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# Technology issues in blended synchronous learning

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Universities have responded to demand from students for increased time flexibility by providing online alternatives to face-to-face education, typically centered around the provision of online learning resources along with asynchronous online learning activities. More recently, synchronous options afforded by the capabilities of web conferencing tools, video conferencing tools and virtual worlds have emerged, providing the potential to bring together face-to-face and remote students using blended synchronous learning strategies. In the OLT-funded project *Blended Synchronicity: Uniting on-campus and distributed learners through rich-media real-time collaboration tools*, seven case studies of the use of blended synchronous learning strategies were explored. This discussion paper highlights the technology considerations and technology setup issues emerging from the case studies, as background material for a round table discussion session at the conference.

**Keywords**: blended synchronous learning, video conferencing, web conferencing, virtual worlds

## Introduction

Changes in the lifestyle patterns and expectations of university students, along with the availability of new technologies, have presented both challenges and opportunities to university educators in recent years. The increasing diversity of the student population and the rising cost of higher education have led to a student population more constrained by the time demands of work and family than ever before (Gosper, Green, McNeill, Phillips, Preston & Woo, 2008; James, Krause & Jennings, 2010). This has given rise to an ever-growing demand for more flexible alternatives to face-to-face study. Alongside this, new online learning technologies and the ubiquitous availability of mobile devices have provided new affordances for anywhere, anytime work and study (Kearney, Schuck, Burden & Aubusson, 2012).

Universities have largely responded to these changing demands of students by providing online learning resources such as reading materials and recorded lectures along with asynchronous online learning activities through discussion forums, supported by the capabilities of learning management systems. More recently, the availability of new online and mobile technologies, coupled with a renewed focus on communication and collaboration skills within graduate outcomes, has led to increased interest in the provision of synchronous learning opportunities for online students. In this context, web conferencing tools such as Adobe Connect (Butz et al., 2014) and Blackboard Collaborate (Spann, 2012), video conferencing tools such as Skype (Cunningham, 2014), and virtual worlds such as Second Life (Beltrán Sierra, Gutiérrez & Garzón-Castro, 2012) have been used to bring together on-campus and remote students in real time.

In the study, *Blended synchronicity: Uniting on-campus and distributed learners through media-rich real-time collaboration tools* (an Australian Office of Learning and Teaching funded project) seven case studies involving blended learning designs were explored (see Bower, Kennedy, Dalgarno, Lee, Kenney & de Barba, 2012; Bower, Kenney, Dalgarno, Lee & Kennedy, 2014; Bower, Kennedy, Dalgarno**,** Lee & Kenney, 2015). This paper builds on earlier publications, which provide details of a large survey of usage of these approaches (Bower et al., 2012) along with in-depth case studies (Bower et al., 2014; Bower et al., 2015), to provide a discussion of the key technology issues emerging from the study and considerations for selection and appropriation of technologies.

## Data collection

The seven case studies from which the data presented here was collected were identified drawing on 1748 responses to a 2011-2012 survey of Australian and New Zealand tertiary educators on rich-media synchronous technology usage (Bower et al., 2012). Table 1 provides a summary of the technologies, discipline foci and learning tasks within these seven case studies. See Bower et al.(2014) and Bower et al.(2015) for more detailed descriptions of the cases. Face to face learning activities during the lessons were video recorded as were selected online activities within the web conferencing, video conferencing or virtual worlds session. Student reflections on the lesson were gathered through a questionnaire and students also participated in focus group interviews following the lessons. Teaching staff were also interviewed before and after the lesson.

**Table 1: The seven case studies of blended synchronous learning strategies**

| Case Study | Technology | Discipline and content focus | Learning task |
|---|---|---|---|
| 1 | Web conferencing using Adobe Connect | Finance, investment | Collaborative evaluation |
| 2 | Room-based video conferencing using Access Grid | Healthcare, quality improvement | Collaborative evaluation |
| 3 | Web conferencing using Adobe Connect | Histology, microscopic tissue analysis | Large-group Q & A and small group problem solving |
| 4 | Web conferencing using Blackboard Collaborate | Statistics, hypothesis testing | Collaborative problem solving |
| 5 | Virtual worlds using Second Life | Mandarin language, authentic communication | Paired role-play |
| 6 | Web conferencing using Blackboard Collaborate | Sexology, exploration of personal experiences | Lecture discussions |
| 7 | Virtual worlds using AvayaLive | Teacher education, technology in learning | Collaborative evaluation and design |

## Emergent technology issues

In the analysis of the data collected during the study across the seven cases a number of technology-related issues emerged which have implications for anybody planning to use blended synchronous learning approaches or anybody responsible for the technological infrastructure needed to support such approaches. These emergent technological issues and considerations are discussed in the following sections.

