A preliminary comparison of synchronous venues for distance learning: traditional videoconferencing vs. web-based conferencing

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Abstract: Synchronous venues are often preferred in distance learning settings as they most closely approximate the face-to-face experience. This paper examines two synchronous venues: videoconferencing and web-based conferencing. Both are compared, instructionally and administratively, to face-to-face venues, as well as to each other. A brief case is reviewed with respect to the use of both venues in a single environment and salient experiences with each. While the videoconferencing technology is more mature and tested, in many ways it is less adequate at approximating the instructional approaches typically common to face-to-face venues than the newer and emerging technology of web-based conferencing.

Keywords: distance learning; synchronous; asynchronous; web-based conferencing; videoconferencing; elluminate; student engagement; distance education; web conferencing.

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1 Introduction

Distance education has traditionally been an arena in which technological advances have been eagerly applied in an attempt to improve instruction and reduce the perceived efficacy gap between it and traditional face-to-face instruction. The applications of some technologies have been effective, while others have not. It could be argued, however, that in the recent past, Internet-based (IP) technologies have largely been effective in

improving our overall ability to deliver quality instruction to students in remote locations. Indeed, if one follows the recent history of distance education, particularly since the Internet became public in the mid-1990s, one would find that the ability to foster active learning has been significantly improved (Chickering and Gamson, 1987; Smyth, 2005).

As Smyth points out,

> "… with the variety of technologies available to teachers today, it is becoming increasingly important for good teachers to understand why they do what they do well in order to make informed choices of appropriate technology aligned to their pedagogical approach."

Some of these choices involve the decision to offer courses in a synchronous fashion or an asynchronous fashion, the specific delivery technologies to use, and the matching of pedagogy with technological capabilities to achieve the best outcomes. Combined with this are the decisions that must be made regarding the changing roles of learners and teachers in our new technological landscape, the way we teach, and the way we view knowledge acquisition.

This paper will focus on two synchronous venues, videoconferencing and web-based conferencing. Videoconferencing has been available for decades, in one form or another, where web-based conferencing has only recently been introduced as a viable alternative for distance educators.

2 Distance education venues

In administering modern educational programs, we have three primary choices of venues for instruction: Face-to-face (traditional), online (Internet-based), and blended (some combination of the first two). Since the face-to-face component is difficult to orchestrate in most distance learning situations, that choice is largely eliminated. That also, in effect, additionally eliminates the blended choice, at least insofar as the face-to-face component is concerned. Indeed the online venue is predominant in most distance education programs today, as the Internet is both ubiquitous and low-cost. But the decision to proceed with an Internet-based program still leaves us with the choice of using an asynchronous or a synchronous venue. Asynchronous venues would include the use of learning management systems (Blackboard, Moodle, Desire2Learn, etc.), traditional websites, forums, blogs, wikis, and other collaborative technologies. Synchronous venues would largely be limited to videoconferencing or web-based conferencing; however, some audio teleconferencing or Internet Relay Chat (IRC) might still be used in areas where broadband Internet connections are not prevalent or as brief synchronous components in an otherwise asynchronous environment.

The available instructional activities for synchronous venues more closely model those of the traditional face-to-face model than do those available in asynchronous venues. While many of the activities such as lecture, discussion, group work, examinations, student presentations, multimedia presentations, guest speakers, web-based searches/demos/discussion, and demonstrations can be attempted in an asynchronous environment, most are more easily and effectively accomplished in a synchronous environment that more closely approximates the traditional classroom.

As Saw et al. (2008) points out, three main types of interaction can be maintained in a synchronous venue: Instructor-learner interaction, learner-learner interaction, and

learner-content interaction. This interaction can be interpersonal, but can also mean an "event or process or situation in which two or more people are engaged in order to respond to one another".

Although the interaction in a synchronous environment is more contemporaneous than in an asynchronous one, there are still certain limitations when compared with traditional face-to-face classrooms. For example, group work is not typically a prominent activity in videoconferenced courses (Chakraborty and Victor, 2004), and additional support and personnel are often required to administer examinations. Furthermore, there is the question of student perceptions in comparisons of the two environments. Ward et al. (2006) reported, for example, that 77% of students perceive better examination performance on material presented by a live lecturer while, in actuality, instructor presence was not essential for satisfactory performance on examinations.

