New Generation Distributed Learning: Models of connecting students across distance and cultural boundaries

Romana Martin, Queensland University of Technology, Australia.
Tania Broadley*, Curtin University & Queensland University of Technology, Australia.
*t.broadley@qut.edu.au

Abstract
In an age of globalised learning and teaching, university education continues to extend beyond the classroom with students participating in rich learning opportunities designed to provide authentic learning experiences and foster an international perspective. Bridging the geographical divide between on campus, off campus, rural and remote learners has been an ongoing challenge for many universities often resulting in a different learning experience based on the mode of study. The discourse of rurality in this paper, is situated in Reid et al's (2010) rural social space where learners face specific economic, geographic and demographic issues relative to a particular context. However, this paper will present a model of innovative communication technologies and new generation learning spaces, coined within as "new generation distributed learning classes", emerging to support learning through video and web conferencing which situates local, rural, distance and overseas learners to participate collaboratively in real-time student-centred learning experiences with diverse student perspectives.

This paper provides an introduction to the new generation of distributed learning and presents three models of distributed learning developed for a multi campus international university. The models are informed by outcomes of a longitudinal research project monitoring the implementation of distributed learning across multiple campuses. The dimensions used to describe new generation distributed learning experiences are also outlined.

Keywords: Distributed learning; new generation learning spaces; regional and remote education; teacher professional development.

Introduction

Over the past two decades, blended and online models of learning have provided anywhere, anytime access to university programs for students studying at a distance; however, in some university environments the on campus classroom learning experiences have often remained very similar to the traditional lecture and tutorial models of the past. In recent times, a more proactive shift towards student-centred problem-based authentic learning experiences and collaborative learning is changing the nature of university education for on campus, rural and remote, distance and international students.

The introduction of next generation collaborative learning spaces and technology rich learning environments that support learner centred approaches can transform the classroom into a vibrant connected learning environment for all students, particularly with the implementation of *New Generation Distributed Learning* supported by video- and web-conferencing facilities.

Definition of New Generation Distributed Learning (NGDL)

21st century *New Generation Distributed Learning* (NGDL) moves beyond the definitions of the past where it represented distance learning at best enhanced with online resources and interactivity (Dede, 1996; Lea & Nicoll, 2002) . Contemporary NGDL can be defined as a multidimensional learning experience that harnesses a range of real-time telecommunication technologies such as video conferencing and web-conferencing, online collaborative learning environments, and rich media resources to provide a highly interactive face-to-face learning experience augmented with a comprehensive resource base and collaboration tools. Digital communication technologies allow the on campus classroom to extend beyond the boundaries of the room to include geographically distant classes and individuals. Students participate in real-time learning experiences collaborating both face-to-face and online to overcome the traditional boundaries between on-campus and online education. As with online learning experiences, the distributed learning experience can range beyond the timetabled class time with students continuing collaborative work online and communicating via conferencing or social media tools.

Synchronous learner-to-learner interaction and virtual collaboration in video communications have become invaluable for enhancing authentic learning opportunities which are critical for developing twenty first century skills (Bridgstock, 2016; Smyth, 2011). Interactive video conferencing, as highlighted by Broadley and Broadley (2014), can effectively support collaborative synchronous learning activities by strengthening the social relations between students and teachers, and by fostering classroom discourse, enhances the educational experiences of students. Broadley and Broadley refer to the relational model developed by Burns and Knox (2011) which illustrates the concept of classrooms as complex adaptive systems with an interplay of "teacher elements, classroom elements and the physical environment" (Figure 1) in which the different elements converge stretching beyond the temporal and spatial location of the classroom combining in dynamic relationships. The Burns and Knox model shows how these elements dynamically interact within the learning environment whilst supporting student learning.
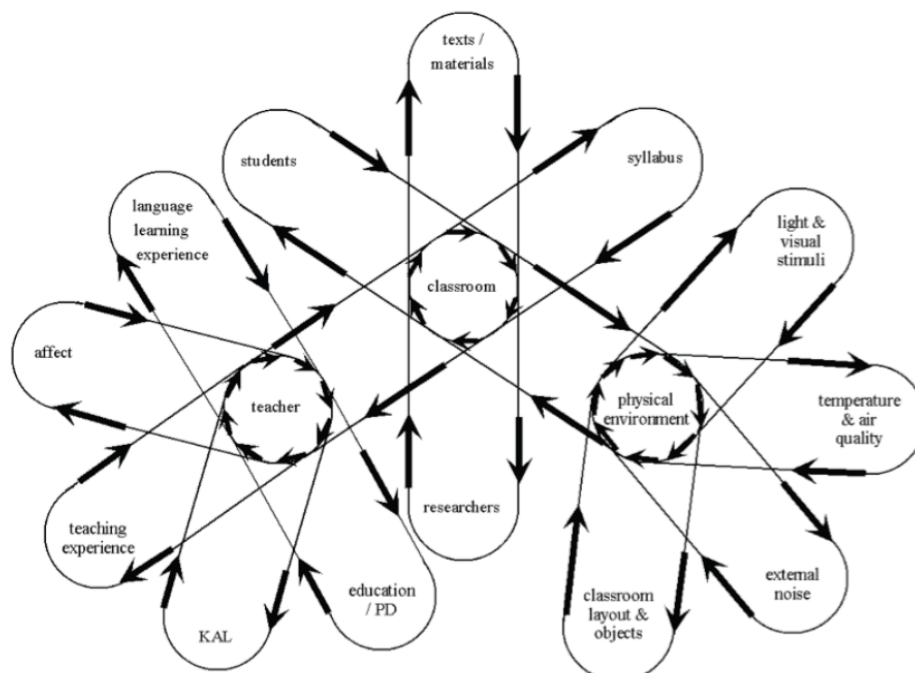

Figure 1: Classroom as a complex adaptive system (Burns & Knox, 2011)

