

Virtual Interactive Real-Time Instructor-Led (VIRI) Learning: the Case of Synchronous Blended Learning in Introductory Undergraduate Course

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While interest in blended learning courses is increasing, it means different things to different people. Traditionally, the online component of blended courses has been asynchronous with course content hosted on learning management systems. Both students and researchers value the use of synchronous communication for the online component and some argue it is a necessary feature for there to be learning (Swan, 2003). This paper considers the use of virtual interactive real-time instructor-led (VIRI) technology innovation for blended learning, and discusses the challenges revealed through student and instructor feedback and recommends solutions for an effective blended learning environment using (VIRI) technology to teach introductory undergraduate courses.

Blended learning is becoming more common at educational institutions not only because of increasing enrollment and administrators who see it as a panacea for reducing costs, but also because of student demand for more flexibility in course delivery (Di Angelo, 2012; Steiner & Hyman, 2010). For example, post-secondary education (PSE) participation rates have reached an all-time high in Ontario (59%). The provincial government continues to put pressure on PSE institutions to increase enrollment for several reasons (Norrie & Lin, 2009). While demand for PSE education is increasing, public operating and capital budgets to support this increased demand are not keeping pace, consequently putting significant pressures on university administrators to look for ways to reduce costs (CAUT, 2009). Many universities view online or blended learning as a way to “increase the efficient and effective use of existing human and capital infrastructure ... and avoid duplication and unnecessary costs” (Council of Ontario Universities, October 2012, p. 7). The contemporary student, often referred to as Gen-X, Millennials, the Nintendo and Net Generation, prefers more flexible learning opportunities (Duffy, 2008). Between 2002 and 2007, the number of students enrolled in online courses more than doubled. Some argue that online learning is not only an effective format to deliver courses (Steiner & Hyman, 2010), but also an appropriate next step in the advancement of learning for this digital generation of students who are accustomed to surfing the Internet, texting friends and sharing their lives on social media websites.

The common form of delivery in blended learning offerings is asynchronous non-real time interaction with an instructor. Instructors host static content on learning management systems or other websites. Some advancement in blended learning offerings have been made where instructors host interactive content with which the student can engage, yet it still may not meet the needs of the student. For teaching to be effective, Picciano (2002) argues it is necessary to include dynamic interaction between students and

the content, between students and other students, and between the instructor and the student. For dynamic content to be effective, it may be necessary to mimic the types of interactions that take place in the face-to-face classroom. A Virtual Interactive Real-time Instructor-led (VIRI) classroom may provide one solution (Francescucci & Foster, 2013). This paper provides qualitative insights about using a VIRI classroom as a method for offering blending learning opportunities to students in order to mimic the dynamic nature of face-to-face classroom experience. It begins with a background on blending learning, and presents the findings of an ethnographic study that uses VIRI classroom technology in a blended learning format for an introductory undergraduate course. It ends with a discussion of insights gained through and recommendations developed from student feedback and instructor reflections about the use of VIRI Technology in an introductory undergraduate course.

BACKGROUND

While online learning has been defined in many ways (Anderson, 2008), the definition of blended learning is even more ambiguous. To be considered blended learning, the online or electronic portion of the course content must be between 20 and 80% (Garrison & Kanuka, 2004; Klein, Noe, & Wang, 2006). For the purpose of this paper, blended learning is defined as the integration of traditional face-to-face classes with elements of online learning, be it static, dynamic, synchronous, or asynchronous.

Swan (2003, p. 4) argues that central to the concept of online education is the notion of interaction, defined as “reciprocal events involving at least two actors and/or objects and at least two actions in which the actors, objects and events mutually influence each other”, which is necessary for there to be learning. Research has shown that students value synchronous online learning because real-time interaction provides immediate feedback much like the traditional face-to-face classroom setting (Park & Bonk, 2007; Sparks & Mentz, 2006). Much of the research to date has concentrated on the benefits of online interaction, especially between instructor and students (Jiang & Ting, 2000). Cao, Griffin, and Bai (2009) found that real-time interaction between student and instructor, led to increased satisfaction with the course. While the issue of asynchronous versus synchronous learning has been the primary subject of online education, it has relevance for blending learning environments as well. Today Gen-X or Millennials, expect to be able to learn in a variety of ways that also include interaction through synchronous online tools.

