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DEVELOPING A COLLABORATIVE VIRTUAL LEARNING ENVIRONMENT BETWEEN STUDENTS IN CROSS DISCIPLINES TO MEET THE NEW COLLEGE STRUCTURE

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Abstract

This paper examines a collaborative project between the department of Construction Management and Technology and the department of Quantity Surveying at Dublin Institute of Technology. The term “collaborative learning” refers to an instruction method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another’s learning as well as their own (Dillenbourg, 1999).

The objectives of this collaborative project are:

1. Promote interaction between students from different but related courses.
2. Enhance student’s ability to think creatively, solve problems, and make decisions as a team.
3. Evaluate the benefits of using a virtual learning environment for assessment.
4. Examine the benefits of BIM as a tool in feedback.

There a number of benefits to this project with an emphasis being given to the interaction of the students. The collaborative learning approach provides a format for the students to interact including giving and receiving help, exchanging information and resources and information, giving and receiving feedback, challenging and encouraging each other, and jointly reflecting on progress. The other perceived benefit will be in the use of a virtual learning environment and information communication tools.

According to Vygotsky (1978), students are capable of performing at higher intellectual levels when asked to work collaborative situations. This was one of the primary encouragements for completing this project. It is thought within both the Construction Management programme and the Quantity Surveying programme that collaboration projects will have a positive effect on the students learning. It should also be noted that on graduation the students will be required to work alongside many other professions within the construction industry and will be expected to communicate using the most up to date technology.

Keywords: Collaborative learning, Virtual Learning, Group work, Assessment Strategies

1 INTRODUCTION

Dublin Institute of Technology (DIT) has the largest number of built environment students in Ireland and is the leading educator to the construction industry. In order for respond to the needs of the Construction Industry the DIT needs to promote collaborative delivery of programmes and ensure that students from different programmes work together. This project between the department of Construction Management and Technology and the department of Quantity Surveying is the first step in promoting collaborative learning within the DIT. The objectives of this collaborative project is to

1. Promote interaction between students from different but related courses.
2. Enhance student’s ability to think creatively, solve problems, and make decisions as a team.

3. Evaluate the benefits of using blogs as a virtual learning environment.
4. Examine the benefits of BIM as a tool in feedback.