In the NGDL environment where there are multiple student cohorts (some in classrooms and some connecting with mobile devices) and more than one teacher or facilitator, the complexity of teaching environments increases with the inclusion of additional elements such as communication audiovisual (AV) technologies for distributed learning, various physical environments and the addition of an assortment of virtual environments. As shown in our adaptation of the Burns and Knox model in Figure 2, in the distributed learning environment there are multiple locations and hence multiple instances of elements such as student cohorts, teachers and facilitators, physical environments, distributed learning space AV tools and multiple virtual environments. Each of the elements is still influenced by other factors such as educational design, teaching philosophies and approaches for teachers and facilitators, and in the physical environment learning space design, comfort, lighting and location as in the Burns & Knox (2011) model. At the centre of the model features student–student and student–teacher discourse which is supported by a combination of communication and AV technologies within the physical and virtual environments. The virtual environments, which may include a number of collaboration and communication tools, allow the classroom discourse to extend beyond the live distributed learning session increasing opportunities for meaningful exchanges beyond the classroom experience. The dynamic interaction of the key elements in the distributed learning environment hence creates a unique multidimensional learning experience particularly in rural or international university settings. This new model places the students at the centre, whereas Burns & Knox (2011) focused on the classroom, teacher and the physical environment.
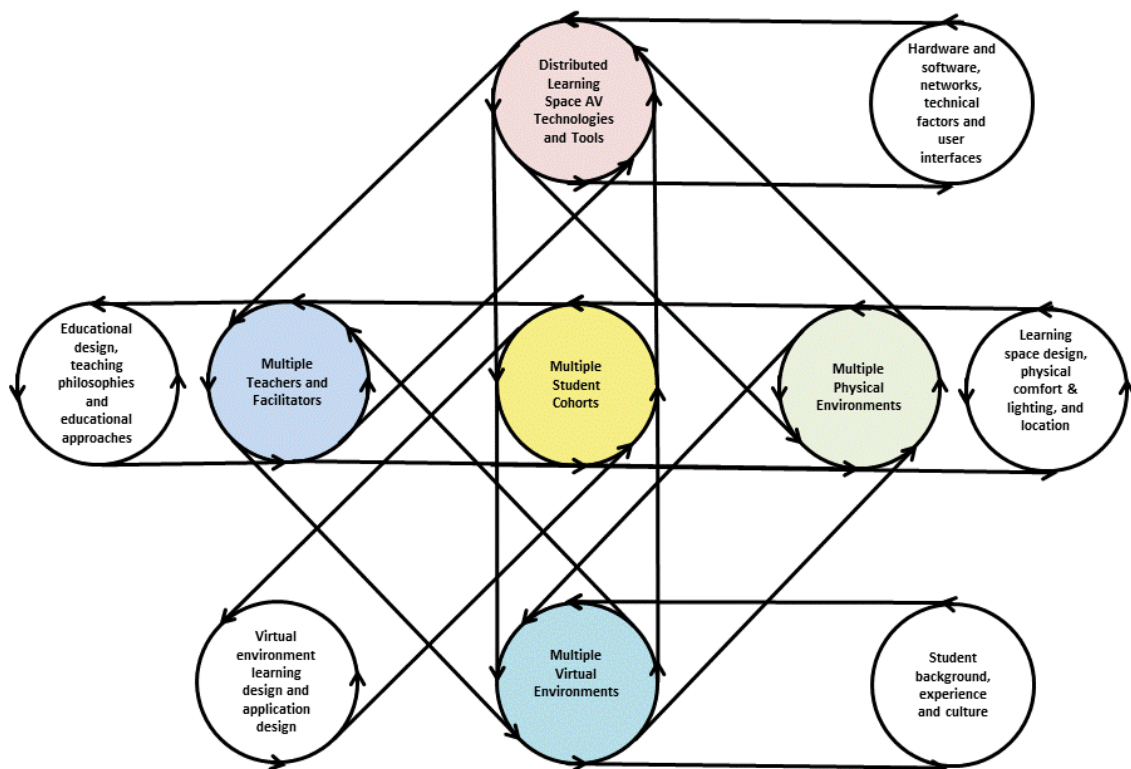

Figure 2: Key elements interacting in the distributed learning environment

While this learner centred approach is relatively new, it is important to highlight that the concept of distributed learning and the use of video conferencing for real-time teaching in multi room and multi campus environments is not entirely new. For example, as illustrated by Freeman (1996) two decades ago, mass lectures could be successfully distributed across multiple campuses allowing students to experience the lecture in real-time with content sharing and a live video link. However, the technologies of the day limited interactivity and the set up and maintenance were time consuming and required lecturers to have considerable technical capabilities. It has also been quite common for universities to provide off campus students with the option to link to live-streamed classes and to interact by asking questions or posting comments in real time via text based tools, nevertheless, the level of interactivity in these systems can still be very limited (Sandhu, Fliker, Leitao, Jones, & Gooi, 2017).

The intention with NGDL is to move away from teacher-centric knowledge transmission models towards learner centred, active and collaborative learning approaches and to foster more student interactivity and engagement through the use of video conferencing technologies. The scope of contemporary communication technologies creates enhanced opportunities to implement NGDL in ways that support highly interactive multi-classroom distributed learning sessions which allow students to join in on mobile devices and participate as if they were all present in one face to face class.

