COLLABORATIVE LEARNING: DEVELOPING A FRAMEWORK FOR THE INTEGRATION OF ONLINE COLLABORATIVE LEARNING TOOLS

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Abstract
Promotion of flexibility and diversity in university education encourages courses to include distance learning and part-time students or students who spend large parts of the year away from the University on placement. In such instances, it is often difficult to facilitate meaningful student interaction, discussion and feedback or to enable successful student collaboration. This becomes particularly difficult for teaching that depends largely on physical and/or visual aspects; for example, fieldwork studies, laboratory work and project/design modules. Whilst a number of collaboration tools are currently available, their use is often at the early stages of implementation, with no cohesive pedagogical best practice approach for successful use of these tools. In response to this gap in the adoption of this new learning technology, this research aims to provide a process framework for streamlining the approach of more effective implementation of such online collaboration. It examines best practice through literature review and interviews with relevant stakeholders and includes findings from a case study where two online collaboration tools were implemented through a live run of a distance learning architectural project module with a diverse student mix. The findings of these studies are used to inform the development of the framework which suggests a stepped approach and evaluates its strengths, weaknesses and opportunities. The research has a pedagogical approach rather than a technological one as it considers pedagogy as the impetus that steers the teaching needs and technology as the tool to satisfy those needs. Therefore, the framework developed is not restricted to the application of the two tools used in the case study, but is adaptable to reflect an approach to the integration of such other tools which broaden access and facilitate larger discussions, collaboration and feedback. Similarly, although these results derive from research within a visual architectural distance learning course case study it includes findings which are relatable and relevant to other visual and practical subjects, and to other modes of learning.

In the future, the researchers aim to further examine collaboration potential through use of an e-portfolio in three different teaching scenarios, with evaluation of teaching requirements, use in practice and suggested improvements for future use.

Keywords: Collaborative learning tools, e-learning, distance education, online collaboration, communities of practice, blended learning, virtual learning environments.

1 INTRODUCTION
The nature of university education is that it is a changing, dynamic entity. With increased access to technology and internet tools, the encouraged increasing diversity of the student mix both within the UK [1] and the drive to broaden access to a greater number and type of students, university education is looking to harness these facets in finding new modes of course delivery [2]. As such several courses include distance learning students, part-time students or students who spend large parts of the year away from the University on placement; and who therefore follow courses virtually as individuals based remotely or on a limited physical basis with the university. There is therefore a need to facilitate better collaboration and discussion amongst these student types for their own benefit and the subsequent benefit of all students. There are numerous benefits to such collaboration for students and educators alike. Such connections facilitate collaboration off-campus, helps reinforce curriculum theory and facilitates larger discussions with a larger cohort. Additionally, it enables educators to enact change in delivery of teaching that may open up their course to more flexible modes of delivery (part-time/distance) that may not have been previously possible, with the potential to enable courses to recruit from a wider pool of suitable students who will enhance the vibrancy and teaching of the University as a whole. This approach also opens the possibility of courses that blend work placement with teaching. While this mode of learning lends itself well to a variety of course types, many educators may feel limited to offer such modes of learning as it is often difficult to facilitate meaningful interaction, discussion and feedback with these students or to enable these students to collaborate...
together [3]. While this aspect of learning is of relevance to all courses, it is of particular relevance to courses for which visual aspects are very important - such as architecture, medicine, and engineering. As such the focus of this paper is on courses offered at postgraduate level to students in the Welsh School of Architecture, Cardiff University. Though the immediate benefits to architecture as a visual course are apparent, transferable and scalable benefits are envisaged not only to other courses with similar visual elements (e.g. music, geography and planning, biosciences, medicine, healthcare, dentistry, optometry, engineering, physics and astronomy, earth and ocean sciences) but to all courses that wish to implement a more flexible, innovative and interactive collaborative blended learning experience for students.