The objective on this paper is not to compare the available synchronous online learning platforms, but to share the challenges that may arise from using one of them and how one may overcome these challenges to enable a student to have a successful blended learning experience. A second objective of this paper is to add to the body of knowledge on the impact on student learning from the perspective of the instructor teaching in a blended learning course by sharing the knowledge gained by teaching in this format and by analyzing the qualitative feedback of students.

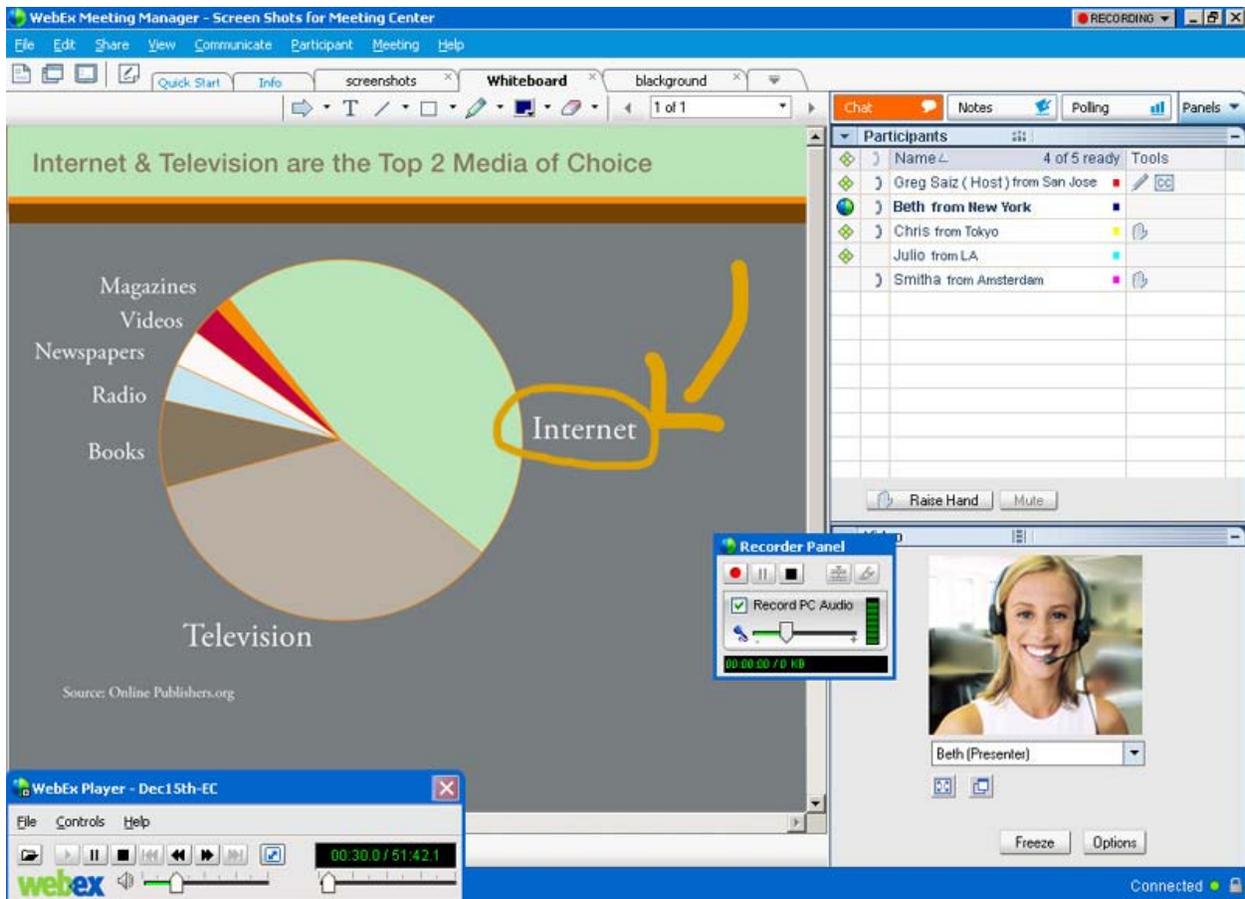
THE VIRI CLASSROOM EXPERIENCE

The VIRI classroom provides a virtual interactive real-time instructor-led experience for students (Francescucci & Foster, 2013). The VIRI classroom is a virtual classroom platform that is delivered over the Internet. Instead of gathering in a physical classroom, the teacher and students meet in a virtual classroom that is located on the Internet. There are several vendors who provide VIRI-like technology. In this research, the technology used was Cisco System’s WebEx Training Center. We chose it over other technologies based on the teaching instructor’s knowledge and experience of VIRI-like technologies. While students can login to the VIRI classroom from a location of their choice, they are required to login at the same pre-determined time. The fixed-time requirement facilitates real-time interaction both among students and with the instructor.

Once students log in, they are in the virtual classroom. While in the virtual classroom, students are required to use a personal computer and a headset to establish their presence in the virtual classroom. The VIRI classroom includes a presentation window that is used to deliver the real-time content, a video

window that displays a video of the speaker, and a number of tool panels (see Figure 1 for an image). The tool panels include a participant list window, a chat tool, a question and answer tool, and a polling tool. The participant window also provides a number of indicators and tools for the instructor to help them manage the VIRI classroom interaction. For example, the participant window indicates who is online, who has a working headset installed, who has their microphone engaged and also includes an individual feedback icon for each student. Students can use their feedback icon to provide non-verbal feedback to the instructor. The VIRI classroom environment simulates the teacher and student engagement in a face-to-face classroom. For example, the instructor can lecture on a topic, ask students questions and ask a student to respond verbally. The instructor can also break the students into groups for small group discussion. Further the session can be recorded to maintain a record of attendance and, if desired, the instructor can make the recording available to students for review or for those who may have missed the session.