To be sure, there are good reasons why an instructor or institution might choose an asynchronous format over a synchronous one. Such things as ease of scheduling, physical location of students (centralised or widely dispersed), area broadband saturation, and availability of synchronous technologies are major factors. Clearly, however, the synchronous environment most closely mimics the traditional face-to-face venue in many ways, and if the infrastructure is available, it can have distinct advantages over asynchronous methods.

3 Background

The case examined here is not a typical. First, a variety of forces converged to necessitate the establishment of a synchronous distance learning environment. The technology adopted for that environment was videoconferencing. Second, shortcomings with the videoconferencing environment became evident, providing impetus to the change to a web-conferencing venue.

The university in this study is a regional state-funded institution located in a rural area. The campus services approximately 11,000 students, mostly full-time, residential students, and offers both undergraduate and graduate degrees. Several satellite sites have been set up by the School of Adult and Continuing Education to help meet the needs of remote students in this relatively sparsely populated, primarily agricultural, area of the state. Most of those sites have instructors travelling to them to teach courses, although in recent years the number of online (asynchronous)[1] courses has increased.

In the School of Business, the Master's program in Business Administration (MBA) has, for some years, had an arrangement with a two-year community college, located approximately 50 miles to the north of the university's main campus, to co-locate a cohort of MBA students. Historically, those students commute to that campus from outlying areas and, for most, it would difficult or impossible for them to attend face-to-face classes at the main campus. Several classrooms at the satellite campus were made available so that faculty from the main campus could commute to that location to teach courses. As MBA enrolments increased in the satellite program at the same time as budgets were being cut, it became apparent that there were several logistical/ administrative problems with this model:

- In many cases there was a single instructor for a course, which meant that a decision had to be made as to which site would be assigned for a given semester. Since most MBA professors also teach undergraduate course loads, most could only teach a single MBA course per semester. That meant that when a given course was offered at the remote location, it could not be offered that term at the main campus, and vice versa.
- The scant offering of MBA courses at the remote location left those students somewhat disadvantaged with regard to the choices they had for classes, forcing them into what amounted to a lock-step arrangement.
- Great care had to be taken with scheduling to make sure students could enter and exit the program in a timely fashion. This has become progressively difficult.
- Most MBA students enrolled at the remote site are employed adults who are working on their graduate programs part-time, while most main campus students are younger, more traditional students, who work on their program full-time. One disadvantage of the physical model is the inability to mix the two cohorts of students to achieve diversity of perspective, which would be advantageous to all.
- Most professors do not like the extra two hours driving time added to teaching an evening course offered at the remote site. Since most of the courses are scheduled for one evening a week in a 2½ hours block of time, total instructor time is at least 4½ hours to teach that single course, when travel time is included. Accordingly, there is reluctance on the part of professors to volunteer to teach a course section at the remote site. While they are compensated for travel expenses, they are not compensated for the additional travel time from campus.

In an effort to address some of these problems, a feasibility study was conducted in the possible use of videoconferencing in this program. Equipment was installed at both sites and a pilot test was conducted. After some technical issues were resolved, two volunteer instructors were trained in the use of the equipment.

For the next several terms two MBA courses were offered simultaneously to both sites via videoconferencing over IP. After teaching using this method, one of the instructors observed the following from a faculty point of view:

- Preparation had to be altered from a ‘normal’ face-to-face class to accommodate the constraints of the system with regard to the variety of activities that could be undertaken.
- The instructor had to also be a ‘director’ with regard to working the cameras, deciding what was being seen by the students at each site, and making sure discussion included the remote site students. This took a great deal of practice and one only became proficient from hands-on experience.
- The course had been conducted using alternating sites. Instructors would travel to the remote site every other week, while staying on campus the alternate weeks. That gave each site equal time with a professorial physical presence. From the instructor point of view, this cut travel in half from what would have normally been required to teach the course at the remote site.

- There was virtually no inter-site interaction between students. All interaction took place within a site. The venue offered no effective method of student interaction with students at the opposite site.
- While this videoconferencing had solved many of the administrative problems, the teaching modalities for the instructors were far more complex than they were used to with normal face-to-face instruction.

