across multiple disciplines b) increase revenue and enrollment c) increase retention rates d) reduce the sense of isolation in the online virtual environment e) make online classroom accessible to the disabled students f) help expanding the curriculum and improving outcomes of the K-12 education system and g) work with publishers to add vocal collaboration to foreign language texts.

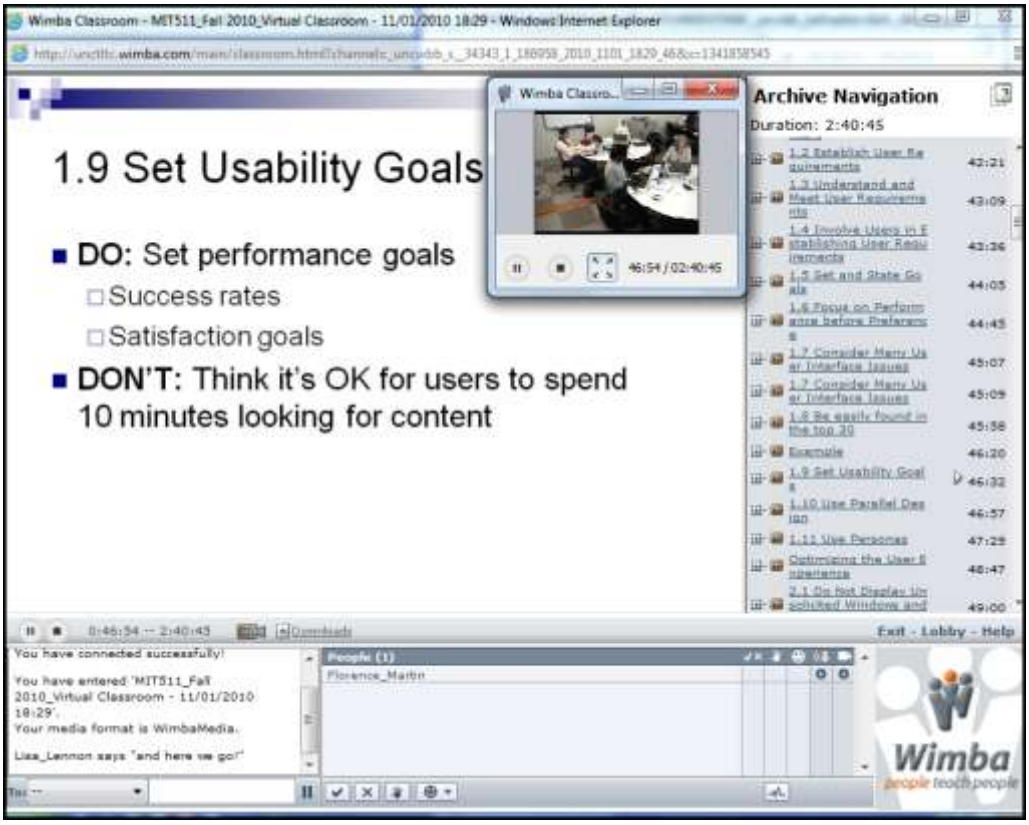

Figure 3. Horizon Wimba virtual classroom

Wimba users at various colleges and universities enjoy the flexibility and appreciate the different mode of delivery. As such they have provided information about its use. For instance, many students have welcomed the access to archives (York St. John University). Wimba was used for training 1200 faculty dispersed geographically in the northern half of Illinois. It saved time and money and increased faculty attendance at the training sessions (Northern Illinois University). Wimba has helped professors overcome the challenge of being forced to cancel class due to professional development opportunities, meetings, or appointments that conflict with their regularly scheduled class sessions and helped them offer classes at all times. They are able teach from the hotel room on the road. Students are also able to participate from anywhere with an internet connection, and can fully participate in the classes (Kansas State University). Wimba was used by faculty and staff to conduct meetings online (College of Southern Nevada). Wimba was also used to conduct Blackboard trainings, professional development seminars, and monthly live orientations for new students (Central Texas College). Wimba has facilitated student mentoring (Boston University). Wimba fosters interactivity, flexibility and high-level student participation in the courses (University of Maryland). Also, Wimba was used to save gas, money, and time while reaching the remote students at Southern State Community College (Wimba, 2011c).