**FIGURE 1
IMAGE OF VIRI TECHNOLOGY**



Source: WebEx Press Kit, retrieved from <http://www.webex.com/hk/en/webex/press-kit.html>

BLENDED LEARNING FORMAT

In this research, students enrolled in the blending learning course, take half of their classes in a face-to-face classroom, and the other half in a VIRI classroom. Starting in the second week of classes, students

alternate between attending the face-to-face classroom and the VIRI classroom. The first face-to-face class includes a mini-training session about the software to ensure student understanding of the VIRI classroom technology. Students taking the blended learning course receive the same lectures, assessments and access to online course resources as the regular face-to-face sections of the same course. The key difference between the blended and face-to-face course offerings is the method of lesson delivery. For the blended format, half of the lessons are delivered in the VIRI classroom environment.

COURSES TAUGHT

The blended learning courses were taught over two semesters. The first semester was a pilot phase. The purpose of the pilot phase of the project was to allow the instructor to become familiar and at ease with using the VIRI classroom technology, so that it would not affect the follow-up phase. The pilot took place in the Fall of 2011 at a large urban university, where the instructor taught two sections of an introductory undergraduate course in a blended learning format using the VIRI classroom technology. All sections contained 90 students each. Then, in the following semester, the same instructor taught an additional blended learning course in which data were collected. The purpose of the follow-up phase was two-fold. The first objective was to solicit feedback from students about their likes, dislikes, and suggested improvements for the blended learning format of the course. Feedback was solicited from participating students through a structured questionnaire, which included some open-ended questions. The second objective was to understand the technological and administrative requirements for teaching and learning in a VIRI classroom environment. The findings related to the technological and administrative requirements were developed based on ethnographic reflections of the instructor who taught the three sections of the blended learning course.