Overall, the use of videoconferencing in this format was acceptable to all parties as a compromise way to solve several problems. Probably those least eager to embrace this change were students at the main campus, who felt anecdotally that they were being somewhat shortchanged by having to 'share' professors with remote site students.

The courses selected for the videoconferencing venue were primarily lecture-based courses. After three years of instructing via this approach, an additional course was developed for the videoconferencing venue. The content of the new course had additional small group components and was much less conducive to the format, as it included (and depended upon) much more interaction between students. The course would require considerably more small group work and student interaction than the initial courses. In addition, the term began with an unbalanced class (only 5 students at the main campus and 25 at the remote site). This lack of balance led to serious problems which were exacerbated by the student-centred, active involvement pedagogy being used in the new course. About 10 weeks into the 16 week course, the instructor reported serious problems with the videoconferencing venue, with the main problem being the inability of students at the two sites to effectively interact in any meaningful way.

About that same time, administrators had been working on a contract with Elluminate (a provider of web-based conferencing software and solutions) to offer a web-based conferencing setup for the university. A trial period had just commenced and the instructor of the new course volunteered to move the course, in mid-session, from the videoconferencing venue to a web-conferencing venue via Elluminate. Fortunately, the instructor was familiar with Elluminate, having used it for several years prior to this time in some adjunct teaching and consulting done at another university. Accordingly, training on the software was not required, but the instructor needed to do the following to make the transition smooth for students:

- be sure that all students had access to broadband Internet connections during normal class session time
- be sure that all students had, or were willing to acquire, the required hardware (a microphone and speakers for their computer) and that their computer systems would work with Elluminate
- be sure that all students would agree to the switch
- spend a portion of the first session with an orientation to the software.

All students agreed, and the transition was made relatively seamlessly. The remaining four weeks of the course were conducted exclusively via Elluminate, with each student accessing the class from the location of his or her choice (most were at home). At the end of the course, the students were queried via email and asked to reply via email as to which venue they had preferred and their reason(s) why. All 30 students reported a

preference for the web-based conferencing venue, offering, among others, the following reasons:

- negation of the need to travel to a site (opportunity to participate from home)
- ability to interact better with students from the opposite site
- increased willingness to participate in discussion
- additional features, such as real-time polling, desktop sharing, and breakout rooms, that were not available in the videoconferencing venue.

The following year the course was offered exclusively via Elluminate. While not without some difficulties, there were few technical problems and students liked the venue. An end-of-course survey, with 29 responses, yielded the following insights:

- 93% of students liked the venue, while the remaining 7% were undecided about it
- 69% felt like they were "contributing members of the class" in this venue, while 17% were neutral and 4% had a negative view
- 90% felt that there was sufficient interaction between the instructor and students during the course, while the remaining 10% were neutral on the issue
- 77% felt that there was sufficient interaction between students in this venue, while 17% were neutral and 6% negative
- 31% of students reported that they would not have been able to take the course in any other venue, due to time, travel, or scheduling constraints.

It should be noted that only 2 of the students had experienced a videoconferencing course, so responses were primarily relative to face-to-face instruction, rather than in comparison to the videoconferencing venue.

Many of these reactions are consistent with previous research (Gillies, 2008), where students were found to be least engaged "when there was tutor monologue, particularly if in the form of talking over PowerPoint slides already issued, and where interaction was minimal or lacking". This had been the model in the videoconferencing venue, largely because of the limitations of the technology. The web-based conferencing technology overcame those technical issues, allowing a much greater variety of activities. It also overcame another limitation of videoconferencing pointed out by Gillies' research in that "few students felt that videoconferencing allowed for much genuine interaction *between* sites and few felt any sense of togetherness with students at the other sites". In the web-conferencing venue, location is rendered completely irrelevant.

Another observation from this experience (from the instructor perspective) was that it was much easier in the web-conferencing venue, when compared with the videoconferencing venue, for the professor to monitor student involvement. As Gillies points out with regard to videoconferencing,

> "… while some students can be highly engaged and involved in their learning, it is possible for others, even at the same site, to be inactive and inattentive for long periods with impunity."

A key lesson learned from the experience was that the web-conferenced venue allows for more student-centered activities. While a teacher-centred framework is certainly

possible, the nature of this venue affords great opportunity for student engagement (see Martin (2005) Chakraborty and Victor (2004)).