Some of the pedagogical uses of Wimba listed by Zhang (2009) are broadcasting live and recorded lectures; Providing guest speaker sessions, and inviting non-local guest speakers; Enhancing language and speech

classes with the audio/video component; Using the application sharing feature to demonstrate how to use a particular software application; Enhance faculty-student communication; Students can collaborate online by organizing team meetings and continuing discussions outside the regular classroom. In a study conducted by Roberts, McNeese, and Thornton (2007) a majority of the instructors and students reported high levels of satisfaction with the text chat, voice chat, whiteboard, and hand-raising features. Most instructors reported good and fair levels of satisfaction regarding application sharing, polling/quizzing, file sharing, and accessing archives.

In 2010, Author and Author examined student perceptions of features within the Horizon Wimba Virtual Classroom. Online students rated the following features most beneficial: viewing archived virtual classroom sessions, ability to raise their hands, and use the polling feature to respond to questions. The comparison group, students enrolled in a blended course that combines face to face and online instruction, rated desktop sharing and presentation viewing as the most beneficial. Overall, the students in the fully online course rated the virtual classroom features higher than students taking the blended course. The current study seeks to understand faculty perspectives of this innovative technology. Rogers (1995) states the features of an innovation influence its rate of adoption.

2. Purpose of this case study

The innovation in the present investigation is the Horizon Wimba Virtual Classroom. The purpose of this case study was to explore faculty adoption and use of Horizon Wimba in their online courses based on Yen et al. (2010) adoption factors (organizational, social, personal and technological) and the virtual classroom features.

The specific questions that were addressed in this study are:

- What factors and features influence faculty adoption of the Wimba Virtual Classroom?
- How do faculty rate the Wimba Virtual Classroom using the characteristics of innovation?
- How do faculty classify themselves using Roger's model of diffusion of innovation?
- How do faculty use the Wimba Virtual Classroom in their teaching?

3. Methodology

This case study was conducted at a Southeastern University in the United States that had Horizon Wimba for five years. This university has 602 full time and 288 part time faculty (UNCW Just the Facts, 2012). Instructors have access to Wimba's Live Classroom licensed for use with Blackboard. Approximately 5% (N=52) of the faculty use Wimba in their courses. In the fall of 2010, an online survey was administered using SelectSurvey©. The Office of E-learning sent an email with a hyperlink to the survey and a brief message about its purpose to 52 instructors identified as Wimba users. Faculty were informed that their participation was voluntary and of their anonymity. The survey was available for a three-week period and during this time one email reminder was sent. Twenty-three faculty completed the survey, which resulted in a 44% response rate. Although the sample is small, the response rate is higher than many online surveys (Cook, Heath, & Thompson, 2000; Sheehan, 2001). Descriptive statistics were used to report the survey data. At the completion of the survey, faculty were asked to provide contact information if they were willing to participate in a follow-up interview. Ten instructors expressed interest and due to availability six were interviewed several weeks later. Each interview was conducted within the Wimba Virtual Classroom where instructors could see the features as they described their use. The interviews were recorded in Wimba and then transcribed. The content of the transcripts were coded and analyzed for common themes.

3.1 Description of survey

The instrument included two sections. The main section consisted of nine questions regarding the adoption of virtual classrooms. The first four questions corresponded to the organizational, social, personal, and technological factors proposed by Yen, Wu, Cheng, and Huang (2010) and were rated on a four point Likert Scale from Very Important (4) to Very Unimportant (1) on their importance in the respondents' decision to adopt the Virtual Classroom. Question five was a Yes/No question, if the features of the Virtual classroom influenced the respondents' adoption of the tool. If the features of the virtual classroom influenced its adoption, then the respondents proceeded to Question six where they made selections from a list of fourteen features in the virtual classroom that influenced their adoption of Wimba. Question seven was a Likert Scale

question on the frequency of using the virtual classroom features. Each feature was rated on a five point Likert Scale that went from All the time (5) to Never (1). In Question eight, Faculty rated the Wimba virtual classroom on the different characteristics of innovation using a four point Likert Scale ranging from Strongly Agree (4) to Strongly Disagree (1). In the last question in this section, faculty classified themselves using the model of diffusion as a multiple choice question. The next section of the survey contained questions on gender, age, rank, teaching experience, and Wimba use.

3.2 Follow-up interviews

Semi-structured interview questions were used to expand the survey results and to elicit responses from instructors about how they use Wimba. The interview protocol contained these questions.