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2 COLLABORATIVE WORKING IN THE CONSTRUCTION INDUSTRY

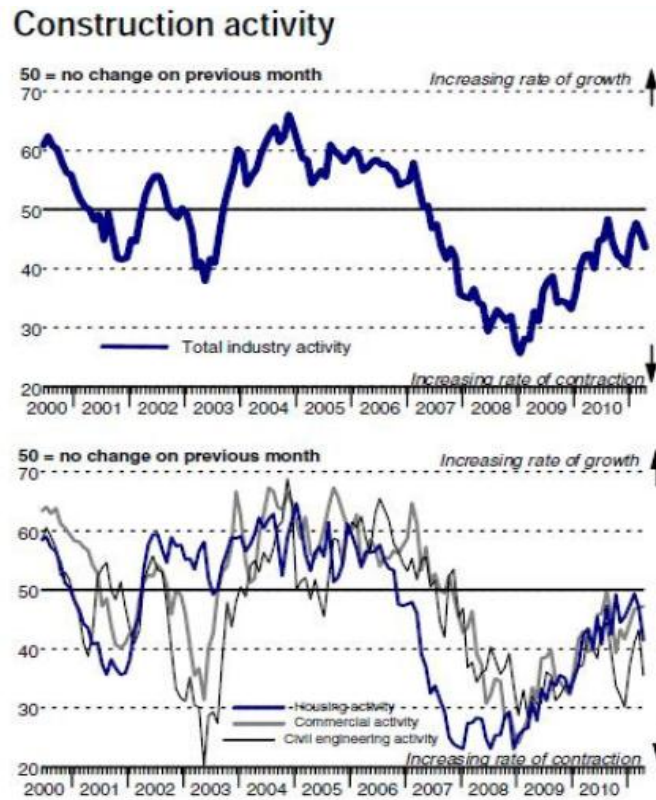
2.1 Background

“Complications arising from poor collaboration are the source of a variety of the construction industry’s biggest problems” (Bouchlaghem, 2012). It is now widely recognised that an effective collaboration strategy based on the implementation of information systems and careful consideration of the wider organisational issues is the key to delivering construction projects successfully. Bouchlaghem (2012) defines collaboration in construction as “an activity in which a shared task is achievable only when the collective resources of a team are assembled. Contributions to the work are coordinated through communications and the sharing of information and knowledge.” Our construction practices and procedures are subject to a rapidly evolving information technology sector, enhanced by worldwide advances in communications technology. These technologies are providing construction professionals with the tools to implement new collaborative strategies. Any given construction project involves the collaboration, at some level between Architects, Engineers, Quantity Surveyors, Project Managers, and many other construction professionals, depending on the magnitude and complexity of that project. Much of this process is based on a traditional sequential approach in which many of the participants often work independently, make decisions that inevitably affect others and then come together in face to face meetings. As educators, we must equip students with the skills and knowledge to prepare them for an industry so dependent on collaboration. Dublin Institute of Technology delivers a comprehensive list of construction related courses, which are recognised worldwide for the quality of their graduates. Yet the authors have found very little evidence of interaction between these courses. This research aims to address this shortfall, and sets the stage for more elaborate collaboration in the future.

2.2 Context of research, and current economic state of the Irish Construction Industry

Students who are currently taking construction related courses are not immune to the existing economic climate prevalent in the Irish Construction industry. Johnston (2010) strongly advocated that construction courses must be economically viable, paying close attention to relevant employment skills. The current economic state of the Irish construction industry has been highly publicised in the media over the last three years. Employment in this sector has decreased at an alarming pace with recent commentators seeing little sign of abatement. Hancock (2011) advises that new orders in the construction industry sector have declined again in March 2011, with companies cutting purchasing and jobs, he includes table 1 below to illustrate this point:

Fig 1

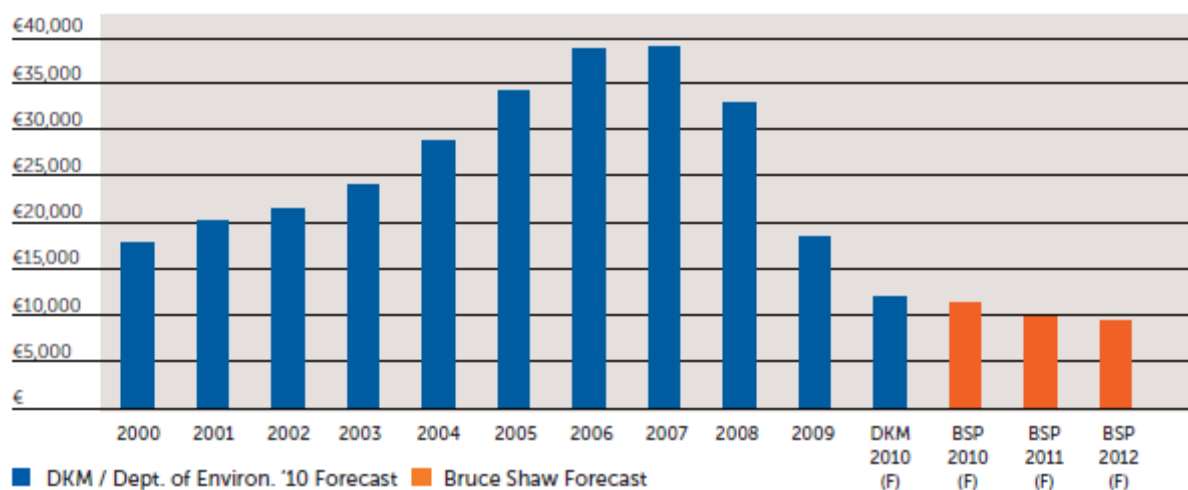


This graphic depiction of construction activity gives credence to economists who have advocated meltdown in the Irish construction industry. This also reinforces the problems surrounding procurement of suitable employment for students graduating from construction related courses.

Scully, Caeleton and Quinn (2011)[7] advise that there are even more challenging times ahead. They advise that the construction industry is now faced with the completion of most major construction projects, with no significant replacements in sight, coupled with further cutbacks in government capital expenditure, delays in NAMA funded projects, and very little private sector activity. They also highlight that against this background, the industry will inevitably decline even further with their predictions of output to fall to a mere €9.5 billion for 2011 which represents a 75% fall from its peak. Table 2 illustrates their predictions going forward.

Fig 2

Value Construction of Output €m 2000-2012



Despite negativity surrounding the construction industry relating to output and employment, students are still choosing construction related courses. With few opportunities for students to obtain experience through temporary positions held during vacation periods, which would have been the norm during boom years, there is an impetus on third level institutions delivering construction related courses to mirror industry where possible.