At a University scale, current solutions to this issue include a number of collaboration tools which are made available from the University and which are in use by various schools. However, these are at early stages of implementation and currently offer no cohesive best practice approach. Existing and new methods need a focussed study to assess their potential. The process of enabling collaboration between students also needs streamlining and clarifying to enable more effective implementation. This paper seeks to offer such an approach through the development, evaluation and implementation of a framework for integration of collaborative learning in a virtual learning environment. The aim of the study is to therefore to provide a process framework process for implementation of online teaching and collaboration within a course to broaden access, diversity and flexibility with a view to streamlining the approach to enable educators to more effectively implement such online collaboration. The study investigates best practice through a Case Study using the available Cardiff University tools of Blackboard Collaborate (BbCollab) and Mahara (e learning portfolio). From this a framework for the use of online collaboration tools is proposed and evaluated through teaching observation and student evaluation and engagement. It should be noted that while the focus on this study is primarily involved with the use of these two tools currently being adopted by the University, it also initially considered other forms of tools which might be used and anticipates that the framework could be adapted to reflect an approach to the integration of such other tools which broaden access and facilitate larger discussions, collaboration and feedback.

2 METHODOLOGY

It was necessary to identify best practice in this area in terms of current advantages and disadvantages with online collaboration, best practice examples, the current virtual collaboration tools available and current practice both within the University and external to the University. In order to meet these objectives a literature review was undertaken, followed by both internal interviews with key staff and external interviews with educators in three external ’sister’ universities containing courses also utilising online collaboration.

The external educator interviews were conducted via skype. Each interview lasted approximately 45 minutes and was semi-structured with each interviewee asked the same questions but allowing for conversational tangents. Notes were made immediately after each interview and collated after the three interviews. Two of the three interviewees had at least 8 years’ experience in online teaching, with the third new to this mode of teaching. Courses taught on were all postgraduate and varied from science, medicine and humanities and students came from diverse backgrounds, genders, ages and nationalities. As such a broad range of issues were experienced and are discussed below.

Subsequently, two case study modules which form part of the “Environmental Design of Buildings” MSc were used to test the framework by conducting surveys with participating students both pre (‘Environmental Design Application’ module) and post (‘Environmental Design Practice’ module) the framework implementation. These modules were chosen as they are project modules which rely heavily on sharing of visual student work during weekly group tutorials and as such were ideal vehicles for testing of virtual collaboration tools. Additionally the same set of students take both modules so a more robust pre and post evaluation could be undertaken. Surveys captured student views on student adoption of the tools and their experience with them, interaction and the value of the tools. The survey was run in two instances in order to grasp the change in student experience with the two different tools used for tutorials; first for the tool (Skype) used previous to Bb Collaborate and then again after the use of Bb Collaborate with the same students participating. Four no. students took part in the surveys, with a 100% return rate. While the number of students surveyed is low, it is deemed acceptable by the authors due to the subsequent use being made of the responses which is principally to inform the curricula and teaching on the module. The authors wish to reveal aspects of real world teaching practice which can inform and improve current pedagogy as part of a “systematic production of exemplars” [4]. Teaching observations were also recorded on the delivery and outcomes of the
teaching on the module without and with the framework. The results were analysed and evaluated with areas for improvement identified. A draft framework was proposed to reflect both on the literature and interview findings as well as the lessons learnt in the implementation phase. While many types of tools are available and were identified to facilitate digital collaboration the tools used in this study were a synchronous virtual classroom tool: BbCollab - Classic version and an asynchronous e-learning portfolio tool: Mahara (Figure 1). Both were selected as students could easily access them without any up-front cost, they were university supported and they offered the functionality needed.

![Figure 1. Tools used](image)

3 RESULTS

The remainder of this paper presents the literature review findings, interview findings and findings of the surveys and teaching observations and presents the resulting draft framework.

3.1 Literature Review Findings

3.1.1 Internal research (in-house)

The internal research was conducted via a discussion event with a Cardiff university Learning Technologist community. The session was themed “implementation of visual collaboration and discussion for cross-student blended learning” and focussed on the following 5 areas: Needs General, 2. Needs Online Collaboration, 3. Experience / Willingness, 4. Tools used, 5. Future. It was identified that there needs to be a drive toward creating parity between the quality of service provided to both local and distance students. It was generally suggested that the essential key to improving the uptake and use of technologies was through instructor facilitation and active involvement. As such the research would add to the to the body of knowledge needed in underpinning the effective use of the tools through establishing good practice.