- What are the benefits/disadvantages of using the Virtual Classroom?
- What courses do you teach using the Virtual Classroom?
- How do you use the Virtual Classroom in your class(es)?
- How do you use the features of the Virtual Classroom?
- Is there anything that you would like to add?

3.3 Survey respondent profile

There were 5 male and 18 female participants. Most of the respondents were Assistant Professors and Lecturers (3 full-time and 4 part-time lecturers), had been in the profession at least five years, were over thirty years of age, and used Wimba for two or more semesters. Table 1 presents the profile of the 23 participants. The respondents varied in terms of their academic unit, with most coming from Education and Nursing (See Table 2).

Table 1: Survey respondent profile

Years in Profession	< 1	2-4	5-10	11+
	2	4	10	7
Rank/Position	Professor	Associate	Assistant	Lecturer
	1	6	9	7
Age	< 30	30-39	40-49	50+
	1	7	6	9
Wimba Use by Semester	1	2-4	5+	
	4	11	8	

Table 2: Survey respondents by department or academic unit

	n
School of Nursing	7
Educational Leadership	4
Instructional Technology, Foundations and Secondary Education	3
Elementary, Middle Level, and Literacy Education	2
English	1
Geography and Geology	1
Information and Systems Operations	1
Management	1
School of Health and Applied Human Sciences	1
Other	1

4. Results

Research Question 1: What factors and features influence faculty adoption of the Wimba Virtual Classroom?

Faculty reported that a combination of factors influenced their adoption of Wimba. Institutional support (M=3.13) and Institutional Resource Availability (M=3.26) had the highest mean among the Organization factors. Promotes Social Presence among Students (M=3.09) and Promotes Sense of Community (M=2.96) were highly rated among the Social Factors. Improving teaching (M=3.30) and Enhancing Student Learning (M=3.65) had the highest average among personal factors. The ease of setting up Wimba (M=3.74) and the availability of technology had the highest means when considering technological factors. The availability of Wimba was the most influential (M=3.91) aspect in faculty deciding to adopt this technology among all the items, irrespective of categorization (e.g., organizational, social, etc.).

Table 3: Factors that Influenced Faculty in their Decision-making Process of Adopting Wimba

Category	Percentage Very Unimportant 1	2	3	Very Important 4	M ± SD
Organizational					
Mandate	30.4	43.5	17.4	8.7	2.04 ± .93
Reward availability	30.4	8.7	39.1	21.7	2.52 ± 1.16
Institutional support	4.3	34.8	4.3	56.5	3.13 ± 1.06
Institutional Resource Availability	8.7	21.7	4.3	65.2	3.26 ± 1.10
Social					
Peer support	17.4	26.1	30.4	26.1	2.65±.1.07
Peer Pressure	26.1	8.7	60.9	4.3	2.43±.95
Promotes Sense of community	0.0	47.8	8.7	43.5	2.96±.98
Promotes Social Presence	0.0	43.5	4.3	52.2	3.09±1.00
Personal					
Personal preference	8.7	47.8	4.3	39.1	2.74±1.10
Personal Motivation	4.3	43.5	0.0	52.2	3.00±1.09
Reduced travel time to campus	21.7	13.0	34.8	30.4	2.74±1.14
Reduced travel cost	26.1	17.4	34.8	21.7	2.52±1.12
Reduced face-to-face lessons	21.7	8.7	52.2	17.4	2.65±1.03
Importance of synch. interaction	4.3	34.8	8.7	52.2	3.09±1.04
Improving my teaching	0.0	34.8	0.0	65.2	3.30±.97
Enhancing student learning	0.0	17.4	0.0	82.6	3.65±.78
Technological					
Availability of technology	0.0	4.3	0.0	95.7	3.91±.42
Easy to set up	0.0	13.0	0.0	87.0	3.74±.69
Easy to use	0.0	17.4	0.0	82.6	3.65±.78
My expertise with technology	4.3	43.5	8.7	43.5	2.91±1.04

Sixteen faculty indicated that the features of the Virtual Classroom influenced their adoption of the technology. Of these faculty 60.9% said archiving the session, 43.5% stated hand-raising and 43.5% said audio chat influenced adoption. Guest access (17.4%) and downloading the archive as a MP3 (4.3%) were the least reported features influencing faculty adoption of Wimba.