Distributed learning can be particularly advantageous for multi-campus international universities as one of the benefits of video conferencing is in enhancing cross cultural communication and fostering an international perspective (Ferry, Kydd, & Boyles, 2012). Furthermore, NGDL could present a model of equitable learning experiences for students in rural and remote areas which according to Reid et al (2010) are situated in a complex rural social space unique to the economy, geography and demography of their region with challenges that are specific to their environment and background. Rural and remote students and are faced with a range of educational and social barriers in higher education which can influence their success and can impact on student retention (Fleming & Grace, 2017; Watt & Gardiner, 2016; Wirihana et al., 2017). It has also been found that students at regional campuses can experience an 'us versus them' relationship with the main campus when what they actually desire is to engage in dialogue with one another, their lecturers and the course content (Todd & Ballantyne, 2007, p. 3). The introduction of NGDL linking the rural and city cohorts would stimulate learning and student focussed relationships through real-time classroom discourse and the sharing of a variety of learner perspectives and experiences. In many courses in disciplines such as health and education, it is essential for students to travel to a city campus to engage in face to face learning experiences and practicals which can place undue time pressures especially on rural and remote students (Burke, Bennett, Bunn, Stevenson, & Clegg, 2017). However, if classes and seminars were available through NGDL facilities regional students could participate without the need to travel or relocate and NGDL could provide opportunities to overcome some of the obstacles to their success (Tummons, Fournier, Kits, & MacLeod, 2017).

Research has also shown that rural origin and rural placement are significant predictors of medical students' intentions to practice rurally (Walker, DeWitt, Pallant, & Cunningham, 2012). Providing opportunities for rural students to study locally and acquire placements in familiar locations is advantageous for those who intend to practice in rural settings as retaining qualified professionals with rural origins benefits rural communities (Boylan & McSwan, 1998; Hegney, McCarthy, Rogers-Clark, & Gorman, 2002).

Where institutions are building new teaching environments or refurbishing existing spaces, opportunities exist to upscale the learning space designs to support NGDL. In recent years, many

universities have recognised this need to provide a built environment that supports contemporary teaching practice and the needs of new generations of learners regardless of where they are located (Keppell & Riddle, 2012; Radcliffe, Wilson, Powell, & Tibbetts, 2009; Steel & Andrews, 2012). Consequently a number of studies have explored the ways in which real time video communication can be embedded in the classroom with or without virtual environments to support student interaction (Bower, Dalgarno, Kennedy, Lee, & Kenney, 2014; Keppell & Riddle, 2012; Rehn, Maor, & McConney, 2016; Symonds, Hartnett, Butler, & Brown, 2012; Warden, Stanworth, Ren, & Warden, 2013). The challenges of teaching in such collaborative and distributed learning environments are being explored in a range of settings, both K-12 and university (Mader & Ming, 2015; Symonds et al., 2012). In this paper, we focus on describing three models of NGDL with multiple classroom settings and introduce several cases of NGDL based on the outcomes of a distributed learning project at an Australian university.

Distributed Learning Project Outcomes

Commencing in 2012, a distributed learning project was undertaken in the context of a complex multinational Australian university, with multiple campuses including rural, remote and offshore locations. In a major transforming learning initiative, a need was identified to improve the student experience and to provide active and engaging learning opportunities for students at all locations. Distributed learning offered the solution for introducing collaborative learning environments across national, rural and remote, and international campuses providing students with more opportunities to interact in classes being held simultaneously in multiple locations with the option for individuals and groups to join in online. It was envisaged that students' learning experiences would be enriched by deep levels of student discourse sharing localised experiences, including multicultural and international perspectives. Furthermore, the project focussed on fostering 21st century skills to equip students for a connected world in which they will have the capability to interact effectively across vast distances through a wide range of technology based solutions.

To support the initiative, in the period 2013-2015 the university had successfully refurbished 62 classrooms; with 54 in a metropolitan campus, one in a remote location some 1300km from the metropolitan area, three at a regional location some 600km from the metropolitan area and four classrooms at a campus in Malaysia. A further 12 learning spaces became available in 2016 with the completion of a new building. In total, 29 distributed learning spaces were operationalised, of which 19 spaces were both video and web conference enabled, and ten learning spaces were equipped with web-conferencing facilities.

The distributed learning spaces were equipped with:

- Video and/or web conferencing facilities
- Cameras at front of room focussing on students
- A camera at rear of the room tracking teacher or students at the front of the classroom
- Fixed desks with built in microphones (fixed layout) or movable desks and chairs – flexible layout (flexible and semi-flexible) with microphones in the ceilings
- Wireless access – students can bring their own devices
- 2-4 multiple projection screens - projection from multiple sources (in some spaces there is no traditional front of room)
- Interactive whiteboards which can be displayed to the far end
- iLecture recording capabilities
- Mobile collaborative workstations (MOCOWs) or computers located at desks in 'pod' configurations

The Pilot

The distributed learning project initially commenced with a pilot situated in the remote region of the Pilbara in the far North of Western Australia. The pilot project focussed on connecting remote students to the city campus with videoconferencing facilities in two identical classrooms with a mirror fitout of the learning spaces providing students with an almost identical classroom experience. The pilot involved a nursing program with students upgrading from enrolled to registered status. The collaborative learning spaces developed for this purpose at both Bentley and the Pilbara included high quality video conferencing equipment and equivalent audio-visual presentation functionality to support a telepresence experience. Students in the Pilbara location reported a positive connection to the distributed classroom discourse and indicated they did not feel like an external student. The distributed classrooms selected for the pilot were of the typology 'fixed-distributed' meaning that the desks face the front of the room in a fixed configuration to mirror the class type available in the Pilbara. An alternative to this are flexible or semi-flexible distributed classrooms which offer a variety of desk arrangements. The type of classroom used in the pilot included desks for groups of 6 with 'pod-based' computers and inbuilt push-to-talk microphones at each of the desks. The fixed nature of the desks allowed for camera pre-sets which upon pushing the microphone button refocused the camera from the classroom on to the student group presenting allowing all participants to see and hear the students.

The content presentation facilities in the venues included a lectern based PC with the ability to also connect other mobile devices, a document camera, and interactive whiteboard functionality screen displayed to all locations. iOS devices such as iPads could be connected via AirMedia and AppleTV. Using software-based screen sharing utilities it was possible to show content from any of the classroom based PCs on the main content screen and share work from each of the student pod computers to the far end class.