3.1.2 Literature review

The literature review mainly focused on pedagogic principles and how they can be enhanced to teaching delivery in order to facilitate distance learning practices. It looked at existing literature and case studies of technology application that aimed to enable student to student and tutor to student collaboration.

Za et al [5] suggests that digital technologies can enable more flexible learning processes, however effective use of such technologies is an area that is under-researched. An example of a social software system is mentioned in the publication as a key example of the support that digital technologies can provide to informal learning. This adaptive education hypermedia (AEH) combines an adaptive hypermedia system (AHS) and intelligent tutoring systems (ITS) with the aim to allow flexibility and adaptation of learning to the specific learners’ needs. Online collaboration tools were found to reinforce the non-formal learning practices by facilitating digital interactions with others [6].

Examples of digital learning environments mentioned by literature include commercial software applications, open source platforms, 3D virtual worlds, and massive open online courses (MOOCs) eg. Blackboard, Moodle, Sloodle and Coursera respectively. Other open source platforms identified in literature were Desire2Learn, Sakai, OLAT, eCollege and Dokeos [7].

Effectiveness of online distance learning relies on three interrelated elements: technology, information and social arrangements [8]. Although technology is one of the key elements for effective distance learning, students’ approach to it has a very wide range, from enthusiasm and appreciation of what it can offer, to negative views and even technophobia (Herrington et al., 2013) [9]. In order to incorporate technology into learning some important aspects need to be addressed. Firstly, technology needs to be applied as a mind tool rather than a simple knowledge deliverer [10]. This way, learners are engaged to critical thinking rather than passive learning. In order to enable technology to be used
as a mind tool, it is crucial to reflect the use of technology in curriculum design so that it is appropriately embedded and becomes a vital part of the teaching experience rather than an ‘add on’ to teaching delivery [11], [12]. Design and delivery of distance learning needs to be carefully planned in order to ensure parity of student experience between traditional on-campus courses and distance courses [3]. However there are certain issues that hinder effective distance learning course delivery.

Harper et al. [3] mentions that the most important issues encountered in distance learning are student attitudes and instructor preparedness. Students taking a distance learning course need to be prepared to demonstrate a high level of commitment and discipline and have the technical requirements to be able to engage with the course (e.g. Hardware, internet connection). On the other hand, educators often need to make sure that they have the necessary skills to enhance distance learning tools into their teaching [13]. Other issues identified by Harper et al. are: need for curricula change, new patterns of interaction, need for changes in organizational structures and support systems, and the roles and activities of participants in academic distance learning environments [3]. Institutional change was also mentioned as a necessary requirement for distance learning to be incorporated in British Universities [2].

3.1.3 External interview findings

Educator: general needs

In the main courses led by the interviewees were asynchronous. As such their needs for virtual discussion boards for both casual ‘watercooler’ chats and for academic modules were mostly being met. However, all expressed a desire for more asynchronous learning events. Additionally there was a desire to attempt to replicate the atmosphere, interaction and spontaneity experience in classroom teaching which one interviewee felt wasn’t recoverable [currently] in an online setting. It was felt students needed an opportunity for casual chat to establish a group dynamic and aid learning.

Tools used

All interviewees use a virtual learning environment (VLE) which has spaces per module for academic information such as: administration information, lecture recordings, podcasts, lecture notes, reading lists, links to clips, assignment information, discussion forum. All had lecture recording software but there were both varying degrees of sophistication in terms of what was recorded (e.g. audio only, to slides, audio and video) and in structure in terms of what learning content was recorded (from every lecture being recorded to some). However all agreed that students enjoyed hearing a ‘voice’; be that from podcasts or lecture recordings. All had some degree of casual/informal collaboration area from staff administrated Facebook groups, to google hangouts and to separate modules on the universities VLE. Interviewees found this splitting necessary not just from practical point of view but in order to encourage a better group dynamic.