Research Question 2: How do faculty rate the **Wimba Virtual Classroom** on the characteristics of innovation?

Respondents rated Wimba as advantageous compared to other teaching methodologies and compatible with their existing values, needs, and experiences. These items were rated higher than the other characteristics of innovation. The average ratings were 3.04 and 3.00, respectively.

Table 4: Features in the Wimba virtual classroom that influenced faculty adoption

	Yes		No	
Tool	n	%	n	%
Text chat	9	39.1	14	60.9
Audio chat	10	43.5	13	56.5
E-board	8	34.8	15	65.2
Polling	7	30.4	16	69.6
Hand-raising	10	43.5	13	56.5
Emoticons	6	26.1	17	73.9
Archiving the session	14	60.9	9	39.1
Application sharing	6	26.1	17	73.9
Sharing weblinks	5	21.7	18	78.3
Breakout rooms	5	21.7	18	78.3
Viewing the webcam	7	30.4	16	69.6
Downloading the archive as MP3	1	4.3	22	95.7
Guest Access	4	17.4	19	82.6
Listening to the audio via phone	6	26.1	17	73.9

Table 5: Faculty perceptions of Wimba based on the characteristics of innovation

	Percentage				
	Strongly Disagree			Strongly Agree	
Characteristics of Innovation	1	2	3	4	M ± SD
Advantageous over current ways of teaching	0.0	21.7	52.2	26.1	3.04±.71
Compatible with values, needs and experience	4.3	8.7	69.6	17.4	3.00±.67
Is simple to use	0.0	26.1	21.7	21.7	2.96±.71
Available for experimentation	0.0	17.4	69.6	13.0	2.96±.56
Was observable to potential adopters	4.3	26.1	60.9	8.7	2.74±.69

Research Question 3: *How would you classify* ***yourself*** *regarding technology using the model of diffusion?*

More respondents classified themselves as among the first individuals to adopt an innovation (39.1%), followed by the second fastest category of individuals who adopt an innovation (34.8%) and then "adopt an innovation after a varying degree of time" (21.7%). One person selected "adopt an innovation after the average member of the society" (4.3%).

Research Question 4: How is faculty using the Wimba Virtual Classroom features?

How often do you use these virtual classroom features?

Table 6 reports the respondent's frequency of using the virtual classroom features. Archiving the session is the most frequently used feature, followed by audio chat, hand-raising, and text chat. Guest access, downloading the archive as MP3, and breakout rooms were the least used unanimously.

Interview Respondent profile

Six participants were interviewed regarding their perceptions and use of the virtual classroom. Three participants were from the nursing school and three participants were from the school of education. One participant taught only graduate courses, two participants taught undergraduate and graduate courses, and

three participants taught only undergraduate courses. Five of the participants were female and one participant was male.