This learning space design incorporates two displays at the front of the room, one showing content from any of the input devices, the other displaying the far end with a picture in picture (PIP) image of the local capture area which may be the students or the teacher. At the back of the room is another screen displaying the far end with a PIP representing the camera captured locally and being transmitted at that time. This allows for the teacher or facilitator to be aware of the far end activities regardless of location. Students connecting on mobile devices can also be displayed (PIP).

The camera input being transmitted to the far end includes multiple options, including a 'tight capture' close-up of the teacher while standing on a pressure pad at the front of the room, or via motion detection cameras, at any location throughout the classroom. The input switches to the students through either a push-button activated camera or an autotracking camera at the front of the room which focusses on the group currently talking and when no one is talking or being tracked, the camera reverts to showing a wide angled view of the entire room. Having a range of input options allowed students at the far end to be aware of the location of groups and the range of learning activities underway in the classroom as if they were present in the room. Throughout the pilot program a number of camera and microphone configurations had been trialled and with the ever evolving capabilities in new AV technologies this is expected to continue to advance providing more flexibility in video capturing options. Feedback from both students and staff indicated that the pilot provided enhanced learning opportunities and a sense of belonging to a learning community which was particularly valued by the remote students in rural areas.

Models of New Generation Distributed Learning

Following the success of the city-remote region Pilbara pilot, distributed learning classes were made available to further regional, international, and online students in configurations adapted for the requirements of each course and location. Distributed learning continued with further classes in the Pilbara, classes in Kalgoorlie and, internationally, classes with the Miri Campus (Malaysia) and the Singapore Campus all with interchangeable lead venues.

The following three cases, informed by the project outcomes, illustrate the possibilities offered by the distributed learning experience. The three models of distributed learning shown were conceptualised from the distributed learning space design work.

Case 1: Connected Two-Classroom Model – City and Rural Campuses (Connected Two-Classroom Model) Figure 3

Emma lives in a remote area, but today she will be attending her university class running at the city campus by joining in the class through a linked distributed learning classroom based at the local college. She will communicate with her classmates some of which are also in the rural area and attending the same local class, but also with others who are based in the city. They will see each other in class, but also interact online and continue to work on projects together. Today the class will be led by a lecturer in the city and at the rural location only a facilitator will be present to get the class underway. Sometimes this changes, with the class being led from the rural classroom, depending on the session topics.
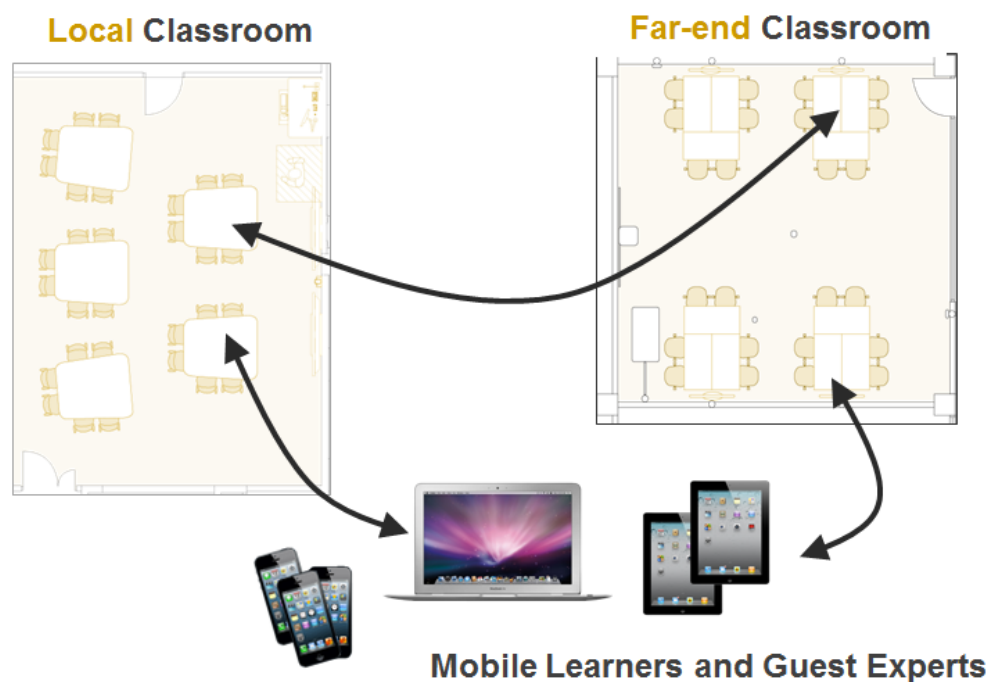

Figure 3: The connected classroom in distributed learning with mobile participants

Emma joins her group in the local classroom and when the class commences, the groups take turns to introduce themselves to the lecturer and the participants at the far end and then the class gets underway. The groups at both locations are presented with the case studies they will be exploring and then participate in a whole class discussion (local and far-end are treated as the same class). Following the whole class discussion, in the next 15 minutes, students work collaboratively in groups at their respective locations developing their solutions to the problem at hand in an online collaborative learning environment. When the class reconvenes, groups present their solutions to the entire cohort using screen sharing technologies to display their solutions on the main shared screens. A whole class discussion takes place to analyse and

evaluate the solutions. As the class comes to an end, groups agree to catch up online through the learning apps and through social media to refine their solutions as these will be submitted and shared at the next class. The lecturer and students say their goodbyes and the session ends.

Emma feels as if she has been part of something, not just an external student working alone at home, she was able to interact face to face and build relationships with others in the class. On a few occasions she was working at a cattle station and unable to go to the class at the local college, but was still able to connect using her iPad and join in the session keeping on track with her studies.

Case 2: The International Perspective: Connecting multiple classrooms, mobile learners and guest experts (Multiple Classroom Model) Figure 4
Sara lives in Malaysia and is completing an MBA at an Australian university which focuses on both business knowledge and intercultural communication. Sara's classes run simultaneously with the same sessions held in Perth and Singapore. Every week the first two sessions are distributed learning classes in which the student participants work collaboratively on problems solving and focus on business case studies based in an international business context. The remaining sessions are more traditional tutorial sessions in the local environment.