Educator: online collaboration promotion and use

All interviewees promoted online collaboration through the use of ‘sparks’ – tasks which could be set weekly reading or module assignments which require the students to discuss these on an asynchronous discussion board. It was felt different tasks drive different levels of engagement, with the weekly tasks having more active discussion board for example than a task which spans a whole module. Additionally there were some once off synchronous events such as once yearly online presentations and a non-compulsory summer school. In the course with a large synchronous component, fortnightly tutorials are offered in the virtual classrooms.

All interviewees thought it necessary to aid the group dynamic to have opportunities for non-academic interaction and promoted this through making virtual classrooms available for social groups to meet, encouraging regional coffee mornings and having a non-academic hub on the virtual learning board which contained introductions, resources, job opportunities, contacts and the opportunity for casual ‘watercooler’ discussion. However organic collaboration did often occur naturally e.g. where students of different stages in career could recognise the benefits the other could give. Interestingly, in all cases interviewees felt the addition of a physical meet-up in reality (e.g. through regional coffee mornings and summer schools) was a good way to ‘short-circuit’ collaboration and that subsequent to these events students were more open and engaging with collaboration.

The response of interviewees to the willingness of use of online collaboration events varied. Where asynchronous discussion boards were used many found that students viewed this as just another chore to do, citing lack of time as a barrier. Other students felt self-conscious as written text would be
held on the discussion board for infinity which differs from a verbal discussion. Other students felt there was a lack of engagement with always the same students contributing. Interviewees felt it was difficult for students to be discursive, that they pasted their own text instead of responding to others comments. Generally it was felt that discussion on an asynchronous discussion board doesn’t happen as organically as in face to face and that it requires build in; for example the educator may have to require students to post one comment a week for example. All interviewees noted that with the passing of time students get used to each other.

**Future direction**

Interviewees with no or limited synchronous learning events felt the solution to lack of engagement in discussion boards was to have more synchronous events where students could participate more such as live broadcasts, real-time webinars and more virtual face-to-face time. One interviewee was unsure if this was the solution or whether it would be better to develop more interactive asynchronous boards possibly via twitter or other forms of technology where short bursts of ‘frenzied discussion’ could be facilitated. This uncertainty however came more from the fact the interviewee felt there was a lack of staff time and resources to facilitate more synchronous events. Additionally all interviewees stated similar challenges with synchronous events such as timezones, staff time, staff training and quality of internet connection in addition to students potential intimidation in real-time tutorials and the difficulty that can be experienced in trying to generate a virtual social network. However, all interviewees felt collaboration was necessary for students to lessen the social isolation, to promote both a sense of community and a virtual learning community. As such it was felt that although many of their students might appear self-driven and don’t always therefore actively seek out a community, they benefit from it where the opportunity for such collaboration arises.

### Summary

The in-house research revealed the evident need for a good practice framework. The session provided a good steer based on existing barriers and successes in the use of the tools we intended to test as well as other options available for the facilitation of local – distance collaboration. Also evident was the need to instructor lead facilitation of the collaboration efforts. Experience showed that student a far more likely to engage with an online activity or collaboration if it is not left to their own initiative but opportunities are created, scheduled and supported.

In literature it is found that in distance learning, the key players remain the same: teacher, student and content [14]. However, the design and delivery of teaching needs to be revised and curriculum changes need to be made in order to reflect distance learning and pedagogic needs. Instructor competences are crucial in order to enhance the above changes in teaching. Apart to the instructors, institutional change is also required in order to support distance learning education. Students’ attitudes towards distance learning and technology use is also important and a high level of discipline, commitment and computer literacy is required in order to be able to undertake a distance learning course. Pedagogy is still what determines teaching quality and therefore needs to be the main focus of teaching design and delivery [15].

In general it is experienced by interviewees that asynchronous discussion boards are not as successful as face to face seminars where more challenge and more deep thinking is experienced by students. All interviewees additionally note the importance of synchronous learning events – be they real face to face meet ups or virtual and all expressed the desire to incorporate more such events such as virtual classrooms tutorials or live broadcasts if the challenges of time zones, resources, technology/internet availability and student self-consciousness could be overcome. All felt such synchronous learning events were key to developing student communities of practice, lessening social isolation of students and improving their academic learning.