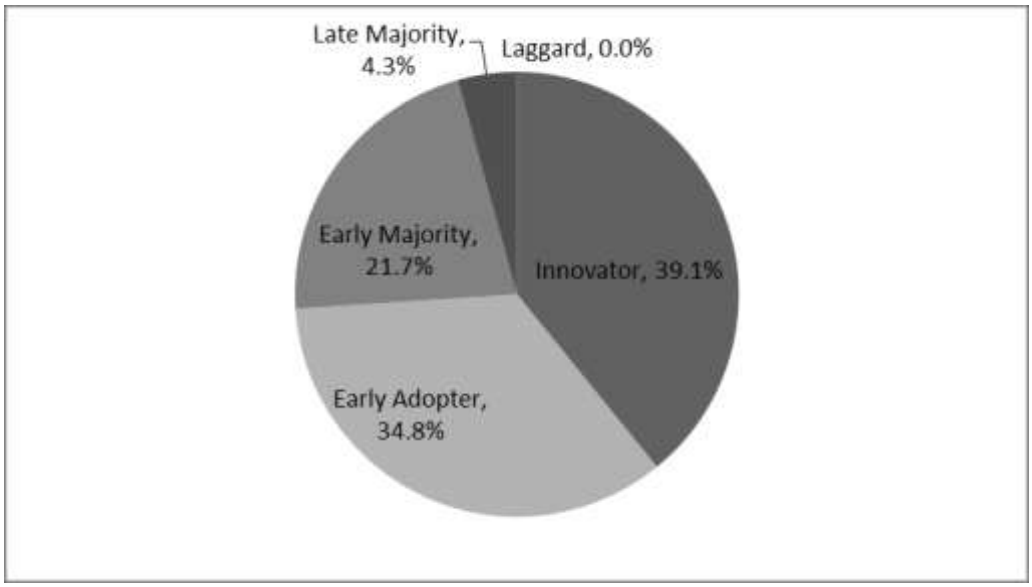

Figure 3*:* Faculty adoption of technology

Table 6: Frequency of use of virtual classroom features

	Percentage					
	Never				All the time	
Features						M± SD
Text chat	13.0	8.7	26.1	21.7	30.4	2.48±1.38
Audio chat	13.0	0.0	30.4	26.1	30.4	2.61±1.3
E-board	17.4	8.7	30.4	17.4	26.1	2.26 ±1.42
Polling	43.5	13.0	17.4	17.4	8.7	1.35±1.43
Hand-raising	8.7	8.7	34.8	13.0	34.8	2.57±1.31
Emoticons	26.1	13.0	26.1	17.4	17.4	1.87±1.46
Archiving the session	0.0	0.0	39.1	13.0	47.8	3.09±.95
Application sharing	30.4	30.4	13.0	26.1	8.7	1.70±1.33
Sharing weblinks	30.4	21.7	8.7	21.7	17.4	1.74±1.54
Breakout rooms	56.5	17.4	8.7	0.0	17.4	1.04±1.52
Viewing the webcam	43.5	4.3	13.0	8.7	30.4	1.78±1.78
Downloading archive as MP3	60.9	21.7	4.3	4.3	8.7	0.78±1.28
Guest Access	52.2	34.8	4.3	4.3	4.3	0.74±1.05
Listening to audio via phone	52.2	4.3	26.1	8.7	8.7	1.17±1.4

Here are direct quotes from interviewees on how they use Wimba in their specific courses

> *"Nursing school has an entirely online program in different parts of the state. So if students are not located here, this synchronous setting works great." –Instructor of Community Health Nursing, an undergraduate online course*
>
> *Wimba helps to engage students more using polling. Those who do not answer in face to face class also respond but hard to gauge their knowledge by not being able to see their confused look if they have questions or not." –Instructor of Instructional Design (School of Education), an undergraduate hybrid course*
>
> *It helps students login in from anywhere and have the freedom of place. Video, sense of being in the room, and ability to share applications and presentations are some of the advantages of*

> *using Wimba. Some of the drawbacks are it has only one video feed, difficulty for students to log in, one student had to call in at times" –Instructor of Computer Applications in Education a graduate online course*
>
> *"Online students can hear/see each other. Adds to the social community. Even with technical difficulties the students seem to really like it for these uses." – Instructor of Technology for School Administrators a graduate online course*

Interview data regarding the virtual classroom is summarized below. Three out of six participants interviewed indicated that one advantage of incorporating virtual classroom software is it can be accessed from anywhere. Two of the seven faculty members mentioned another advantage of incorporating the virtual classroom tool into fully online courses is that is can enhance student's connection to campus and adds a social aspect to the course unattainable through asynchronous tools. One faculty mentioned that different students participate in this format more than students that participate in the asynchronous or face to face format only. Another faculty member mentioned that the live classroom engages students more.

The two major disadvantages mentioned by the participants were the fact that this particular virtual classroom software only allows for one video feed, and that they are at a loss for what to do when students or instructors have technical difficulties. Each of these disadvantages was mentioned by two of the participants. One instructor gave an example of how their audio/microphone went out during the middle of a live session. The only resolution that the instructor could implement was to call a student and have them relay what the instructor was saying to the rest of the class. Another instructor mentioned how difficult it was to read the students and change instructional strategies during class because one cannot see if there is confusion by reading facial expressions.

The virtual classroom features used by the participants were loading PowerPoint files to share, sharing websites, whiteboard, breakout rooms, polling questions, application sharing, website sharing, text chat, and interactive buttons such as hand raising. Five out of six of the participants were using the virtual classroom as a synchronous tool for live meetings. The other participant was using the virtual classroom as an asynchronous tool by recording lectures and allowing students access to the archive recordings. Other participants allowed students to access the archives for further clarification of content or to make up attendance for missed live sessions.