2.3 Pedagogy and industry

The pedagogy relating to both courses taking part on this project includes traditional lectures supplemented by tutorials. Blight (2000) reinforces that lecturing is still the most common method of delivery despite advances in new technologies. This paper does not advocate radical changes to our current modus operandi of delivery on these courses, however it supports enhancement of the traditional approach. This collaborative project intertwines collaboration with information technology. Bouchlaghem (2012)[4] advises that much of the recent development on collaborative working in the construction industry has focused on the delivery of technological solutions, concentrating on the web. We have made this a central component of this project by tasking students with the creation of web platforms via pb works on the internet. This facilitates a high level of interaction between students, who are already comfortable with using more socially based web platforms. It also familiarises students with current IT tools, and creates a spirit of innovation which is currently demanded by employers in industry. Macfarlene (2004) advises that our courses must endeavour to introduce real life situations or problems into our content, to prepare students with the challenges that await them in industry.

2.4 Common Skills

A common theme which runs through this project relates to common skills essential for both disciplines, and how students from each discipline can benefit from interaction with each other. Pickens and Jagger (2005) describes the function of measurement carried out by Quantity Surveyors as the process concerned with converting construction drawings into words and numbers in accordance with a strict set of rules. The exact same terminology could be used when describing the Construction Managers role when producing a programme of works or schedule for any given project. Both disciplines require a number of holistic skills, which are not technical in nature such as: patience, accuracy and initiative. These skills can only be attained through practical project work, and the completed tasks have helped students become more proficient in these areas

3 ASSESSMENT STRATEGY

3.1 Assessment

Hamlin and Szorenyi-Reischl (2006) stated that “development of assessment strategies that guide students towards desired approaches to learning and validly and reliably measure student performance”. This was critical when developing the assessment strategy for this collaborative project. The assessment is designed to give Quantity Surveying students and Construction Management students a manageable set of tasks that will facilitate collaboration and promote critical thinking.

Students were furnished with a set of drawings of a real life project from which they will be expected to complete a number of tasks, each task has been designed to ensure that the student are dealing with a particular set of drawings. This allows the student to think critically about the design of the building and can recommend any changes to the current design. The students are encouraged to examine the constructability of the project and are expected to propose alternative construction techniques that may improve the efficiency of the build process. The tasks have also been designed to ensure that adequate collaboration has taken place between the members of the group. This was done by requiring a number of inputs into each task set for the students.

Once the students become familiar with all the drawings and the project specification, the task will be agreed with the students with a number of submission dates spaced over the two semesters on which the project runs. The students will be split into groups and will be expected to work as a group for the duration of the project. Once the students are familiar with each other and with the project drawings they will be required to develop a Virtual Learning Environment (VLE)

3.2 Group Work

The assessment for the module involves creating groups of four, each group is expected to create a virtual learning environment from which all work can be accessed and commented on by each group member. Each student is will become an author of their virtual learning environment and will be expected to contribute by uploading their own work but also giving feedback on the work of their group members. The group work will allow students to develop relationships with each other and will benefit from peer to peer learning. On completion of the first submission all the blogs will go live and all students will have access to the blogs. This will allow peer-to-peer learning and encourage students to involve themselves in continuous improvement. There are sound educational reasons for requiring students to participate in group activities. Group work enhances student understanding. Students learn from each other and benefit from activities that require them to articulate and test their knowledge. Group work provides an opportunity for students to clarify and refine their understanding of concepts through discussion and rehearsal with peers.

3.3 Virtual Learning Environment (VLE)

Despite the enthusiasm for digital technologies, and the fact that wikis (blogs) have existed for over a decade, their use is relatively new in academia. It should however be noted that it is a very fast growing area within academia. On previous projects when blogs have been used for assessment the feedback from the students has been very positive. Students have tended to be very innovative in their use of the blogs and have interfaced different software into their blogs. It has also been observed that the computer skills of students who were involved in the blogs were significantly improved on students from previous years who were not involved in the blogs. Benckendorff (2007)[19] proposes that the use of ICTs in teaching and learning provides some opportunities to help graduates develop a range of knowledge management skills. This form of assessment gives the students a base for the use of the web in education and for their future career. This is very important in the 21st century student as students must embrace web technologies to progress in third level education and the workplace.

The students will be given a tutorial on how to create and manage all the material through a virtual learning environment at the start of the semester. This will be the medium for the delivery of all assessment and feedback. The preferred method of VLE for this project will be through the medium of PB works (<http://pbworks.com/>). In deciding on the web tool to use for this project there were a number of considerations that needed to be taken into account such as accessibility, ability to upload

documents, cost, ease of use, ability to create individual design and security. There are many different web tools available online that meet many of our requirements such as Google Blogger, Dropbox and Google+, but PB Works was selected as it allowed students to upload documents and to comment on the uploaded documents. It also allowed the tutor to create a section for feedback and to upload sample answers. PB Works also allowed the students to personalise their site and to create an online portfolio that could be useful in future career applications.