4 Advantages and disadvantages of synchronous venues

When discussing advantages and disadvantages it should be noted that these are relative to the 'gold standard' of face-to-face instruction. One might even make the case that, in many ways, some of these technologies are actually *superior* to face-to-face venues (particularly with regard to administrative issues such as time and space constraints).

4.1 Videoconferencing

Most modern videoconferencing setups utilise the Internet as the transmission medium and feature bidirectional audio and video, with camera and microphone control for both (or multiple) sites possible from a single controlling site. From a technical perspective, these sites are expensive and difficult to set up and have several infrastructural disadvantages:

- Because of the complexity of the equipment, rooms used to house the equipment are most often dedicated to that purpose. While portability is possible, it is difficult.
- Bandwidth management must be undertaken.
- Technical support must be available for instructors.
- Technical personnel need to be available at both ends of the link (originating site and remote site) to address possible technical issues.
- Equipment acquisition and setup costs are high.
- Room design must be optimised for best results (placement of microphones and cameras, lighting, etc.).

From an instructional perspective, key factors in student acceptance of such systems include instructor preparation, instructor skill, and personal student involvement (Gillies, 2008). While videoconferencing allows such activities as role playing, interactive group work, simulations and gaming, practical demonstrations, guest lectures, and tutorials (Smyth, 2005), there are limitations to the actual conduct of these activities and achieving a quality level equivalent to that in a traditional classroom takes a great deal of preparation on the part of the instructor.

Additionally, there is the issue of the different perceptions of the remote site students and the main site students. Bisciglia and Monk-Turner (2002) point out that students at the remote site, for example, "perceived a greater level of connection between the professor and other students than those enrolled in the traditional class". The equalisation of these perceptions is difficult in the videoconferencing venue, as the students at the two sites never really have an opportunity to mingle and interact across locations. This problem can be mitigated, to some extent, by the addition of asynchronous components that foster interaction between groups, allowing the perceived boundaries between groups of students to be reduced or eliminated.

4.1.1 Advantages of videoconferencing as a distance learning venue

The benefits of videoconferencing, when compared to other methods used for distance education, have been well-researched in the literature for a number of years.

Chakraborty and Victor (2004) listed the following benefits of videoconferencing:

- it allows synchronous voice and video interaction
- it enables multiple remote sites to be easily supported
- it enables connections with external resources
- it improves the use of computer demonstrations
- it facilitates the blending of a variety of student demographics at home and remote sites.

Motamedi (2001) added some additional advantages:

- it provides access to instructors to those physically removed from the main campus
- it reduces or eliminates travel
- it provides visual, physical presence for learners (when contrasted to other forms of distance education)
- it supports the use of a diverse set of media
- at an administrative level, it can help organisations achieve greater reach and revenue by expanding programs to new audiences.

While all of these are clearly advantages over older, less technologically advanced, distance education technologies, and possibly over online-based asynchronous venues, few of them are really advantages over the traditional, face-to-face classroom experience. In fact, most advantages that are truly such advantages are administrative in nature, rather than pedagogical. In the instructional sense, we are trying to play 'catch-up' with face-to-face, and few advantages over that venue are evident. However, from an administrative perspective, there are numerous advantages, particularly those listed with regard to location, new audiences, and underserved populations.

4.1.2 Disadvantages of videoconferencing as a distance learning venue

There is a wide literature base which points to the need for instructor training for those involved in videoconferencing. Clearly, the students in these settings have needs that are distinct from those in traditional settings (Gillies, 2008), and instructors need to be specifically trained to handle these needs. Simply porting a traditional course to this environment is rarely successful.

Gillies further points out that

> "a fundamental problem of the videoconference is the inflexible reliance on technology so that in cases where 'live' technology fails there is often no obvious fall-back alternative which can be employed immediately."

This disadvantage is not unique to videoconferencing, as it also applies to virtually any synchronous venue, including web-based conferencing. Accordingly, anyone engaged in synchronous distance learning, regardless of the technology being employed,

is well-advised to have backup technologies available (often in the form of older, less robust technologies such as IRC) as a fallback, with all students being advised and trained for such contingencies.

