

Learning *in* and *for* the workplace - technologies that deliver

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Abstract

A model is presented that allows access for learners to a vocational qualification (FdSc Dental Technology) whereby the number of required visits to the host university (Cardiff Metropolitan University) is minimal. Both practical and theoretical concepts are delivered including the creation of dental artefacts. Adobe Connect Pro®, BlackBoard® and Mahara® are all used to allow a blended delivery approach for the required practical and theoretical skills. The reliance on employer engagement and the training and techniques used to promote it are given. The innovative and extensive use of technologies has improved recruitment, retention and performance of students on this programme.

Keywords: Work based learning, videoconferencing, learning resources, accessibility, mentoring

Introduction

There has been an expanding interest in work based learning (WBL) and as a result the Centre for Dental Technology, Cardiff Metropolitan University (CMU) has developed a model for the delivery of one of its part-time programmes to learners in the workplace. This paper will explain the evolution of an initial Learning and Teaching Fellowship project to the delivery model being implemented and further developed today. The efficiency and accessibility of delivery using this model has made a huge difference in the viability and sustainability of such a programme.

The initial project established links between the Cardiff Metropolitan University and the workplace (in this case dental laboratories) using Adobe Connect Pro ®, a web-based videoconferencing software package. This equipment allowed traditional types of information along with highly detailed images to be captured and used either live, or as re-usable learning objects (RLOs) for demonstration of laboratory practical procedures, to illustrate opportunities and to demonstrate methods of good practice via peer review of the recorded sessions.

Students were situated at independent geographic sites not only from the educational provider, but also from one another and met in the virtual 'classroom' on a weekly basis. The Institute's traditional VLE (BlackBoard v9.1) was used extensively to support the students with access to learning material and resources.

Drivers for change

Students within this discipline have experienced a huge reduction in access to qualifications due to the closure of educational centres across UK (Murphy & Huggett 1973, 1984; Robinson Patrick & Newton, 2010). The large distances students need to travel as a result of these closures presented a huge obstacle for learning. Employers were restricted by their geographic location, to the style of programme delivered by their local provider and were unhappy with the current state of education and training (Wibberly, 2008; Robinson et al., 2010). The recent registration of Dental Care Professional groups (including dental technologists) meant that all those working in Dentistry needed to hold a recognised qualification before being able to place dental artefacts on the market. (GDC Council, 2013)

There were institutional drivers for change from Welsh Assembly Government, (2008) and were being led by technology enhanced learning initiatives such as Gwella and JISC. (UWIC 2008; UWIC, 2009) Finally, there was consideration to the amount of travel that was being undertaken and this model of delivery offered an opportunity to reduce the amount of travelling necessary and contribute to a CO2 reduction, addressing many green/sustainability issues. (<http://www.transportdirect.info>, 2014)

Evolution of the original idea

The Centre for Dental Technology regards itself as possessing considerable experience in the use and implementation of new technologies in education as a result of activities detailed below.

In 2000 the Centre took part in a successful BT-funded 'Dentaltec' project, exploring the use of video, stills and text to augment laboratory demonstrations broadcast to partner institutions over the internet. Then in 2005 an L&T Fellowship project was carried out to specifically develop and evaluate the delivery and assessment of the Foundation Degree Science in Dental Technology through the use of new educational technologies. Several web-based videoconferencing packages were investigated and Adobe Acrobat Connect Pro® was chosen as it utilised the best features, was simple to use and had format 'modes' that resembled traditional learning environments. It was trialled with two students, for initially only two modules in the first instance and then rolled out (at the students request) to further modules on the programme.

Following collaboration with a local Dental Hospital and School, money was secured from the Department of Health in 2009 to develop the project further in light that dental technology was recognised by UK Government as a profession at risk (Department of Health, National Audit Office, 2004). This risk was due mainly, to the demographics of the workforce, as a result of poor recruitment into the profession over recent years and the expected exodus of many experienced technicians at around the same time in the future. Additional matched funding from the Dental Laboratories Association allowed greater scope for the project's aims which was subsequently recorded as a successful blended learning model of delivery (Department of Health, 2011).