5. Discussion

Several studies revealed that intrinsic factors are stronger motivators than extrinsic factors for faculty participation in online education and use of technology (Maguire, 2005; Parker, 2003; Wilson, 1998). However in the current case study extrinsic technological factors such as availability of technology, ease of set up and ease of use, were rated the highest by faculty adopting the Wimba virtual classroom. This is consistent with the Groves and Zemel (1999) survey, which rated equipment availability and student learning as the most important factors for influencing faculty to adopt technology.

Hannafin and Savenye (1993) reported that the fear of failure in using the technology has been an initial barrier to technology adoption. Faculty may be experts in their discipline and not in the technology that they use to teach. Faculty may be afraid that technology will be difficult to use and fearful that they will be unable to use the technology in front of their students and colleagues (Byron, 1995; Beggs, 2000). This is evident from the results of this case study where more than 80% of the respondents mentioned that they prefer to adopt the virtual classroom based on the factors of easy to set up and ease of use. About 43% also mentioned that their expertise with technology played a role in them adopting Wimba. Wimba has an initial learning curve for the synchronous class sessions to be delivered smoothly without interruptions. Even if a faculty member has mastered the technology, there is always the possibility of internet disconnection, system crashing, or a feature malfunctioning and this might interrupt live class delivery. Paige et al. (2011) reported that the faculty is frustrated with synchronous classrooms because of their limited technology knowledge and their inability to help students when they get disconnected. They also found that faculty emphasized the importance of high speed internet connection and up to date computers for the synchronous virtual classrooms to function smoothly. Faculty might also be hesitant to use the complex features such as a desktop sharing, breakout rooms, video conferencing etc. if they are not confident of the technology and the internet connection.

Among the personal factors, interest in enhancing student learning and interest in improving teaching were rated the highest. Faculty members are concerned with their teaching and want to use Wimba to enhance instruction. A recent investigation of faculty technology adoption, with various modalities, led to the same conclusions about personal interest in teaching and learning (Yen, Wu, Cheng, & Huang, 2010). This corresponds with Beggs (2000) who surveyed faculty and found that improved student learning was rated important by 96.8% of the participants. In prior research, personal motivation to use technology (Lee 2001; Schifter, 2000) was rated low compared to the availability and complexity of the technology. In this case study personal motivation was a factor in the absence of mandates from the university and peer pressure.

Features that influenced adoption of Wimba and Frequency of use

Sixteen of the 23 faculty surveyed stated that the features of the Wimba virtual classroom influenced their adoption. The archiving, audio and text chat, and hand raising were the most used features. This is consistent in the Paige et al. (2011) study where audio chat, text chat and hand raising were used in every Elluminate synchronous virtual classroom session. Archiving the session was reported as the most frequently used feature, followed by audio chat, hand-raising, and text chat. Archiving in a traditional classroom involves videotaping the class lecture and making it available for the students to re-watch. However, in the Wimba room the lecture can be archived by clicking a button. Students can watch the lecture any number of times and see all the interaction that occurred in the classroom, and watch only the portions that they want. It also makes it possible for instructors to observe and reflect on participation patterns (Arbaugh, 2000) or note modifications for subsequent lectures. Rockinson-Szapkiw and Walker's (2009) description of the use of virtual classrooms in counseling predominately involved archives, audio, and text chat among other features. Class sessions were recorded for students to review and discuss archives of their role-play scenarios. Meanwhile the chat features facilitated student interaction as if they were face to face.

The hand-raising option allows students to get the instructors attention at any time during the synchronous class. It also can be used as a strategy for calling on students or identifying students to perform different activities in the Wimba room. The audio and text chat features allows class participants to chat with one another as a whole class or individually. The audio chat is only available for the whole class in Wimba. The instructor or students can speak to the entire class via audio. Text chat messages can be sent to the entire class or specific individuals privately.

Audio Chat is an important tool for interaction and helps student-student and student-instructor interaction (Zhang, 2009; Malik, 2010; Author & Author, 2010). Audio chat is used mostly in cases where the class sizes are smaller and a live interaction can be maintained. Students can not only talk to their instructor but also to their peers. Zhang (2009) reported that the audio chat option is very convenient because students can ask questions and get an immediate response. Audio chat is also helpful for understanding the speakers intended meaning because inflection and tone can be heard in voices that are not present in text. Text Chat also helps to maintain the interaction in the virtual classroom. The advantages are that it can be used even in large class sizes, and students who are shy and do not want to talk out loud using the microphone can still interact by typing their questions or comments. The instructor gets multiple responses and he/she can read and reply to student's contributions.