In the distributed learning classes, which are related to the weekly case studies, international business leaders from all over the world join in as guests for discussion sessions making the classes current and interesting. Instead of listening to a lecture the students are engaged in collegiate discussion that will assist with their problem-solving tasks. The structure of the sessions allows students to discuss their cases and questions with others in their groups and to formulate a group question for the international expert which they post to the web-based conferencing system chat area. One of the students will be nominated to start their group's discussion with the expert and other students then join the conversation.
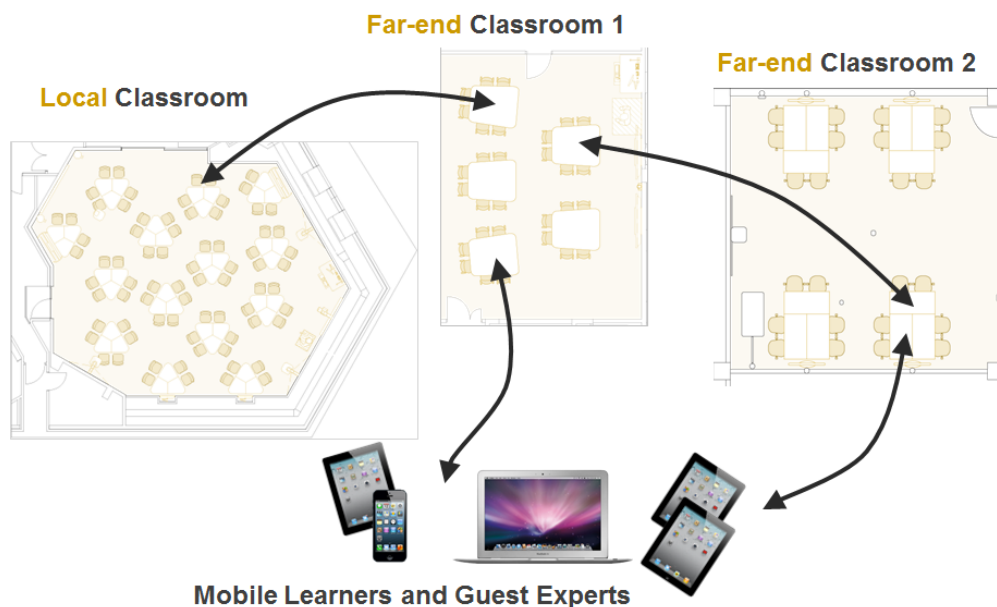

Figure 4: Multiple connected classes with mobile participants

A number of students travel in their jobs but they can join in from other locations on their mobile devices. The most appealing aspect of the classes for Sara is the currency of discussion topics that deal with what is happening in international business today with input from real experts in the field and she enjoys the social aspect of the class.

Case 3: One studio to many locations: Connecting multiple classrooms and mobile learners (The Digital Media Suite Model) Figure 5

Jon is completing his university degree whilst working on an offshore oil platform and due to his work schedule it is rare for him to be able to come to the city campus for his petroleum engineering classes. However, he has enrolled in an engineering course that has distributed learning sessions. The sessions facilitated by content experts are available through a digital media suit. The digital media suite supports live web conference connectivity with students in a number of classrooms, in both Australian and international locations, and with mobile learners like Jon. The studio sessions take place at the start of the week and are followed by two distributed learning sessions later in the week in which Jon, via his laptop, joins groups for tutorials and lab sessions.
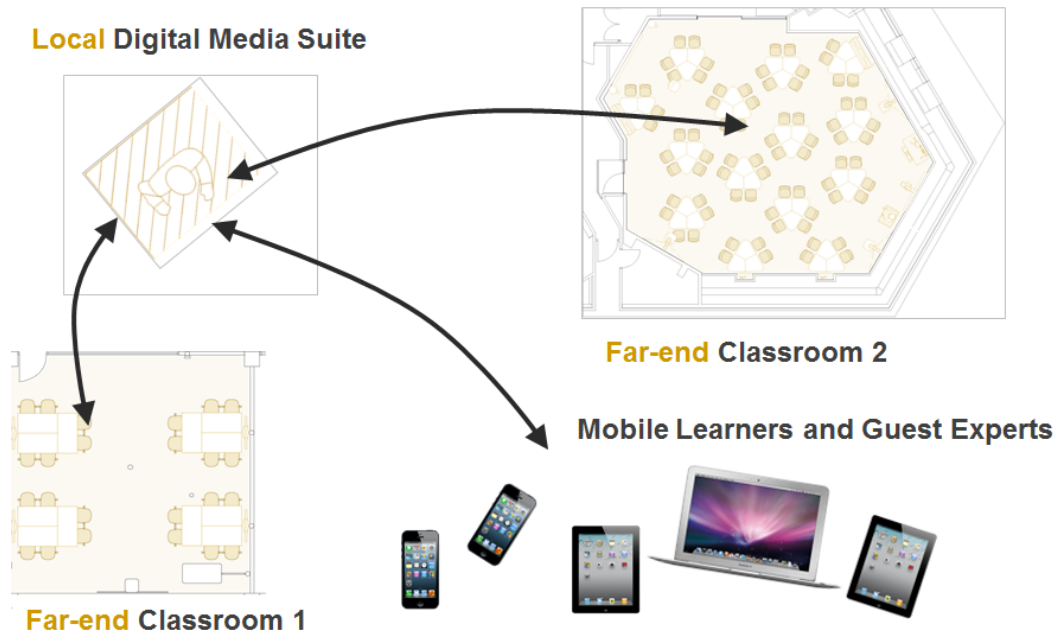

Figure 5: One Digital Media studio with many connected participants

In the studio sessions the facilitator/lecturer uses a range of visual media to illustrate topics such as fluid flow through reservoirs or thermodynamics, and uses light boards for calculations and showing relevant formulas and other illustrations. Throughout the session students can ask the facilitator questions and through online collaboration tools connect with other students. The sessions are dynamic and media rich and are recorded for follow up and review if Jon's work shift prevents him from attending the session. The design of the digital media suite ensures a high quality production in which the media and audio from the session are all captured in high definition providing a much better live audiovisual experience and a high quality recording than traditional lecture capture technologies. Jon knows that no matter what his work schedule is he will not miss out on critical learning opportunities and discussions. Jon can still participate in his class no matter where he is.