One of the outcomes was that specific timetables for the "reduced attendance" learners were drawn up. This model of delivery resulted in the teaching team reducing the number of visits per academic year from 24 to between 4 visits. This has been revised in light of experiences and students now attend at the end of modules. The time during visits is used to sit written assessments (when required for submission of work for the completed module and also to collect any equipment and special materials necessary for the next. It also gives students and staff an opportunity for personal tutorials to air any problems or issues they may have regarding modules, the programme or any other

queries that may have arisen since the last meeting. Students generally attend between 3-6 times per year, depending on the modules studied and the assessment demands in their respective years.

The Quality Assurance Agencies (QAA) review of Foundation Degrees in Wales in February 2013 went some way in its review document to highlight the work and achievements of these projects when it said in a section entitled Good Practice: “The review team consider that the innovative design and the development of the FdSc Dental Technology programme, and the embedding of distributed electronic learning technologies, is good practice.”

Management and development of learning resources

The work based students on this programme were dependent on learning resources within BlackBoard and these were very important for their learning experience and success on the programme. Part of the investigation was to enable existing learning resources to be used as they were, without the further need for staff to amend, or recreate them. All content and associated learning material were initially exactly the same as that used for the traditional attending learners. PowerPoint (and the associated Photo Album facility in particular), an on-screen electronic whiteboard in addition to ‘hands on’ practical demonstrations via webcams and plenary sessions were all utilised during the study. Through development, many Microsoft Word.doc documents were converted to .pdf file types for sharing in the virtual meeting room, a technical issue with the software package that remains unchanged.

It should be noted that the following items were introduced over the development period to enhance the learning material available to the learners.

Interactive webpage notes - Wimba®

The traditional method of uploading lecture notes and accompanying information in Word documents was converted using “Wimba” ® to interactive webpages and uploaded to BlackBoard. This allowed for easier navigation within the information and

also allowed the development of formative assessment activity within them (e.g. Flashcards, self-tests, definitions). This conversion also addresses many issues regarding accessibility issues for students with visual impairment of some sort or dyslexia and also to enable easier viewing on mobile devices. Notes in the traditional printed hardcopy format were also available should students prefer them.

E-portfolio - Mahara®

The importance of rewarding students with academic credits for learning undertaken in the work setting is pivotal to Foundation Degrees and as a result an e-portfolio was introduced. Students were required to engage with this by completing pre-set tasks. These ranged from explanation of processes, detailed information of a series of cases and also the completion of professional competencies in negotiation with the mentor. The introduction of this portfolio has been considered so successful by the external examiner of the undergraduate programmes, that it has been introduced within the fulltime BSc programme. Feedback from students has varied but the majority felt that the system was very easy to use and was more engaging than the previous method of recording learning in the workplace, as it allowed a variety of media to be used by the student as evidence for the learning, allowing learners to include images, audio and video of their workplace experiences within their portfolio.

Embedded 'streamed' video

There are within the programme many complicated practical procedures taught and static photographs were found to be insufficient. Web cams were tried to broadcast live images, but student feedback suggested that these images were not at a sufficiently high quality, so another solution was required. Coincidentally, the Universities Learning and Teaching Development Unit was aiming to establish a 'YouTube' style streaming media facility at Cardiff Met using a streaming video server to deliver high quality content. The collaboration between us allowed evaluation of the capabilities of a streaming server whilst providing students on the programme access to streamed HD video. Procedures were filmed using high-quality video equipment, edited and then uploaded to the streaming server. These videos were then embedded in Blackboard. The issue of remote learners accessing content off campus is not a new problem, but when a programme has all the 'student learning'] learning in their workplace the

problem is compounded. Often the workplace does not specialise in the area being taught, and it is then that these videos become invaluable resources. They allowed lecturers to demonstrate complex processes and physically small items to the learners regardless of this lack of access to a specialist in their own workplace.

HD camcorders and video lighting were used, to capture the detailed close-ups of the miniature processes involved. Streaming technology then facilitated the provision of high quality video to students who were accessing the content. Without the guarantee of a high-speed network the efficiency of the streaming server – enhanced by the ability of students to switch quality levels depending on their connection speed, offered a truly equitable solution. The streaming server also resolved issues of large video files filling up the Blackboard server. Since then, the programme has set up its own YouTube channel and videos are populated there. This is left as an open/public site, essentially creating an Open Educational Resource.