Less used features

Downloading the archive audio as a MP3 and guest access were reported as having the least influence on faculty adoption of Wimba. Downloading the archive as MP3 is a new feature that not many of the instructors have used. Moreover to get the full experience of the Wimba archive students need to be on a computer to watch the video rather than just download the audio. They can listen to and watch the archive directly on the computer without downloading the archive as MP3. The guest access feature is not used much in regular class settings which may be the reason it was a less used feature in this case study. However, it is helpful while inviting guest speakers or conducting meetings where people from different locations can meet to talk. In this case study, faculty had not used breakout rooms much. Break out rooms allow the facilitator to split the class into small groups in their own virtual classrooms to complete group work. This is a complex feature compared to other features and faculty may be less inclined to try it especially without prior training. Depending on the content that is taught, the class size, and the activities that are conducted breakout rooms may or may not be used (Rockinson-Szapkiw & Walker, 2009; Arbaugh, 2000). In the Paige et al. (2011) study, desktop sharing,

application sharing, polling, breakout rooms, quiz manager, closed captioning, web tour and use of webcams were the less used features in the elluminate synchronous virtual classroom. These are all complex features that require some advanced knowledge of the virtual classroom. The campus that was studied in this case are only in the fifth year of adoption which may account for the little use of these advanced features. The participants of this study mainly use the virtual classroom to conduct lectures and class discussions.

Wimba and the characteristics of innovation

Faculty rated Wimba high on all five different characteristics of innovation–relative advantage, compatibility, complexity and trialibility. In this case study, though none of these characteristics were rated extremely high, they were all rated close to M=3.00 at the agree level.

Relative Advantage. The nature of innovation determines what specific type of relative advantage is important to adopters (Roger, 2005). Wimba has advantages over traditional ways of face to face teaching. Some of the advantages are that faculty are able to use Wimba not only in the online courses but also in their blended courses, to add flexibility in course delivery. They are able to offer virtual office hours. Online students are able to participate in the classes without having to come to campus and the students can collaborate with their peers from their current location (Author & Author, 2010). Some of the other advantages are that synchronous virtual classroom enhances student-to-student and faculty-to-student interaction, enables student-centered teaching approaches, provides opportunities to provide immediate feedback to students and clarify their understanding of instructional content. The advantages are consistent with Shin (2003) who defines transactional presence as the degree to which a distance student perceives the connectedness of the teacher, other students, and the institution.

Compatibility. Faculty considered Wimba to be compatible with other teaching methods. Faculty are able to replicate similar teaching strategies from a face to face classroom within the Wimba room. Faculty are able to call on students, get responses from them immediately, and also do group activities with them. Wimba included similar features (Whiteboard, Text chat, Audio chat, Desktop Share, Breakout rooms, Video chat, Archive, Use emoticons, etc.) as the ones compared between Breeze and Elluminate and is compatible with the other synchronous virtual classrooms (Schullo, Hilbelink,Venable & Barron, 2007). Wimba synchronous virtual classroom system is compatible within existing course management systems such as Blackboard. The Wimba system at this university was integrated with in the Blackboard course management system.

Complexity. In terms of complexity, if an innovation is too difficult to use an individual is less likely to adopt it. Similar to the models proposed by Yen, Wu, Cheng, and Huang (2010), faculty considered ease of use, and ease of set up as important factors for virtual classroom adoption. Wimba is an easy to learn and easy to use tool and faculty were able to use this tool with minimal training. The interface was institutive enough for both students and faculty to learn the different features. It was noticed that the students felt comfortable navigating the tool from the second class period.

Availability. Wimba is available for faculty to experiment free of charge at the university and they can use it without having to pay any extra cost as the overhead was paid by the university. There was no restriction on the number of rooms that each faculty can use, how long they can use, or how many people can login to each room simultaneously. The Wimba rooms were also available for students to login on their own. Students and faculty also had options to login to the Wimba room using the toll free number, which was beneficial if they were not near a computer. The archives also made it possible for the users to watch the lectures that they might have missed watching in real time. These options might have had the faculty agree on this characteristic of the innovation.