### Tool implementation: use of Blackboard Collaborate tool

BbCollab could be summarised as a web conferencing tool but the features and functionality of such a tool can equally be leveraged and presented as a virtual classroom environment.

#### Features of tool/ease of use

BbCollab allows for synchronous collaboration in an engaging, intuitive way. The tool has a very simple interface making the learning curve relatively small. In most cases tools could be simply clicked and used. Bb Collab features a presentation space that is used to display shared files such as a
PowerPoint or PDF. This can then be annotated live by multiple parties. The tools also come with a whiteboard for free form collaboration. There is the option to enable live video streams of up to 10 participants. The tool comes with a chat interface that easily tucks away but is essential for communication with larger groups. There is a robust permissions system built in with roles for presenter, participant, closed captioner and administrator. Roles can be quickly changed. There are also some powerful interactive tools available such as polls and breakout groups. Additionally sessions can be recorded which is useful for later review work by students.

3.2.2 How the tool was used

The tool was used in an MSc project module for tutorial delivery and assessment. Tutorial delivery was synchronous and students had the chance to share their progress in their tutorial group by uploading a file and sharing it so that all students and the tutor could see their exact slide/page. The project assessment was also synchronous, students shared and presented their work to their tutors at the online presence of their fellow students in their tutorial group. Assessment sessions were also recorded so that other tutorial groups could asynchronously view the assessment session recording and benefit from feedback given to their classmates. Tutorial groups of the module were formed based on availability of students to attend synchronous weekly events (tutorials).

3.2.3 Students response to the tool

The tool did come with its challenges. With most new technologies there is a learning curve. Even though the learning curve might be relatively small with Bb Collab we encountered other challenges such as users losing connection to sessions or unable to connect. Most of these problems were resolved by establishing a minimum broadband requirement but also managing student expectation of the tool. Occasionally documents would fail to upload and a simple log out and back in would remedy that. Managing the users in the environment is easy after some basic housekeeping is established. For example making sure audio is muted by default or advising students turn off their video if the speed starts to suffer a bit.

Two surveys were run with the students. One survey focused on collaboration during tutorials and the other focused on collaboration during assessment events (crits). The collaboration in tutorial survey demonstrated that students’ tutorial needs weren’t better met after the use of Bb Collaborate (Figure 2). Students found that technical problems were still apparent after the application of the new tool. They also would have liked more functions of the tool to have been used e.g. video participation to tutorials was deemed important but was not used to eliminate connection problems.

The use of BbCollab in tutorials wasn’t deemed ‘good’ by all students, on the contrary, one student considered it to be ‘bad’ (Figure 3). However, a personal observation of the tutor was that during tutorials, the students made use of the live annotation function of the BbCollab tool which enabled better communication.
Students found that both the tools used for tutorials (Skype and BbCollab) had limitations. Getting ideas across and sharing information had about the same results both pre and post BbCollab use (Figure 4), however receiving information and feedback was easier when using BbCollab according to the students (Figure 5). Considering that ‘receiving feedback’ was one of the most mentioned need for tutorials mentioned by the students, its facilitation through the use of Bb Collaborate was a very positive finding. It should be noted that suggested improvements by students all are relevant to technical improvements rather than tool functionality improvements both pre and post BbCollab use.

Students found the shared screen function, which was available both pre and post collaborate use, useful. Interaction with the shared screen which is a function available by BbCollab was also deemed useful by the students. Student to student communications outside tutorials are mostly done through Skype and social media and mobile applications (such as WhatsApp). After the introduction of Bb Collaborate, students continued to primarily use Skype for their communications, but social media use was reduced (Figure 6).