<https://www.youtube.com/channel/UCRHeYKqhzbxNGb1HzUYHBmA>

The students have reported during course committees and at module evaluation sessions that the quality of the video is not so important, but it is the ability to view a whole process/procedure that is of particular use. This has an immediate impact regarding the amount of videos that can be created and uploaded due to the reduced time it takes to produce them at a lower production quality.

VLE Menu arrangement

As part of an institutional review of the VLE, it was found that there was a variation in the quality of material and also in the organisation within modules. In light of these findings and when referring to exemplar modules (Blackboard, 2014) several changes were suggested and made to the menu arrangements across the school. A specific evaluation area was created on the main menu where individual module evaluation and annual evaluation forms were stored. Students were prompted to completed evaluations at the end of each module and at the end of the academic year

Logins and Recordings

A single URL to login for individual modules was used to make finding and logging into the correct lesson/meeting room easier. Students had been known to go to the wrong room in the virtual world, as they do in real life. The URL for meetings was the first item students saw when they opened the module folder.

All recordings were kept in a specific area in relevant folders for the various modules and were arranged with date and lecture number including the title as a result of a request of students. This was implemented and keywords were also added to descriptions, to ease searching.

Evaluation of changes

Although employers themselves were not included in the evaluation, students were issued with a written questionnaire following both modules and at the end of the academic year. Students felt that there was no need for any support by employers over and above what is provided to traditional attending students with this type of delivery. Formal feedback from the questionnaires was good following the first year which continued to report positively. This may be in some way due to the learning experiences of both lecturer and student with the software, or it may be associated with the module type delivered (theory, practical or a combination of both). Whatever the reason, there was very little negative input about the method used to deliver the modules and students were happy to continue with this style of delivery in the future.

Students' participation and uptake of the technology has been excellent and in most cases the motivation of employers' involvement to educating and training their staff has also improved. Evaluation has been undertaken regarding:

(a) the learning experience

Did the technologies allow interaction? Did the learners feel part of the class? Were they able to contribute easily? Was the meeting room engaging and appropriate for the material being delivered? How involved were colleagues?

(b) use of technologies

This referred to the technology used to deliver the material and engage students. Was it stable enough, were resources visible enough, particularly the image quality of practical artefacts?

(c) *knowledge base:*

How much did they know about the particular module before it started? This varied throughout the year as different work-based experiences were brought to the meetings by different learners.

Summative assessment is of course another indicator when carrying out evaluation and in regard to student scores in this area, one of the students involved in the initial pilot scored highest in the overall module grade and the other student scored higher than the average of the remaining students. It is evident from summative assessment results from subsequent cohorts that the student learning experience and level of attainment has not in any way been compromised; in fact, initial analysis suggests that there may be an improvement in student performance.

Retention and progression of students across levels has certainly improved, that has been attributed to the fact that attendance at the University, the length of time spent travelling and associated fatigue is unnecessary.

These findings go some way to confirming that the project and systems used have not compromised the learning taking place and it could be argued that it was improved as a result. Since the original pilot, further cohorts have also scored consistently well in assessments, although a complete analysis of assessment performance scores has yet to be undertaken to confirm this.

This project has also demonstrated that practical, or laboratory based assignments can be given formative feedback by tutors, to the same extent as in a traditional learning environment. There is reported to be a limited negative effect on group interaction; students did not lose the “classroom” feel. The findings to date, suggests that the “normal” or traditional amount of employer support is adequate, although this has been an area that has been discussed with individual employers when a greater number of modules were offered.

Mentoring

As additional support for the learners and to encourage engagement of employers in the learning experience, work-based mentors were identified and were responsible for student(s) at each laboratory. Three mentoring training sessions are held over the first academic year to introduce the role and associated responsibilities of mentoring to this group. There was also a handbook produced to guide the mentors.

Any problems regarding a learner's access to specialist facilities and/or equipment have been addressed by the use of resources in local hospitals, or in other privately owned laboratories. There were also regulations for registrants and their responsibilities when employing trainees laid out by the General Dental Council that helped with co-operation and engagement of employers (GDC, 2014).