### Technology setup

When setting up the audio for blended synchronous learning classes it was important to avoid audio feedback loops caused by sound coming out of one set of computer speakers and being detected by the microphone of another computer. In most cases this was managed by having all audio into and out of the face-to-face classroom run through the teacher's machine. Another alternative to this was to have all participants use earphones. The main technology setup issue reported by students was that the microphone in the face-to-face classroom was unable to capture all of the student comments. This meant that the teacher needed to re-articulate student comments into the microphone in order for them to hear what was said. In these cases teachers paraphrased comments or in some instances did not relay them to remote students. This also led to interference with the flow of the lesson as remote students experienced periods of inaudible student commentary or face-to-face students listened to comments twice as their teacher repeated them.

One important decision for teachers is whether to let students make audio contributions or to only allow them to use text chat. The advantage of enabling audio contributions is that it can enable more

rapid and more extensive contributions. It could also enhance the sense of co-presence and reduce cognitive overload caused by trying to work with two visual modalities such as the text chat and notes area at the same time. On the other hand, text was more reliable than audio and enabled many simultaneous contributions by participants. Using audio and text communication at the same time was perceived by some students to result in fragmented conversation that was hard to follow. Additionally, slow typing speed sometimes led to text appearing after the issue being discussed had moved on. The importance of being able to record the session was observed across cases, with students who participated in web conferencing sessions citing this as an advantage of the approach. The inability to easily record and disseminate the virtual worlds and room-based video conferencing lessons was perceived to be a limitation by both teachers and students. Also, one teacher noted that the inability to record individual breakout rooms during web conferencing sessions was a distinct weakness of the system.

**Problems and constraints associated with the technological approach**

Technological issues were reported in each case, ranging from minor to substantial in impact. Internet speed and technology reliability were reported in all case studies, resulting in delayed or choppy audio or in some cases, temporary inaudibility. Some teachers indicated that they needed to monitor the system for audio feedback loops, and disable the microphone rights of other participants if feedback loops occurred.

In addition to these general issues, the following are some of the issues emerging from specific cases:

- Not noticing that the teacher's microphone was muted for 2 minutes of the lesson;
- Latency on the interactive whiteboard slowing the pace of the lesson;
- The web conferencing system crashing, possibly because too many breakout rooms were open at once;
- Students experiencing temporary difficulty accessing the features of breakout rooms;
- Students being inexplicably logged out of the system;
- Inability of iPad client software to allow students to draw on the web conferencing whiteboard;
- The teacher's browser crashing during review of group work responses in the virtual world; and
- Difficulty navigating and interacting within a 3D environment.

Some difficulties with the technological approach related not to the technology itself, but conventions and etiquette relating to its use. For instance, some remote students reported that it could be hard to know when to talk because of the lack of visual cues.

**Strategies for working with technology**

A range of strategies for managing the technology-mediated nature of the environment emerged from the student and teacher questionnaires and interviews and researcher observations. All teachers started their session at least 10 minutes before the scheduled lesson start time so that they and students could test the technology setup. One teacher pointed out that it was important to prompt students for contribution at regular intervals – this not only promoted engagement and learning, but also enabled the teacher to assess whether or not the technology was working as intended. One teacher also recommended micro-strategies for working with text chat. For instance it is useful to ask distance students whether or not they have any questions because it can take time for them to write, in which case the lesson might have already moved on. Asking students to use the prefix "Q" enabled the teacher to more easily distinguish text chat questions (requiring responses) from comments. If there are ever problems with audio, it is important to remember to use text chat to ask students whether they can hear. Teachers were in general agreement that it was useful for them to develop skills in troubleshooting technological issues, because immediate technical assistance may not always be available on demand.

## Conclusion

This paper has highlighted the key technology issues emerging from seven case studies of blended synchronous learning. Through the proposed round table discussion session at the conference participants will have the opportunity to ask questions about the particular issues highlighted and

share their own experiences in order to build collective understanding about this important aspect of blended synchronous learning design and support. The Blended Synchronous Learning Design Framework which was developed during the study will be used to help frame the discussion (Bower, Dalgarno, Kennedy, Lee & Kenney, 2014).

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