FINDINGS

Student Feedback

At the end of the semester of the follow-up phase, students were asked to complete a survey to provide feedback on what they liked best, what they disliked the most and what changes or improvements they would recommend for future blended learning courses. The top three categories for the items students liked best about taking a blended learning course included: the convenience of not having to go to class; the ability to join the VIRI classroom from anywhere; and the savings of time or cost of travel by not having to come to campus. Table 1 provides a sampling of the comments coded in each of these categories. It appears that blended learning courses that use VIRI classroom technology for half of the classes, address the current student need for flexible learning opportunities by allowing students to attend classes at the location of their choice.

TABLE 1
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF “BEST THING ABOUT THE COURSE”

Convenience of not having to go to physical classroom
<i>the convenience of staying at home and being able to attend class and being able to view all the material easily</i>
<i>There was the convenience of not having to go to class however there were still opportunities to interact with the professor and other students during the face-to-face lectures.</i>
<i>The convenience of not having to come to class, but instead, go home earlier on Thursdays.</i>
<i>The hybrid course was very convenient to attend.</i>
<i>do not have to come to class and its convenient to sit in my own desk and wearing my pajamas while I'm studying.</i>
<i>Having the same course taught at a much more convenient location, and much more comfortable.</i>
<i>It was convenient rather than coming to class and also I'm a shy person, so it was easier to talk online rather than in class because I could have asked questions in the Q&A chat box.</i>

Able to join classroom from alternate location
<i>Being able to attend from home</i>
<i>That I could attend classes from home.</i>
<i>Being at home during lectures and being less intimidated to ask and answer questions</i>
<i>Staying home and attending the hybrid course in my room</i>
<i>being able to be at home at still be in class</i>

Savings of time or cost of travel by not having to come to campus
<i>The fact that I did not have to travel far</i>
<i>The online courses allowed me to stay home ... without worrying about allocating time to commute to and from class.</i>
<i>I was also able to save on the transportation money that would have been spent that day.</i>
<i>I was able to stay at home and save the commute time. It takes me about an hour and a half to get downtown.</i>
<i>no traveling time need to for course when its online</i>
<i>That I did not have to commute on Thursdays</i>

The top three categories for items that students disliked most about taking a blended learning course included: the difficulty in concentrating during a VIRI class; the technical issues associated with joining or participating in a VIRI class; and the difficulty in engaging with other students. Table 2 provides a sampling of the comments coded in each of these categories. Students expressed concern about their ability to concentrate during a VIRI class for extended periods of time. They indicated it was too easy to get distracted by either other content on their computer or other situations in the environment from which they joined the VIRI class. This may be partially due to the visual anonymity afforded to VIRI classroom participants, because the instructor cannot physically see them, and or because they have no one physically present to manage their distracted behavior. This supports the position argued by Swan (2003) that interaction is necessary to support learning and suggests that it is important to build interaction into the online delivery of the lesson to keep the attention of students which will aid in their learning.

The technical issues identified in the dislikes are primarily related to Internet connectivity issues and or headset problems. Although we asked students to join the VIRI classroom from a wired connection, some still chose to connect using a WIFI connection. Similarly, even though we recommended that students bring their headsets to the simulation and test their connections, some students still had difficulty with their headset connections. This suggests that it is important to reinforce the message to students that the type of connection they choose may impact their learning experience. Furthermore, as the implementation and adoption of VIRI-like blended learning courses increases across a university, the headset issue will diminish as after students fix it for one course, it will be resolved for future courses.

Last, is the issue of engagement with other students. Some of the student interaction issues may be related to forming groups for collaborative work or engaging in group breakout discussion sessions. Again, the visual anonymity makes it easier for participants to disengage in group discussion. Further, because students only meet face-to-face half of the time, it makes it more difficult to form relationships with fellow classmates, a prerequisite to forming groups for group work assignments. To address these concerns, an instructor may consider creating an incentive or monitoring the participation within online breakout groups. To address the group formation issue, it may be necessary to create icebreaker type opportunities, or to randomly assign students to groups to alleviate the issue.