3.4 Peer Assessment

Peer assessment will be used in this project as a method of encouraging collaboration and creating an environment where a student's work will be critically examined by a member of his group. The peer assessment will be in the course of feedback given to the student by his fellow student within the VLE. Rather than asking the students to mark their colleagues the tutor will mark the student's contribution to feedback. This will allow students to amend their work prior to the hand-up date. Brown and Knight (1994)[20] suggest that if you equip the students with what is being assessed they are more than capable of completing such assessment. With this in mind it is the intention to run a tutorial to give the students the required information to assess the work of their fellow students. The students will be entitled to refer to the tutor for assessment if it is felt that the peer comments are unfair or flawed however it is not envisaged to be a problem. Brown and Knight (1994)[21] have shown examples where peer assessment marks and tutor marks had been remarkably close when examined on a peer assessment project.

3.5 Feedback

Feedback is an essential part of learning but it is often the case that students take on feedback and do nothing about it. The VLE allows the tutor to observe if the student has taken on your feedback and made the changes appropriately. As part of the project work students must make the changes suggested by the tutor before moving on to the next section of the project. This is very valuable to the student as it encourages them to examine where they went wrong on their original submission. This exercise also ensures that the work is of a high standard when it is released for inspection by other students. Feedback can be given to the student virtually; this allows you to give feedback without actually meeting the student. On a project like this with many elements of assessment this can be a very efficient method of feedback. It facilitates reflection and evaluation.

3.6 Writing for a Larger Audience

The quality of the writing and work completed in the VLE was of a higher standard than I had received in previous years in paper format. It is my contention that this is due to the fact that the students knew that the PB Works site would be available for anyone to read and that they were more conscious of getting their grammar and spelling correct. It was made aware to the students that their work would be published on the School web site. The extended audience provides recognition for students that can be quite positive. The student starts to feel that their work is being taken seriously and is being read by many people.

3.7 Connecting with Other People in the Field

Blogging provides the possibility of connecting with experts on the topic students are writing. This is very much the case for the 1st year students who created the blog for the site visit. On completion of their blog they sent them to the construction professionals from the site. The construction professionals were able to examine the blogs and give feedback to the students. This was a very positive experience for all involved and allowed the student to reflect on the site visit.

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4 PROJECT EVALUATION

The project was evaluated in two methods; the first was through the examination of the results of all the students. These results were compared to the results from last year's cohort of students. This allowed us to examine how the students work may have improved by using different assessment strategies and delivery modes.

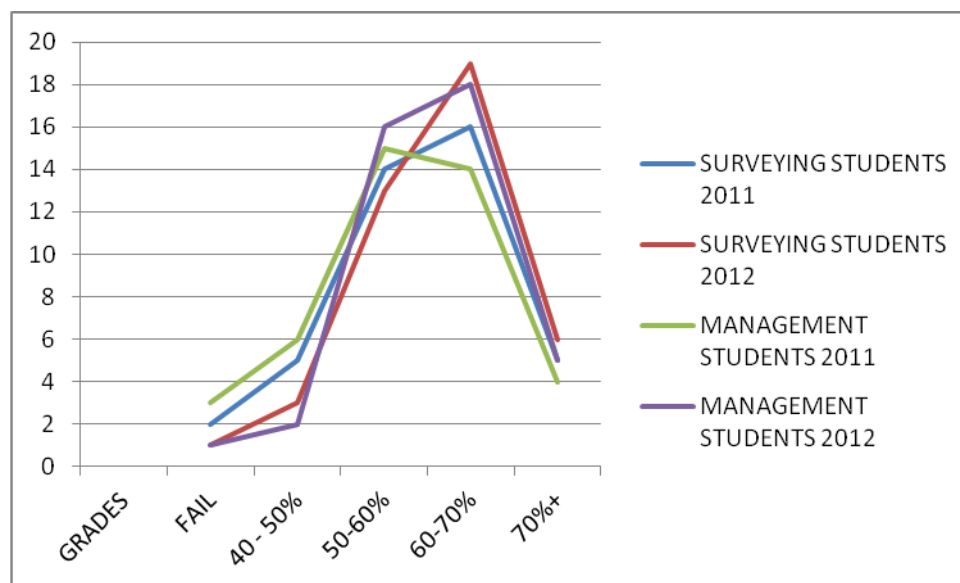


Fig. 3 Comparison of student results from 2011 and 2012

The second method of evaluation involved using the SEEQ Students' Evaluation of Education Quality. The SEEQ instrument consists of 32 standardised questions (#1-32) grouped into the following nine dimensions of teaching.