Project Findings

Pedagogical Challenges

While introducing distributed learning environments, in the pilot and subsequent trials, a range of pedagogical challenges became apparent. Unlike resolving technological challenges, the solutions to the pedagogical challenges were not necessarily simple as they required not only a change in teaching practice, but in some cases a significant paradigm shift for educators. One of

the key considerations in the pilot was to promote student discourse and ensure equal involvement for both local and far end students since it was not adequate for students at the far end to be only observing what is happening in the local class, they needed to be actively involved as participants. Therefore, the priority was on adapting to more student-centred active learning approaches and to a 'flipped classroom' model, whereby the time in the classroom was focussed on interactive learning limiting teacher-centric content transmission. However, as found by a number of authors _ENREF_12_ENREF_17_ENREF_24(Hajhashemi, Caltabiano, & Anderson, 2016; O'Flaherty & Phillips, 2015; Symonds et al., 2012) the introduction of 'flipped learning' approaches can be particularly challenging as there is no clear consensus on how this can be achieved and implementations of flipped learning can vary from class to class; yet, when implemented successfully, a flipped and active learning environment can be positively impact on student creativity and innovation _ENREF_7(Chiu & Cheng, 2017). Therefore, with the aim of achieving a flipped and active learning environment, many lecturers required to redesign the curriculum and adapt the learning activities to include a focus on:

- Student-centred and active learning activities maximising face to face interaction in the classroom
- Interactive collaborative learning both within groups and across groups of students (local and remote)
- More authentic tasks, problem solving and real-life case studies
- Embedding lifelong learning skills for 21st Century learning such as building skills for a connected world, including the capability to interact effectively at a distance
- Upskilling both students and staff in the use of communication technologies and mobile devices.

Educators teaching in distributed classrooms were required to develop a range of pedagogical capabilities to develop learning designs that support and encourage active and collaborative learning experiences; whilst at the same time adapting their teaching to include multiple cohorts at diverse locations.

Practical Teaching Solutions for Distributed Learning
Teaching in a distributed setting may include a range of interactions throughout the session. At times the teacher may be explaining or introducing an activity (teacher-centred); at other times the students hold the floor interacting, discussing and presenting their work. There are also times in the class when the local and far end cohorts may work independently at each location while the microphones are muted, and then re-join at a later time to share outcomes of their activities.

To facilitate the 'break out' times an online timer (e.g. http://www.online-stopwatch.com/) is used which allows both groups to work to the same timeline and keep track of their progress. Online timers provide a visual and audio indicator for both the local and far end groups which allows for microphones at all locations to be muted during the collaborative work time.

A number of web-based tools allow for students to contribute to a single output regardless of their location. For example, GroupMap (groupmap.com) which can be used for activities such as brainstorming, mind mapping, matrix development enables all students to contribute to an individual or group based map which is then automatically aggregated into a class map. An active learning activity can involve student mind mapping or completing a problem based activity using one of the GroupMap templates and then sharing discussing their individual results.

At other times it is desirable for groups to work together aggregating their input via an app or tool, or collaboratively editing responses across the distance whilst they discuss their choices.

This 'true' collaboration that may involve a group at the city campus and a group in a rural area can be supported by tools such as Blackboard Collaborate where students can communicate both by video/voice or simply using the chat feature and develop solutions to problems. Wiki tools with inbuilt chat features, such as PrimaryPad, allow students to collaboratively develop documents and later export the outcome to embed in their work elsewhere. Such tools can continue to be used after the class allowing for activities to progress once the distributed session ends and outcomes can be shared at the next session.

Professional Development
To support the introduction of distributed learning, two levels of professional development activities were offered to staff. First, lecturers and facilitators were invited to participate in interactive sessions on how to run a collaborative learning session the distributed classroom. This program was conducted by experienced educators who modelled active collaborative learning in live distributed learning classes, involving local teaching staff and the remote facilitators. The professional development sessions focussed on the pedagogical concepts involved in distributed learning and included an orientation to the environment and the functionality of each aspect of the distributed learning spaces. Participants took part in activities interacting with two or more cohorts simultaneously and experimented with ways to foster collaboration and student discourse. All participants had an opportunity to assume the role of a facilitator to lead part of the session and as a student. In the second part of the program, participants actively redesigned one of their learning activities for distributed learning and were able to share their learning designs in the live session.

The second level of support related professional learning sessions focussed on the functionality of venues and use of collaboration software. Additionally, staff had the option to have one-on-one technical orientation sessions with the AV support team who guided individuals through the operation of each facility in their teaching venue. These sessions were able to be arranged at the lecturer/facilitators convenience and could be highly individualised. Furthermore, at the start of semester an onsite technical support officer was in each venue to assist and guide staff and students through any specific difficulties experienced on the day, including unpredictable events such as disconnections. The close work of the AV support teams with the educational professionals fostered a deeper understanding of the teaching needs and resulted in an evolution in the AV and IT systems and supports to mesh with educational needs.

A Framework for Planning Distributed Learning Experiences
When introducing distributed learning experiences in a complex university environment with a range of different disciplines and classroom settings; it became necessary to establish common terminology and an understanding of requirements. To this end we developed a universal framework for planning the various types of distributed learning experiences with enough flexibility to be able to cater to the diverse learning needs. Hence this framework contains the variables that are likely to change from one case to another as each distributed learning situation has different needs and may apply different pedagogies.