The tools that they used to collaborate with local students outside tutorials were more diverse when Bb Collaborate was introduced; before BbCollab they only used Skype and mobile applications whereas with Distance Learner collaborations, BbCollab seems to have replaced Blackboard Discussion Board and reduced slightly the use of Skype. The second survey looked at collaboration in assessment events (crits) and was only run after the application of BbCollab as previous to BbCollab students didn’t participate in their peer’s crits. Participation in their peer’s crits was very well received by students as they all felt that they benefited from participating in their peer’s crits and all of them found that the experience met their expectations apart from one who thought that the experience was better than what expected.
3.2.4 Opportunities

The live annotation feature of Bb Collaborate gave the opportunity for instantaneous feedback to not only be in a verbal but also in a visual form by both peers and tutor. This is particularly important as live annotation and visual feedback was lacking in the previous software used and is vital for visual courses. Further to this, the ability to record the assessment sessions when tutors provide verbal feedback has enabled the distance learning cohort to be able to have access to all the feedback and comments provided by the tutors during the synchronous assessment events in an asynchronous manner.

3.3 Tool implementation: use of Mahara tool

Mahara is an e-portfolio tool which allows for the creation of a professional online portfolio that can be downloaded for students to keep. The tool itself is very feature-rich and includes social networking elements thereby providing an online platform great for sharing and showcasing work and for peer collaboration and discussion around their work or specific projects.

3.3.1 Features of tool/ease of use

Mahara is essentially split into 3 distinct areas: Content, Portfolio and Groups. Content is where content elements can be developed, uploaded and collected. It is also where personal information can be gathered and multiple journals set up. There is also a planning tool in which milestones can be established and tasks set with completion targets within. The portfolio space is where content can be curated into a page for presentation. Elements from the content area can be created into a page or collection of pages for larger volumes of work, which can be easily shared with others making it the ideal workflow for peer discussion and collaboration. The group area is an open or closed area where pages or collections shared with a group can be viewed and discussed. Group members can collaborate collectively in one space.

3.3.2 How the tool was used

The project module in which Mahara was used has both a local and a distance student cohort. The local cohort has weekly tutorials where all local students can participate and comment on their peer’s progress. Due to geographical barriers and different availability of distance students within the week, the distance student tutorials were broken down to much smaller tutorial groups and therefore were not previously able to experience and comment on the progress of their peers outside this group. A Mahara group was created for the module and both local and distance students were added to the group along with the module leader and tutors. The students were asked to upload their weekly progress of their project work on Mahara and share it to enable the weekly progress of each student to be available for viewing and comment to both local and distance students.

3.3.3 Students response to the tool

Although this tool had the potential to provide great benefits, especially with regards to connecting peers in different student cohorts, it was not well received by the students. This mostly had to do with the learning curve and the timing that the tool was introduced to the students. Due to early adoption of the tool and delay of availability of the tool by the University, its incorporation to the module wasn’t feasible at the beginning of the year or the start of the module, but when the bulk of the project work...
had started. This meant that the students were already overloaded with student work and had to acquire new skills which included the use of new simulation software for their projects. Our request for students to start using the e-portfolio environment (Mahara) at that stage was deemed as an ‘add on’ burden by the students rather than a facilitation tool for their learning. This resulted in underuse of Mahara by both local and distance students and lack of interest in commenting on their peer’s project work. The above has highlighted the importance of allowing time to both students and educators to familiarise themselves with the tools that are going to be used prior to the actual teaching experience.

3.3.4 Opportunities

By sharing their work in a common group, students were enabled to watch and learn by their peer’s progress and the comments that the work received and contribute to those comments themselves. Though minimally used, the peer feedback benefits were twofold; firstly, by linking the distance learning cohort and secondly by linking the distance cohort with the local cohort. Through sharing of both local and distance student work on Mahara, distance students were able to view and comment on their peer’s projects, not only amongst the rest of the distance cohort, but also amongst the local cohort. Further to this, both cohorts could view tutor feedback given to all students taking this module.

3.4 Framework development

The three research phases that include the literature review, consultation and tool application culminated in the development of a step by step framework which firstly outlines in summary form the main findings and which secondly includes a step by step approach for practitioners for the integration of online collaborative learning tools in their modules (Figure 8).