During the pilot stage it was of interest to note, that one of the employers had a large number of employees and covered multiple disciplines. As such the student was able to receive learning support from dedicated mentors who were experienced within that area. The other student worked in a very small laboratory where the expertise in other discipline areas was unavailable. Other neighbouring laboratories agreed to 'adopt' this student for periods where a specialist could offer the necessary instruction and support. This cross laboratory collaboration had not been seen before by the University.

Employers were expected to continue with student support as with those students who would be attending the University in the traditional manner. The only difference being that the time they would ordinarily have attended lectures would be allocated 'learning time' within the laboratory.

To encourage and maintain mentoring activity of employers, 'rewards' were offered in the form of Continual Professional Development hours, (a requirement of registration) to each staff member responsible for a trainee. Once the employers were engaged, then they were offered three training sessions about Mentoring and supplied with open education resources (Newman-Ford, 2009) to which they could refer. These training sessions were also carried out online to allow the mentor to experience the learning environment to which their trainees had become accustomed.

Staff Peer Review

An added benefit of this model was realised by staff in that there exists the facility to record video-conferencing learning sessions. This offered a non-intrusive method of peer observation. Staff involved undertook the roles of both reviewer and reviewee. Participating members of staff learnt more about appropriate teaching methods, and how to further develop patience and the interactive contact with the students at remote sites. The obvious benefits of this type of peer review are their unobtrusive nature and that the recorded session can be viewed at any time, by both parties, either independently or together.

Conclusions and recommendations for future practice

It is felt that the model developed here allows the same techniques for delivery of material to be used with remote learners at the workplace, as those in a traditional setting. It is suggested that there is tremendous opportunity for interaction between lecturer and student, with improved student retention and performance to that of the traditional part-time “attending” learners.

There have been great benefits demonstrated following the introduction of this project. It has shown that it is possible to deliver traditional lectures to students at remote sites using this software. Other gains include the reduction of time and expense of travel, the associated reduced carbon footprint, travel fatigue experienced by students (particularly in the workplace the following day), no additional support necessary from employers, the ease of use for both parties of the technology, an increased flexibility of workforce (as University assignment work can be moved into quieter times of day/week). The employer (and mentor) has improved and direct access to academic tutors.

It was not all beneficial and there were some drawbacks identified. Students were not always allocated the necessary study time in the workplace by employers and thus struggled to complete the practical exercises, the lack of specificity of subject matter (specialist labs) made it difficult when carrying processes that were unfamiliar.

The reluctance of students played a part, in that initially, many did not like the idea of being on screen.

There was reduced access to library facilities and the use of designated 'learning packs' has been suggested. This sits alongside the limited opportunity to engage in social networking and a reduction in peer support to that of a traditional student. Another project is currently being devised to identify the shortcomings and improve the induction process for these cohorts.

There are lessons for others involved in delivery or the management and implementation of learning resources. This project has shown that high quality images that demonstrate intricate practical processes can be produced and broadcast to students quickly and easily. This project has also demonstrated students' engagement with Bb increases when they feel that "valuable" learning resources are available there, via the tracking option. This availability of multi-media crosses many programmes and is not specifically related to constructional aspects. Dance, sport, interview techniques are all other potential areas for inclusion. It was hoped that the Blackboard Mash-Up tool could be used although there is a planned change of VLE that has prevented that. Instead Moodle integration is currently being tested and developed to ensure all facilities that currently exist, remain.

There is also a place for such a mode regarding the supervision of research students who may appreciate a 'face-to-face' discussion with their supervisor, rather than e-mail discussions that can be unclear, confusing or just too impersonal. Opportunities exist to use such a facility with students who may be on placement and need to check work with a tutor on a regular or individual basis. The same applies for students who may need to access student services, but find it difficult to attend the home site for any reason.

Overall, it is considered that this project has made a positive contribution to the L&T strategy of this University and could influence the delivery of such programmes in the wider context in the future, particularly in regard to accessibility and retention of students on programmes, the engagement of part-time (particularly work based) learners and also towards the sustainability issues of reduced travel and the associated reduction in CO2 emissions.

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