

Blended synchronous learning environments – FLEXspace.org

We are really only beginning to grapple with and understand the implications of the service and technology innovations that will bring more dynamic, cost-effective and accessible learning experiences to students all over the globe.ⁱ

Key Learnings

- Provides access to learning to remote students who are unable to travel to campus for reasons of geography or life demands which meant that they are unable commit to coming onto campus all the time
- Students can enjoy a similar learning experience whether located on or off campus
- The research to-date has proven that with a change in pedagogical approaches, a mixed collaborative learning environment works effectively in either the on-campus active learning space or online as a web-led conference, but academics have to adapt to the new challenges that occur when the face-face and web components are brought together
- The model demands a shift in the way in which academics approached their teaching and classroom management as barriers between modalities did pose some challenges for both students and academics
- All students valued the flexibility that blended synchronous learning afforded, and in many cases felt that it led to an enhanced sense of community.
- Blended synchronous learning provides a different kind of learning experience, "*a sense of presence and feeling connected*" and provides very flexible access to the distance learner, leading to increased student satisfaction and engagement.
- In online and blended modes, the brand of the university and the sense of belonging and affiliation is still very important.
- With a trend towards learning service unbundling with students going to different providers for different parts of the experience, identity becomes even more important.

Introduction to FLEXspace and the blended synchronous learning research

FLEXspace - The Flexible Learning Environments eXchange is a large collaborative effort that started in the State University System of New York and quickly spread (see flexspace.org). It is currently located at Carnegie Mellon University. Flexspace.org is an innovative environment that supports a highly engaged community of experts, decision makers, influencers, and practitioners from higher education, K-12, libraries, museums and industry committed to improve learning space planning, design and implementation. It is a one-stop shop for best practices, detailed examples, and a community dedicated to improving learning spaces around the world.

Research on blended synchronous learning environments first originated in selected Australian and New Zealand universities with the Blendsynch project. These learning environments are spaces continued across campus and off campus giving students the ability to partake in the same learning experience irrespective of location. The remote students were unable to travel to campus for reasons of geography or being based at different campuses. Others had life demands which meant that were unable commit to coming onto campus all the time. This model provided these students with

flexibility. Students on campus and remote students worked together in 3D virtual worlds web conferencing and video conferenceⁱⁱ.

Case study partners were selected from 1748 responses to a 2011-2012 survey of Australian and New Zealand tertiary educators on rich media synchronous technology usage. Following liaison with a range of potential partners, seven cases were selected for intensive further study and evaluation. Eight case studies were reported with each illustrating learning design to bring together on and off campus students (see www.blendsync.org).

The design and implementation factors were reviewed from the perspectives of student, teacher, and researcher observations on how these environments influenced student learning activity and perceived learning outcomes. Key findings indicated the importance of designing for active learning in these environments and the selection of appropriate technologies and services to support these learning and teaching modes.

The learning experiences investigated in the Blendsynch project are defined by Mark J. W. Lee, one of the members of the FLEXspace research team as **“learning that is beyond passive, didactic lectures”**. This active learning model combines pedagogy, space and technology to support a rich student experience (see Figure 1).



Figure 1: The components of Active Learning

The barriers between modalities did pose some challenges for both students and academics. The model demanded a shift in the way in which academics approached their teaching and classroom management - particularly for collaborative activities. Academics found that teaching a class of co-located students or a class where all participants were remote were both easier options than a mix of on- and off-campus students. However, the blended synchronous model saved significant amounts of time and negated the need for separate class times for on and off campus students.

The range of blended learning models studied and their impact

Seven case studies of blended synchronous learning were conducted using these technologies as shown in Table 1. The case studies each covered a different discipline and the uses of blended synchronous learning varied.

Technology	Subject Area	Learning Activity	F2F	Remote
Web conferencing	Actuarial studies	Collaborative evaluation of examples of student work	11	7
Room-based video conferencing	Health informatics	Lecture and small group collaboration	24	17
Web conferencing	Medical science	Large-group questions and answer and small group problem-solving	12	11
Web conferencing	Statistics	Direct instruction and individual problem solving	12	2
Virtual worlds	Chinese studies	Paired role-play	12	9
Web Conferencing	Sexology	Lecture and whole-group discussion	7	15
Virtual Worlds	Teacher education	Direct instruction, small-group discussion, and small-group activities	23	22

Table 1. Summary of cases, technology used and participants

Remote students found the model offered them faster access to support and increased their sense of connectedness. Many on campus students appreciated being exposed to a broader range of perspectives. All students valued the flexibility that blended synchronous learning afforded, and in many cases felt that it led to an enhanced sense of community. The ability to hold extended discussions and to mutually support one another as well as having all the information in one space were perceived as advantages of blended synchronous learning. The technology enabled students to engage in a wider range of activities than would otherwise have been possible, including group writing tasks, diagram labelling exercises, voting activities and role play. In some cases both on and off campus students reported learning more in the blended synchronous mode than in their usual classes because of the active learning tasks the teacher designed and applied to virtual worlds. In a few cases on campus students thought that remote students slowed down the lesson or interfered with their interaction opportunities.

One method employed in the virtual world was to pair each student in class with a remote student as a proxy to relay questions in the classroom. In another, students who were co-located on campus had a projection into the classroom of the virtual world environment and those in the virtual world had a web stream of the classroom, so enabling all students to feel they were part of the same environment. Figure 2 is an example of a virtual world teaching environment.