<table>
<thead>
<tr>
<th>Framework</th>
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<tbody>
<tr>
<td><strong>Step 1: Identify needs</strong></td>
</tr>
<tr>
<td>• What are your learning/teaching/pedagogical needs?</td>
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<tr>
<td>• What are your motives/goals to achieve?</td>
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<tr>
<td>• What modules are you considering this for and do you have sufficient lead-in time to prepare?</td>
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| **Step 2: Evaluate resources** |
| • Do you have the tools/technology available? |
| ![YES](image), Proceed to step 3 |
| ![NO](image), Contact IT staff to acquire tools |

| **Step 3: Assign resources** |
| Decide: |
| • Staffing and staff time required |
| • At least one staff member to have continuity throughout module, though other staff such as IT or e-learning officer may assist |
| • Format of collaboration/potential tools to use |
| • Check if University supports particular tools |
| • A range is available; consult with your IT department |
| • Education team or e-learning officer to discuss |
| • Module/aspect within module to trial |

| **Step 4: Planning** |
| Plan the learning - with regard to: |
| • Student group numbers |
| • Up to 4 can work well as a trial size. As your experience and confidence grow this number can be expanded. |
| • Timetabling and timezones |
| • Create a spreadsheet of locations and timezones, or a Sign-up list to help organise the groups per timezone |
| • Establish the hardware and software requirements for both staff and students |
| • Technical problems can be avoided if the requirements are set and communicated in advance. |

| **Step 5: Trial the tools and troubleshoot problems** |
| • Organise a trial with students. Possibly through some formative activity |
| • Manage your and their expectations |
| • Many problems can be solved by restarting the application, students disconnecting other devices from the internet and closing other applications on their computers. |
| • Troubleshoot problems and make changes |
| • A matrix of common problems and their solutions can be developed for reference |

| **Step 6: Hold the event** |
| • Maintain the pedagogical need in mind |
| • Be prepared |
| • Be flexible |

| **Step 7: Reflect, adapt, progress** |
| • Reflect on how session went |
| • Make note of potential positive changes |
| • Exert and progress |

Figure 8. Framework

4 CONCLUSIONS

The aim of this paper was to provide a process framework process for implementation of online teaching and collaboration within a course to enable educators to more effectively implement such online collaboration. This framework was informed by the three phases of research from the scoping internal and external research, best practice and lessons learned through the implementation phase.

The internal research revealed the evident need for a framework and good practice and student engagement opportunities needed to be created, scheduled and supported. External research revealed that synchronous learning events were key to developing student communities of practice, lessening social isolation of students and improving their academic learning and reinforced the need for a framework of implementation for such events. Literature revealed that pedagogy is still what
determines teaching quality and therefore needs to be the main focus of teaching design and delivery and the focus of any implementation framework.

Through the implementation phase the online collaboration were used at an early adoption stage and their use was adapted to pedagogical needs. The two tools that were adopted were Bb Collaborate and Mahara e-portfolio. The former was used during synchronous project tutorials and assessment and through its interactive visual features enabled better tutor-student and student-student collaboration and feedback during tutorials. The features that were most valued by students were the ability to share the screen during synchronous tutorial sessions and the live annotation feature of Bb Collaborate. This facilitated the sharing of ideas and communication of feedback on their work, which was deemed a very important need by most students. Participation in other students’ crits was very well received by students. Student’s main complaints with the Bb Collaborate tool were mostly relevant to technical issues encountered during the use of the tool. The e-portfolio tool, Mahara, was used for student work curation and asynchronous tutor-student and student-student feedback. The use of Mahara was not well received by the students although it had great potential with regards to linking the distance cohort between them but also linking the local with the distance cohorts. This was mainly due to late inclusion of the tool in the module due to lack of availability of the tool.

The main lessons that were taken from this project was that e-learning needs to have a strong pedagogical approach and to be based on the teaching needs dictated by the curriculum. Additionally there is great benefit in trialling tools in advance and allowing students to familiarise with the tools before they are asked to use them for teaching. It is also important to establish technology requirements before the use of the tool (both with the teacher and the students’ prior to the use of the tools (e.g. Internet connection requirements, software/ hardware requirements), and to establish a clear route for reporting and troubleshooting problems.

Future work will see the further exploration and development of these tools as they continue to form part of the module. The findings from their initial application will inform their continued use so that student experience is advanced and teaching requirements are better facilitated.

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