TABLE 2
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF
“WORST THING ABOUT THE COURSE”

Difficulty concentrating easily distracted
<i>I found it very hard to concentrate learning strictly from a computer screen.</i>
<i>Getting messy, distracted at home, can't speak and ask question directly.</i>
<i>I don't feel I took away as much from the virtual classes because I found it a little harder to concentrate.</i>
<i>Difficulty concentrating, got distracted more easily, less motivation to attend, strain on eyes</i>
<i>A bit harder to pay attention</i>
<i>easily distracted.</i>
<i>no face to face interaction, more easily distracted</i>
<i>Sitting in a chair for three hours and being really bored because there is not social interaction among friends</i>
<i>it is so hard to concentrate because I did not see the professor teach in front of me and there are more distractions such as cellphone, etc.</i>
<i>difficult to focus</i>
<i>I found that I would get distracted very easy.</i>

Technical Issues with joining or participating
<i>The rare technological glitch.</i>
<i>the fact that sometimes it disconnects you from the classroom and you have to sign in again.</i>
<i>in virtual classroom things like handouts or certain technical glitches.</i>
<i>I had trouble connecting to the virtual classroom the first class and therefore missed half of the lecture and had to make up the material so it was quite a frustrating and unpleasant experience.</i>
<i>The poor wireless internet connection to WebEx caused me to lose connection.</i>
<i>Mainly the fact that i couldn't properly connect.</i>
<i>Internet connection was spotty, even with wired connection</i>
<i>internet connection, keeping track</i>
<i>The internet connection sometimes would give problems.</i>
<i>Technical difficulties with classmates' headsets.</i>

Difficulty engaging with other students
<i>The online classes didn't allow me to connect with other students and make friendships.</i>
<i>Less engagement between students and the professor.</i>
<i>The group project: having classes online made it more difficult to meet up with group members.</i>
<i>The worst thing was when we broke up into break out groups in the online class and no one seemed to want to contribute or talk at all when trying to come up with an answer to present to the rest of the class.</i>
<i>Made it harder to find a time where all my group members were willing to meet.</i>
<i>The lack of student co-operation in terms of group work</i>

The top three changes that students suggested to improve the blended learning experience in a VIRI classroom include: addressing the technical issues with the VIRI class; offering more blended learning or

VIRI-only courses; and improving the ease of use of the VIRI classroom. Table 3 provides a sampling of the comments coded in each of these categories. Many students suggested that the Wi-Fi connectivity issues should be addressed to allow students to connect using a wireless connection. The difficulty with Wi-Fi connectivity is that it is not a function of the VIRI classroom technology, but a function of the students' wireless service provider and the Wi-Fi hardware used by the student. Therefore, it is not something that can be addressed by the VIRI technology service provider. However, one may consider evaluating headset hardware and recommending a preferred headset that is easier to integrate with most computers.

The second most reported suggestion was to offer more blended course offerings. It appears students enjoyed the blended course and wanted to take more courses in that format. This suggests that the VIRI technology used in blended learning courses may be an effective tool in meeting the learning needs of students.

Finally, in terms of ease of use, these suggestions were primarily related to improving the navigation within the VIRI classroom. Students found that a number of the functions within the VIRI platform are not intuitive or user-friendly. Some functions are difficult to figure out, while others require too many steps to complete (e.g. breakout session – the session leader has to turn everyone's microphone on once in the breakout session, instead of having the microphones turn on automatically or adding a button that students press when they want to speak). To address this last category of changes, one may consider evaluating the alternative VIRI-like technology platforms to assess which is the most user-friendly and intuitive for students in order to remove any obstacle that might hinder the learning experience.