More important, however, from the instructional point of view, is the oft-cited disadvantage of the difficulty of sustaining the interest of the remote learners (see Martin (2005) and Motamedi (2001)). This can be a serious issue and one that is difficult to deal with when teaching in this environment. Activities must be altered frequently and be as student-centred as possible. While the technology provides for some semblance of 'face-to-face' interaction,

> "eye contact is not possible, deictic gestures are restricted, and contextual conditions are merely apparent to the communication partner to a limited degree." (Hron et al., 2007)

According to research conducted by Chakraborty and Victor (2004), there were

> "… significant differences between the local and remote site students in their learning behaviour and classroom activities. The local students received more information and explanations from the instructor; they read and reviewed materials more than their remote counterparts; and they were more involved in group projects and presentations."

While some of this behaviour can be minimised by instructor preparation and training, it cannot be eliminated entirely, due to the nature of the videoconferenced venue.

Feedback from instructors in the venue has included the following additional drawbacks:

- The venue is prone to temporary interruptions, mostly technical, which impact the remote site exclusively.
- Students at the remote site may feel unfairly disadvantaged with regard to questions posed to them.
- Questioning of remote site students is difficult for the instructor and the tendency is to direct questions at students in the same room.
- Videoconferencing does not lend itself to traditional lecturing for any length of time because student attention at the remote site is significantly reduced without a physical presence. According to research (Ward et al., 2006), 90% of students in this environment prefer lectures delivered from the same room (not from the remote site).
- Student interaction is possible within the site, but not between sites. Although both sites can hear contributions made by students at the opposite site, few students at the remote site are willing to share for fear of not being recognised or heard.
- Sometimes signals are not completely disrupted, but are compromised as to quality. This results in a suboptimal experience for remote site students.
- It is essential to have a technical person present at the remote site, at least to boot and configure equipment at the beginning of the class. This can be expensive, particularly if the class is being conducted after normal working hours, which distance learning classes often are.

If we are convinced that the synchronous environment is what we want, the question is whether or not it is possible to overcome these difficulties and provide a better learning experience for students, while still maintaining the relative advantages of this venue.

4.2 Web-based conferencing

Currently, web-based conferencing has become heavily utilised outside education, particularly in the business environment. Edwards (2008) highlighted its applicability to business:

- spend less on travel
- extend your company's reach
- increase internal business process efficiency
- encourage brainstorming
- enhance customer satisfaction
- unite geographically dispersed work sites
- speed project completion
- spread important news and information
- close deals faster
- provide fast IT support.

While several of these are applicable only to business, most are also applicable to an educational application of the technology as well. Since these technologies operate over existing IP networks, they are relatively inexpensive to implement, with software and support being the only costs. There is no hardware to purchase and many of the vendors offer the venue on a subscription basis, hosting all of the infrastructure themselves.

Most web-based conferencing software includes the following features:

- audio capabilities (requires a microphone for each participant)
- video capabilities (webcams or more sophisticated cameras can be used)
- whiteboard
- polling
- breakout rooms for small groups
- the ability to record sessions and make the recordings available to participants
- chat board
- private messaging
- application sharing
- multimedia presentation

- web tours
- native PowerPoint conversion and presentation.

It should be noted that these capabilities encompass all of those currently available with videoconferencing and add some additional features, such as polling and breakout rooms. Additionally, most features are available to all participants, so a student can share a desktop or application or conduct a web tour. Features are not limited to instructor use only.

Gaide (2005) offers ten factors to consider when acquiring web-based conferencing systems:

- initial expansion costs
- user compatibility
- learning curve
- training and support
- customisation options
- voice and video capabilities
- customer support
- scheduling
- security
- recording and archiving.

Most commercial offerings will currently address all of these factors; however, some open-source solutions may be lacking in several. In a recent paper in *Distance Education Report*, entitled "Synchronous Instruction – More than Text Chat" (2007), an analysis of available web-based conferencing packages was undertaken, which included the following commercially available offerings: Elluminate, Horizon Wimba, and Macromedia Breeze. All are similar in their feature sets and capabilities and are representative of the genre.

4.2.1 Advantages of web-based conferencing as a distance learning venue

Clearly, the feature set offered by these packages exceeds that available in the typical videoconferencing environment. Whether or not this translates to better instruction, or more learner-centred activities, remains to be seen as the venue matures and more empirical research is conducted. At the outset, the additional features offered are significant and useful in instruction. Breakout rooms, for example, encourage collaboration between students regardless of their geographic location.