The seven main variables in our framework for describing potential distributed learning experience are:
1. The distributed learning model
2. The locations participating and who will lead each session
3. The participants – students, teachers and facilitators and guests
4. Frequency of distributed learning sessions
5. The pedagogies
6. Collaboration levels from classroom, to group and individual

7.   Type of communication technology required

1.   Distributed Learning Model

In many situations the aim of the distributed learning experience was to simply connect two classes and offer access to external students (e.g. Case 1 – Connected Two-Classroom Model), in other situations the requirement was more complex requiring multiple venues to connect (e.g. Case 2 – Multiple Classroom Model).
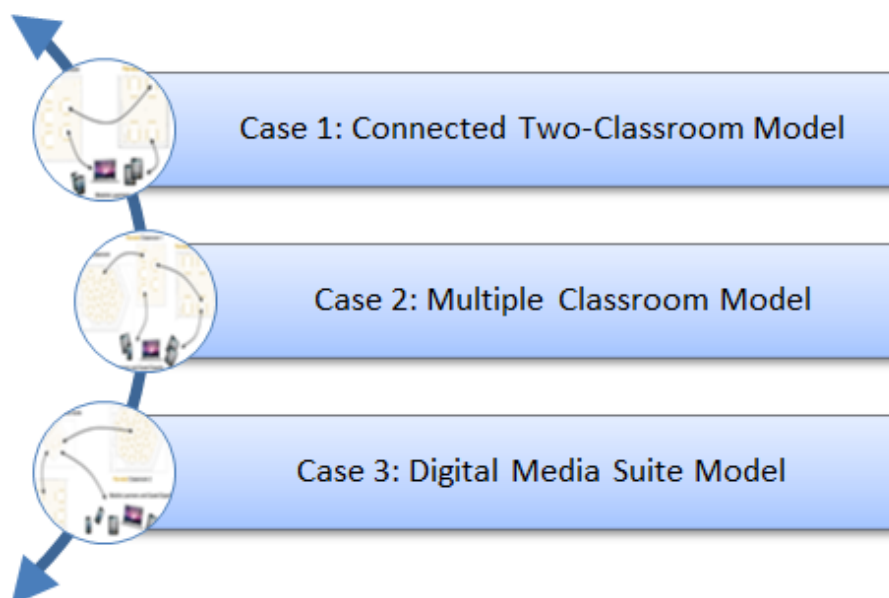

Figure 6: Distributed Learning Models

The Digital Media Suite Model (e.g. Case 3) meets the needs of reaching multiple distributed classes and external students from a location where there is no classroom presence. Variations of these include classes where instead of linking to other classrooms, the classroom or digital media suite connects to external students local, rural or international.

As indicated in Figure 6 by arrows, these models are by no means the only possible models and over time this list will be extended as further models evolve.

2.   Locations participating and leading the sessions

A distributed session may have a lead location that does not vary from week to week, as shown in Figure 7, where Location 1 is the point that coordinates the activities of the participant groups and individuals. However, there is scope to vary this and have inter-changeable lead locations, for example, where the Australian location leads one week and Singapore leads in the following session. It is also possible to have Guest e.g. industry experts or students at any location taking the lead role when required.
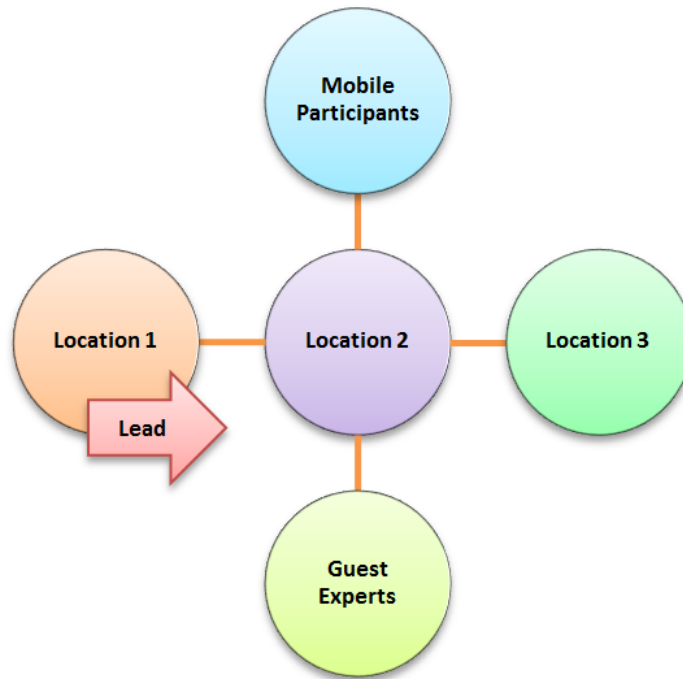
Figure 7: Lead locations in distributed learning

3. Participants

A distributed learning session can have any combination of participants as shown in Figure 8. For example, a session may comprise of internal students at different locations or a mix of internal, external and online and international students. There is scope to include guest participants such as experts from industry or other institutions or guest students.