TABLE 3
SAMPLE COMMENTS FOR TOP 3 CATEGORIES OF “SUGGESTED CHANGES”

Address technical issues
<i>try to make it a wireless connection.</i>
<i>Improve the Internet connection</i>
<i>Not wired connection and shorter hours</i>
<i>Enable the use of Wi-Fi to connect to the virtual classrooms</i>
<i>To improve the system to enable wireless connection participation.</i>
<i>Improve internet connectivity</i>
<i>being able to connect using Wi-Fi</i>
Offer more virtual classes
<i>Make more classes virtual.</i>
<i>I suggest doing the entire class over the virtual classroom. I really enjoyed it.</i>
<i>have more of the classes online</i>
<i>Make the whole course virtual classrooms oppose to face to face.</i>
<i>I think more virtual classes will make this course better.</i>
<i>Make sure there are more online classes and to take attendance of students that are in class.</i>
Make it easier to use
<i>Easier navigation through whiteboard and discussion areas.</i>
<i>Make them more user-friendly.</i>
<i>Making the virtual classroom easier to use.</i>

Ethnographic Reflections

In addition to the student feedback, it is also important to understand the instructor's perspective on teaching in a VIRI classroom. What follows is a summary of the reflections of an instructor who taught three classes of an introductory undergraduate course using the VIRI classroom technology.

There is a significant learning curve for any instructor who teaches in a VIRI classroom. The learning curve is associated with understanding the tool and its associated functionality and how to integrate it with course pedagogy. The instructor who taught the blended learning course, using the VIRI classroom, is more technically savvy than a typical instructor at a large urban university and may be considered an early adopter of technology. The instructor also had experience with the basic version of WebEx technology. Even with the instructor's familiarity with technology and with WebEx, there is still a great deal of learning that is necessary to become proficient in teaching in a VIRI classroom. It may be necessary for less technically sophisticated instructors to invest more time and effort learning how to use or adjust one's pedagogy to take full advantage of the VIRI classroom technology. Therefore, to increase the success or adoption of blended learning courses that use VIRI-like technology, it will be necessary to simplify the use for instructors and possibly create trial opportunity for instructors in order to increase their comfort level and the adoption of the new technology (Rogers, 2003).

In addition to the significant learning curve to become proficient in teaching in a VIRI classroom, a great deal of effort is required on the part of the instructor when teaching in a VIRI classroom. The instructor requires greater 'mental overhead', when teaching in a VIRI classroom. Not only does the instructor need to think about the typical pedagogy that is part of delivering any face-to-face lecture, but in addition, in a VIRI classroom there is significant administrative thinking to ensure the VIRI classroom operates as expected. For example, in a face-to-face class, the instructor can simply ask a question and very quickly see a show of hands from students and ask a student to respond. In a VIRI classroom, to mimic the experience of asking a question, there are additional steps the instructor must take because the students are not physically in front of him. These steps include scrolling through the participant window to determine which students have "virtually" raised their hands, selecting the student, passing the microphone to that student, turning on the microphone for the student, checking to see if the student's microphone is working and finally receiving the response. Teaching in the VIRI classroom means the instructor not only needs to concentrate on pedagogical delivery of the lesson, but also must deal with the administrative overhead of operating the VIRI classroom. Therefore, to increase the success or adoption of VIRI technology in blended learning courses, it may be necessary to ensure that the new innovation (VIRI-technology) is compatible with the past practices of faculty (Rogers, 2003). To increase adoption it may be necessary to consider solutions that minimize or eliminate incremental 'mental overhead' by choosing technology that is compatible with the current pedagogical practices of faculty.

The challenge of adequate Internet bandwidth can impact the classroom experience. While the instructor always used a wired connection when teaching VIRI classes, he did experience one disconnect to the VIRI classroom during the 15 class sessions taught over the course of eight months. The instructor felt that the connection issue was an anomaly associated with his Internet service provider and does not believe this would be a challenge for other instructors who may use the VIRI classroom through a wired connection. However, the disconnection issue for students was much more significant. The instructor could see when a student was disconnected and had reconnected. While the issue was more significant for students, it was primarily due to Wi-Fi connectivity issues. Therefore, it becomes crucial that students understand the need to use a wired connection to participate in the VIRI classroom, so that there is no impact on their learning experience.