Observability is the extent that an innovation is visible to others. An innovation that is more visible will drive communication among the individual's peers and personal networks and will in turn create more positive or negative reactions. At this university, only about 10% of the faculty use virtual classroom tool in their courses. Though there was encouragement from the office of elearning, there was still not a visibility at all levels to use this tool. This characteristic of innovation was rated the lowest among the five.

Faculty Classification on technology

More than half of the faculty identified themselves as an innovator or an early adopter of the Wimba technology. Innovators are the first individuals to adopt an innovation and early adopters are the second fastest category of individuals who adopt an innovation. Currently, instructors opt to use this product instead of being required. Innovators are very eager to try new ideas and are able to cope with high degrees of uncertainty about a new innovation at the time of adoption. The Innovator is often less respected in the social system but they play the important role of introducing the new innovation to the social system. The early adopters are highly respected within the social system and are often the opinion leaders. Other potential adopters seek advice from individuals about adoption of new innovations (Rogers, 2003; Yohon & Zimmerman, 2006). In Yohon and Zimmerman's (2006) study on adoption of software and hardware by faculty they reported that although opportunities to learn technology through workshops and seminars were available faculty members preferred more informal learning opportunities such as talking to other faculty. This may be the case for further Wimba adoption at this University and other institutions. Even though university incentives, such as stipends and workshops may exist its necessary for faculty to take the inititative when using new software in their courses (Trentin, 2006).

The interview data highlighted advantages and disadvantages of using virtual classrooms that have previously been discussed in the literature (Author & Author, 2010, Brannon & Essex, 2001). The description of archive use corroborates the survey findings, as a tool that facilitated adoption and is commonly used. The participants in this case study generally used the Wimba presentation feature to deliver course content regardless of whether the session was recorded or not. In contrast Rockinson-Szapkiw and Walker (2009) discussed more interactive instructional approaches using analogous software. It would seem as though both nursing and education instructors would use similar practices based on the human development aspect of these professions. Developing virtual classroom pedagogy that focuses on various kinds of interaction may prove helpful. While the instructors in this case study identified themselves as innovators and early adopters of the virtual classroom, they may still be at initial stages of discovery and use. It may be recommended that instructors become proficient with the frequently used features—prior to teaching within the virtual classroom—and moving on to more advanced features. Training on the least used, or more complex, features of the virtual classroom such as breakout rooms and MP3 downloads may promote further student engagement and facilitate attainment of course objectives.

Limitations and Future Research

The findings of this case study are based on faculty at one institution and are subject to biases inherent in self-report data. The list of factors or virtual classroom features that were investigated may not be exhaustive. There may be other considerations for faculty adoption that were not covered in the survey. It is important to note that interviewees were selected based on their response to the invitation and availability. While only two disciplines (nursing and education) are represented in the interview data, they are on the cutting-edge in terms of technology use at this institution. The results are not representative of faculty using virtual classrooms or e-conferencing software. It is recommended that research akin to this case study be conducted with a larger sample to determine the generalizability of the results and to determine the internal consistency reliability of the instrument. Adequate sample size for subgroups would facilitate analyses of demographics (e.g., tenure status, faculty rank) and institutional characteristics (e.g., school size, Carnegie Classification) in order to investigate differences. Future research may also examine which types of courses are best suited for Wimba instruction in terms of method of delivery (integrated, blended, networked learning) and format (lecture, seminar). Specific information about the use of features (e.g., content analysis of audio and text chat sessions, the use of emoticons) may provide details about instructor and student interactions within the virtual classroom. Researchers should also assess and explore the impact of computer-mediated teaching and learning strategies (Kilpatrick, 2010).

6. Conclusion

Data from this case study was collected from one institution which has a strong emphasis on teaching excellence and is progressively moving into the online arena. Although the sample size is small this is reflective of the number of innovators and early adopters. Typically there are few faculty that utilize innovative technology (Yohon & Zimmerman, 2006). The survey data provided information on what influenced Wimba adoption, while the interview data described instruction. Although a subset of features led to Wimba adoption and are used frequently, perceived ease of use and usefulness of the technology may impel its use.

Descriptions of virtual classroom use provide meaningful information for administrators interested in promoting technology enhanced learning on their campuses and for faculty considering adoption. Based on the results of this case study, administrators can promote the factors and features that influence decision making to adopt the tool. Based on the interviews in this case study, administrators can also describe the ways how other faculty are using these tools in their classroom, and how beneficial it can be if adopted. This will open doors for adoption of synchronous virtual classroom.

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