A key advantage is the negation of location as a factor. While videoconferencing places a heavy emphasis on centralisation of location, gathering learners together in a physical setting, there is no physical setting in web-based conferencing. Accordingly, all students are equal with regard to their presence in the virtual classroom. All have equal

access to the instructor and all course assets. All can contribute equally, levelling the playing field and eliminating any hierarchy of students based on location. This can be a major advantage of this venue over videoconferencing. Potentially, it could even be turned into an advantage over a traditional classroom.

Another advantage is flexibility. While videoconferencing would render some pedagogical approaches difficult or impossible, there are few instructional activities that could not be done in the web-based conference room. It is much easier to translate a traditional class to use in this environment, as much less modification and reconfiguration is required.

If configured correctly, and if sufficient bandwidth is available, inexpensive webcams can make it possible in this environment for all students to see each other, albeit not simultaneously. This lends a personal element to the classroom that may be somewhat lacking in other venues. The software is also scalable, meaning that those without such devices, or with lesser bandwidth availability can still participate even though they may not have the use of advanced features such as video transmission.

4.2.2 Disadvantages of web-based conferencing as a distance learning venue

There are some possible difficulties with web-based conferencing, but most are easily overcome. Henning (2001), noted the following potential drawbacks:

- there may be a time lag in audio/video response
- poor connections may interfere with the collaboration features
- the venue is subject to local network traffic, which will vary for each participant
- there may be mechanical issues with hardware such as microphones or webcams.

Since that was written in 2001, numerous improvements have taken place which would tend to ameliorate these drawbacks. The time lag has virtually disappeared, as most participants now have broadband connections to their homes or chosen locations. When dial-up was the predominant network access method, time lag, lack of video capability, and sporadic connection problems were the norm. Recently, as greater broadband penetration has taken place, these issues have tended to be less common. Still, however, experience has shown that lack of broadband access effectively renders an individual unable to fully participate in web-based conferencing. Accordingly, broadband access would likely be a requirement for participation in Elluminate-based course sections.

Mechanical issues and issues with equipment can, and still do, occur. A logon to a server is necessary, and a recent end-of-course survey in the case examined here showed that out of 41 total students, only 2 reported ever having a connection problem during the 16 weeks of the course. Those connection problems were also reported as single incidents. If 41 students were logging in each week to a 16 week course, that would total 656 total potential logins, with only 2 failures, or a 0.3% failure rate.

Some students did report issues with their microphones during the course; however, those students were still able to contribute to discussions via the chat feature. While they were somewhat disadvantaged temporarily, such problems did not exclude them completely from participation, nor did the problems persist to the next class session.

5 Conclusion

5.1 Analysis

As the case examined here has shown, much of the impetus in implementing synchronous distance learning is administratively based. Such things as servicing geographically remote populations, addressing the needs of underserved areas, and the ability to expand programs without a corresponding expansion of physical infrastructure can be key elements in such decisions. Some of these administrative needs can be addressed with asynchronous online courses, while others cannot. For those that cannot, synchronous technologies such as videoconferencing and web-based conferencing offer viable options to face-to-face instruction.

From an instructional viewpoint, we can only hope to approximate a face-to-face experience, as has been illustrated by the case discussed here. Instructors in either venue will face a learning curve with either technology and generally must adapt some of their face-to-face pedagogy to the particular environment in which they find themselves.

While no single venue is a panacea for the complexities of distance education, both venues available for synchronous instruction offer certain advantages. Clearly, the more mature technology, videoconferencing, has been utilised in many settings over a relatively long period of time. However, it is limited by its very nature to certain physical sites. The emerging web-based technologies, like their counterparts in the highly interactive climate of today's Internet, are robust, easy to learn and use, and readily available with relatively minimal cost. The improvements in such technologies can potentially be leveraged by distance educators to improve interactivity, student-centred learning, collaboration, and access of remote student populations in ways not possible before.

Table 1 illustrates a summary comparison, from an instructional perspective, of the two synchronous venues discussed here, along with the 'gold standard' of face-to-face instruction. As is illustrated, the web-based conferencing technologies, while moving closer than videoconferencing, in many respects, to face-to-face instruction, still fall short in several of the key elements inherent in that format.