Figure 8: Session Participants

4. Frequency of Distributed Learning

Often an assumption exists that when introducing distributed learning it is essential that the entire semester takes place in distributed learning mode (e.g. weekly, all scheduled class sessions), however, this may not be necessary. As illustrated in Figure 9, there are alternatives such as the option to run distributed sessions at regular intervals (e.g. one session per week or fortnightly) bringing all students together for collaborative sessions. Another option, especially for those starting out with distributed learning, is to run occasional or ad hoc distributed sessions.
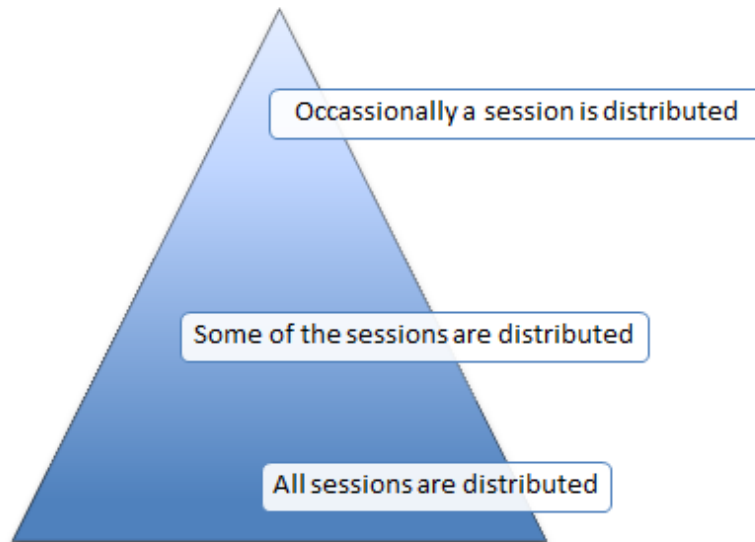
Figure 9: Frequency of distributed learning sessions

5. Learning Pedagogies

In the distributed learning environment learning activities can range from teacher-centred transmissive approaches through to student-centred highly collaborative approaches. In the distributed learning project the emphasis was on building 21st Century learning skills for a connected world, lifelong learning and cross-cultural communication skills. The principles underpinning the success of the project were a shift towards student-centred learning, problem-based authentic learning experiences and collaborative learning as shown in Figure 10.
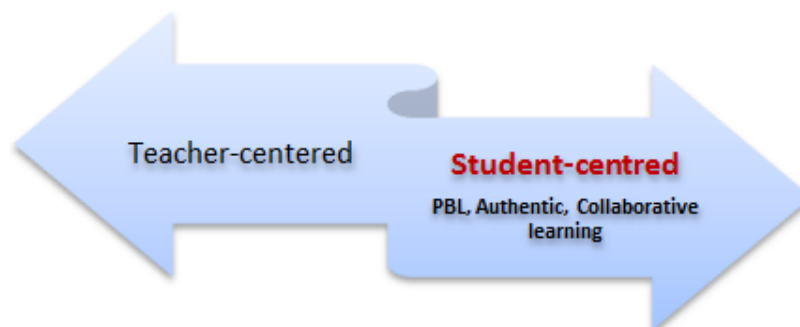

Figure 10: Pedagogies

6. Collaboration Levels

In the distributed learning environment learning activities can be designed to take place at multiple collaboration levels depending on the learning tasks and whether web based tools are employed. For instance, activities such as introductions and content sharing may take place at the classroom to classroom level, then groups may present to the distributed classrooms, or groups may work at a group to group level in both the distributed learning environment and online collaboration environments.

There is also scope for students to interact individually, usually in the online collaboration or communication environments or via social media. Some learning tasks may continue beyond the timeframe of the distributed session and may also take place at a group or individual level, for example, where two geographically distant individuals work together to solve a problem.

Figure 10 shows the levels of communication likely to take place at various times in a collaborative learning session in distributed learning.
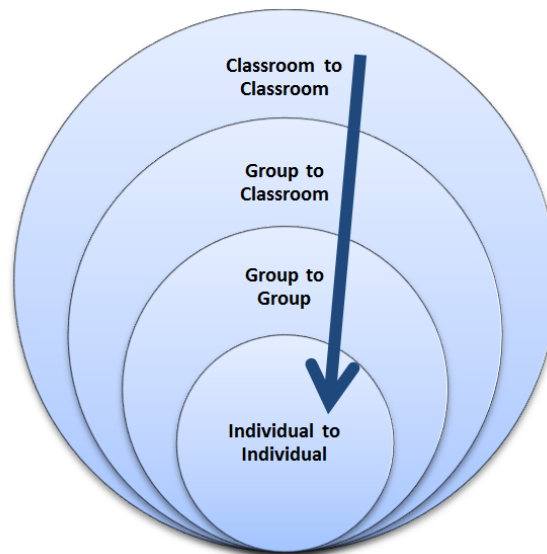

Figure 10: Collaboration levels in distributed learning

7. Type of communication technology required

The options available for classroom to classroom connectivity are numerous. In the project described in this paper the two main options available were the venue based video-conferencing system or web-based conferencing. A number of web conferencing systems were available to staff in the initial phases of the project, after which one system, WebEx, was selected as it could be universally supported by the AV and IT departments. This aspect of distributed learning is likely to vary from one institution to another and change over time as new technologies and tools become available.

Conclusion

New generation distributed learning (NGDL), as defined in this paper, provides a medium for engaging students in active collaborative learning across the boundaries of distance both in and beyond the classroom. The notion of external, distance and online is not new; however, the aim to include external students in a truly equitable learning experience as those in the on-campus classroom has been achieved through technology, pedagogy and space design. Based on the outcomes of a university wide project involving local, rural, remote, international and external students, three practical models of distributed learning were outlined and a universal framework for planning distributed learning experiences developed for success.

The key elements interacting in the distributed learning environment were illustrated in Figure 2 showing the complex interplay between multiple student cohorts, multiple teachers and facilitators, in multiple physical and virtual environments utilising a range of distributed learning space communication technologies and tools. These interactions are influenced by educational factors, learning space design and the backgrounds of both students and teachers.
Based on the city-rural distributed learning pilot, distributed learning was extended to further locations including local, rural and remote, international and external cohorts. The outcomes of the city-rural pilot project were invaluable in informing next steps in both the design of learning spaces in the local university context, but also in terms of the requirements for far end venues,

but most importantly, resulted in a better understanding of both the pedagogical and technical issues. The positive reception of NGLS by the rural and remote student cohort confirmed the value of NGLS for making students feel part of the learning community by the increased student-student and student-teacher classroom discourse and collaborative nature of the learning designs that continue to engage students beyond the classroom in the virtual learning spaces and through social media. The experience that has been gained in this project will continue to inform the pedagogical and learning space designs as further models of distributed learning are developed.

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