Figure 2. Case study 7: On campus student view showing in-class participants interacting with avatars in the virtual world

Some classes had a wall with a grid of individual video screens as in Figure 3, while in others each student physically present in the classroom had their own computer logged into the web conferencing using BlackBoard Collaborate, Adobe Connect or Zoom for Education, for example.

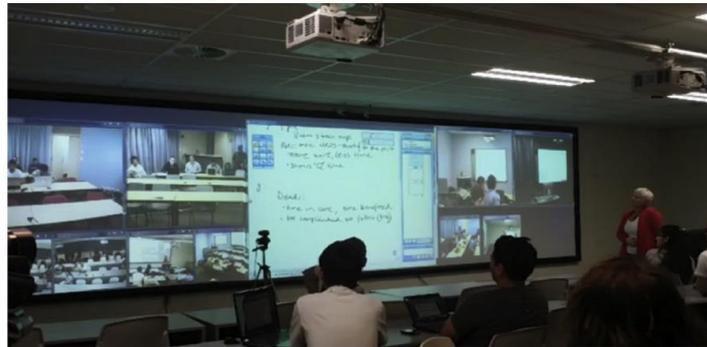


Figure 3: Case study 2: Room based video conferencing

Teachers also recognised that there were several advantages to blended synchronous learning, such as the ability to include remote students in classes, field more questions during lessons, and increase the active learning of all students. The technology was a way to facilitate greater contribution by all students and increase the sense of community amongst the class. However, teaching in a blended synchronous learning mode placed high demands on teachers in terms of cognitive load, with the teacher needing to simultaneously manage two cohorts of students, multiple streams of information and the technology, all whilst teaching the subject matter. Technology performance issues and preserving the quality of the face-to-face experience were also seen as issues.

Blended synchronous learning offers many advantages to institutions: it can provide more flexible access to programmes, increase the amount of in-class participation, enhance students' sense of connectedness, and potentially be more financially efficient. However, findings from this study indicate that for blended synchronous learning to be successful, institutions need to provide appropriate technical support, teaching assistance, professional development, and pre-equipped learning and teaching spaces. Additionally, adequate workload allowance needs to be provided to teachers teaching in blended synchronous mode to account for the extra time commitment it requires for preparation.

Mark Lee suggests that blended synchronous learning offers a different kind of multimedia experience. It provides *"a sense of presence and feeling connected"* as well as very flexible access to the distance learner, leading to increased student satisfaction and engagement.

The researchers recommend that traditional bricks and mortar institutions begin experimentation with these online and flexible delivery options. A focus is required to retain the 'sense of place' of the institution in the online world through good design and positioning.

Lessons Learnt

"It is possible to succeed in fully blended synchronous mode but takes preparation and there is a learning curve"

Table 2 shows the learnings from these different blended learning environments which have led to a Blended Learning Design Framework. The most salient learnings are highlighted in the boxes.

Presage (Design)	Pedagogy <ul style="list-style-type: none"> Clearly define learning outcomes Design for active learning Determine whether to group remote with F2F students Utilise general design principles 	Technology <ul style="list-style-type: none"> Match technologies to lesson requirements Set up and test the technology in advance 	Logistics/setup <ul style="list-style-type: none"> Be highly organised in advance Solicit the right institutional support Prepare students Prepare self Establish a learning community
Process (Implementation)	Pedagogy <ul style="list-style-type: none"> Encourage regular student contribution Distribute attention between remote and F2F students Identify the focus of learning and discussion Avoid duplication of explanations Circulate among groups Draw upon existing pedagogical knowledge Be flexible, adaptive, and composed 	Technology <ul style="list-style-type: none"> Know how to use (and troubleshoot) the technologies Appropriately utilise audio/visual modalities Advise students on how to use the technology Ensure students have correct permissions Use tablet or other mobile/handheld devices to facilitate visual input if required 	Logistics/setup <ul style="list-style-type: none"> Start lessons 10 min early for technology testing Log in to a second computer (to see student view) Apply tactics to work with text chat contributions Seek teaching assistance where possible and desirable
Product (Outcomes)	<ul style="list-style-type: none"> More active learning (remote and F2F) Enhanced sense of community (through co-presence) More flexible access to learning LEADS TO <ul style="list-style-type: none"> Increased student satisfaction 		

Note. F2F = Face-to-face.

Table 2: Key learnings from the seven case studies

The future

Flexible furniture and features for remote students including the ability to fill out the teaching room with sensors that are interchangeable, and which can collect data about students position and movement, arrangement of furniture, facial expression, sensor enabled learning spaces and by using arrays of devices and connections that the Internet of Things is offering. This will help obtain a full picture of students learning experiences. There will be new privacy and ethics issues raised by these possibilities that will also need to be addressed.

A next research phase studying multimodal learning experiences started in the 2018-19 academic year centred at a new Technology Enhanced Learning centre at Carnegie Mellon university (see <https://www.cmu.edu/teaching/>).

Some topics being addressed by the ongoing research include:

- Holographic telepresence technology to create a presence in the room
- Telepresence robots
- Instrumented classroom spaces
- Sensor enabled room tracking student movement

ⁱ Bower, M., Lee, M. J. W., & Dalgarno, B. (2017). Collaborative learning across physical and virtual worlds: Factors supporting and constraining learners in a blended reality environment. *British Journal of Educational Technology*, 48(2), 407-430. <http://dx.doi.org/10.1111/bjet.12435>

ⁱⁱ Bower, M., Dalgarno, B., Kennedy, G.E., Lee, M.J.W. & Kenney, J. (2015) Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education*, 86, pp 1-17. Available at <https://doi.org/10.1016/j.compedu.2015.03.006>