Table 1 Comparative summary of synchronous venues

	Face-to-face	*Videoconferencing*	*Web-based conferencing*
Lecture	Easy	Easy, but not as effective as face-to-face for remote site(s)	Easy and effective if webcam is used. Not as much access to nuanced body language as in face-to-face
Discussion	Easy	Easy for home site, but moderately difficult for remote site	Easy. Best with microphones or webcams
Group work (during class)	Easy	Difficult, especially if heterogeneous groups (transcending sites) are desired	Easy with the use of breakout rooms
Examinations	Easy	Requires proctors at remote sites	Difficult. Would require testing outside of the venue

Table 1 Comparative summary of synchronous venues (continued)

	Face-to-face	*Videoconferencing*	*Web-based conferencing*
Student presentations	Easy	Easy	Easy
Media (videos, audio)	Easy with projection	Very bandwidth-dependent. Some lag time for remote site often occurs	Media files can be preloaded to server and then individually access by students so distribution is streamlined
Guest speakers	Easy	Easy	Easy. Since physical presence is not required, more guest speakers are available
Web-based searches/discussion	Easy with projection	Easy	Easy
Demonstrations (physical)	Easy	May not be effective for remote site, depending upon the nature of the demonstration	Difficult. One strategy is to create a video of the demonstration and distribute as a media file
Demonstrations (software/computer)	Easy with projection	Easy	Easy
Student/student Interaction	Easy	Difficult, particularly between sites	Easy (site independence)
Student/instructor interaction	Easy	Difficult, particularly from remote site	Easy
Instructor/student interaction	Easy	Easy	Easy

Perhaps, however, the comparison is more pronounced in Table 2, which shows a comparison on several administrative considerations such as location and infrastructure. On those issues, greater flexibility is possible with the implementation of web-based conferencing. This is important because this technology is also available as a blended tool that could be combined with face-to-face instruction as a supplemental venue, opening up greater scheduling flexibility opportunities and facilitating better utilisation of traditional campus resources.

Table 2 Comparison of administrative considerations

	Face-to-face	*Video conference*	*Web-based conference*
Location dependency	High	High	None
Institutional hardware infrastructure required	Moderate	High	None
Student hardware infrastructure required	None	None	High (broadband)
Flexibility	Moderate	Moderate	High
Distance dependency	High	Moderate	None
Institutional software infrastructure	Low	Low	High
Institutional bandwidth availability	Low	High	None
Technical support	Low	High	Moderate

Perhaps the cutting edge of tomorrow's education will be the blending of these technologies: Taking the salient features of each into an environment that is technologically rich, pedagogically sound, and flexible enough to address myriad learning styles, lifestyle requirements, and time and space constraints.

5.2 The need for further research

The observations and conclusions in this paper are based on a single case. The objective has been to set the stage for additional research as well as to give educators a starting point from which to make comparisons between the available venues. Clearly, there is a need for empirical analysis of the web-based venue, its efficacy in a variety of settings, and its relative effectiveness compared to the other venues available to online educators. There is considerable literature and work that has been done in this regard with the videoconferencing approach, but very little has been undertaken in the area of web-based conferencing.

Studies should be undertaken to examine the strengths and weaknesses of the emerging technology of web-based conferencing as a course delivery system. In addition, the impact of this new venue on student perception of the online experience should be an area of investigation that should be given a high priority.

5.3 Summary

This paper has used a case approach to highlight several differences between the two major synchronous venues available today to distance educators: Videoconferencing and web-based conferencing. In summary, each has its advantages and disadvantages with respect to specific pedagogical approaches or activities. However, some clear advantages were observed in the web-based conferencing venue with certain activities, notably group work and cross-site interaction between students. Additionally, web-based conferencing is less costly to implement, does not require physical infrastructure, and is geographically independent. This last advantage could prove most important moving forward as the needs and expectations of online students evolve with maximum flexibility playing an increasingly important role.

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Note

[1]In common parlance, 'online' generally refers to a course taught over the internet in an asynchronous fashion. Although videoconferencing and web-conferencing utilise the internet for connectivity, the term 'online' is rarely used with reference to them.

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