The VIRI classroom is quite good at mimicking the face-to-face classroom experience. Students were able to engage in class discussion much the same way they would in a face-to-face classroom. However, the implementation of the functionality in the VIRI classroom sometimes impacts the flow of the lesson. The way the functionality has been implemented is not as user-friendly or intuitive as it could be. This may be a factor of the VIRI technology used in this study. When considering an implementation of VIRI technology in blending learning courses, an institution may consider evaluating other alternatives

available and seeking the input of faculty members who may use the technology to increase adoption. Rogers (2003) argues that innovations, which are simple and easy to use, are adopted much more quickly.

A final major challenge with VIRI classroom technology is the ability of the instructor to gauge students' comprehension of the lesson content. In a face-to-face classroom, instructors have the ability to see students' reactions and read their non-verbal cues to determine if they comprehend the concepts or topics being taught. They can immediately adapt their lesson to improve comprehension. In the VIRI classroom, the instructor cannot see the students. Therefore, it is necessary for the instructor to use alternatives techniques, such as polls, quizzes, or other techniques to gauge student comprehension of the lesson. For an instructor transitioning to teaching in a blended learning format using VIRI technology, a significant amount of lesson plan rework may be required.

RECOMMENDATIONS

The following recommendations are important to consider when making the decision to implement blended learning courses using VIRI classroom technology. The first set of the recommendations is directed at addressing the concerns of students, which are designed to improve the student learning experience. The second set of recommendations is directed at addressing the adoption of VIRI-like technology by faculty in the delivery of blended learning courses.

In order to improve the effectiveness of the VIRI classroom experience, students should be required to use a headset, to login from a location that is free from background noise and to connect using a wired connection. These measures will ensure an optimum technical environment for effective learning in a VIRI classroom. It is recommended that students be required to use a webcam, in addition to the headset, in the VIRI classroom. The webcam would transmit the student's video only when they attempt to speak or when being called upon by the instructor for a contribution to the discussion. Video could also be used during breakout sessions. The use of video would increase student accountability and concentration during the VIRI classroom lesson, knowing that the instructor could see them at any time. The use of video will also help students to get to know one another because it will help students put a face to a name. This may also aid helping students form groups for collaborative work.

Rogers (2003) argues that to increase the likelihood of adoption of new innovations, they must be compatible with existing practices; they must be simple and easy to use; and users should be encouraged to participate in a trial of the new innovation. Therefore, for institutions' considering the implementation of VIRI-like technology for blending learning courses, the following recommendations are suggested in order to increase the likelihood of adoption of this new technology.

First, higher education institutions should consider the use of dedicated resources to handle the classroom administration during an instructor's lesson. These dedicated resources could be trained to operate and troubleshoot the VIRI classroom technology on behalf of instructors, thereby freeing up the instructor to focus on lesson delivery much like their face-to-face classroom responsibilities. The efficiencies gained by having dedicated resources could ease the transition of faculty into the teaching of blended learning courses. It may also reduce the resistance to change, if an instructor is not required to change what they already do today. This would eliminate the additional mental overhead that is required for an instructor to teach a lesson and administer the VIRI classroom technology.

Second, in large-scale deployments, institutions should consider centralized training for students to minimize the use of limited classroom time for training students to use the VIRI classroom technology. By having a student take centralized training outside of classroom time, they would only need to be trained once; instead of each time they take a blended learning course, thereby minimizing the use of limited class time for technical training. Further, it may be prudent for institutions to also conduct centralized training for instructors who are considering teaching blended learning courses using VIRI classroom technology. Armed with this training, instructors could easily adapt their course pedagogy for a blended learning environment.

Finally, for any institution implementing VIRI classroom technology, it is recommended that they standardize on one VIRI classroom technology and develop a strategic partnership with that service

provider to further develop the technology to suit the needs of the educational environment by developing a version that is more user-friendly and intuitive for students and instructors in blending learning courses. Standardizing on one technology also minimizes the amount of training and retraining that would be required on the part of students and instructors.

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