1. Learning
2. Enthusiasm
3. Organization
4. Group Interaction
5. Individual Rapport
6. Breadth
7. Examinations
8. Assignments
9. Overall

The first 8 dimensions (#1-29) are measured using a five-point scale (strongly disagree, disagree, neutral, agree, and strongly agree). The 9th dimension, "Overall" (#30-32), is measured using a five-point scale (very poor, poor, average, good, very good). A workshop will be set up to explain the SEEQ system and also to get initial feedback. The third method will involve workshop, the workshop involved a two hour session with the students, the first hour of the session was chaired by an independent academic who is not involved in the project. It was decided that this methods would allow

students to open up and give honest opinions to the collaborative project. Much of the workshop concentrated on the benefits of collaboration and the practical elements of working with students from different programmes.

The general feedback from the workshop was very positive, with students commenting very positively of their experience. The feedback from the workshop gave the research real validity and allowed the learning benefits of the project to be developed further. The student' feedback also allowed the project tasks to be developed.

The first section of the workshop related to the overall experience of the student and the benefits that the collaborative project brought to their personal skills. The results from this section of the workshop were very positive with students giving positive feedback to the questions. Most students seem to have positive experience with many of them getting a broader understanding of the construction industry. One student explained how he "really enjoyed working with students from other disciplines. Before doing collaborative I have never worked with any other disciplines within the construction industry. It was a great experience and I feel my expectations were achieved". This was a common response to question 1.

The students felt that the collaborative project boosted their confidence and maturity. One student felt that "people were relying on me for completing my section of the project and if I fell behind I was told through the PB Works site, the fact the tutor had access to this ensured I didn't fall behind." This was common feedback from students with many of them feeling that as the project developed their confidence grew. On completion of the collaboration project the students believed that their information technology skills were much improved. This allowed students to bring these skills into the classroom and gave the student the opportunity to bring these skills into other module of study

The next section of the workshop related to the future benefits to the student including learning and their future employment opportunities. The student response to this was varied between different students. The true benefit for future employment is difficult to access in the current economic climate as there are very few students being offered positions on graduation. It has however been remarked by many students in the workshop that they felt it was a great benefit to their CV if they are to apply for work abroad. They felt that the VLE allowed them to send their work to potential employers as a link on an email rather than paper format.

The SEEQ results have not yet been correlated as the students have not yet all submitted the questionnaire. Once this information becomes available it will be published as an addition to this document.

5 CONCLUSION AND RECOMMENDATIONS

Within any collaborative project it is essential that clear objectives are set from an early stage to identify what the student should fulfil and a time frame in which it should be completed. The tutor will play a key role in setting objectives and giving a clear time span for the student to work to. When setting objectives it is important that the tasks are specific, achievable, realistic, and measurable. This will ensure that any set of tasks can be completed in the time span required. An objective may take the form of an ability to use AutoCAD to a required level by June. This objective is specific, it is achievable, and it is realistic and is measurable if a task is set for the student.

With the advances in technology and the changing methods of communications, the research has shown that the use of information technology and the virtual learning environment has enhanced the students experience. This would ensure that the methods being used are current and up to date. The use of a VLE and the creation of a portfolio have increased the skill level, confidence and productivity of the student and has allowed for a greater level of collaboration between group members. The VLE selected (PB works) was deemed to be appropriate for a collaborative project and had benefits that other online recourses did not facilitate.

Once any new method of deliver is introduced to a programme it is essential that it is evaluated at as early a stage as is possible. This should be a comprehensive review of the delivery and the benefits that it has brought to the students learning. This will allow lecturers to complete a continuous improvement exercise on the collaborative project. The evaluation will take place on the completion of each year and will take the form of a workshop with student and a questionnaire as set out in section 4. Year one feedback has been completed and has been very positive with only minor changes to be implemented into next years project and although the SEEQ results still require correlation the Workshops has been very positive.

In an attempt to reflect the built environment in an academic environment, this paper has developed a model for collaborative learning and teaching among student from different disciplines. This model is designed to help built environment academics develop programmes that will reflect the built environment. The model addresses the module delivery, the assessment method, group work and the benefits of a VLE in collaboration projects. The model may be used in any area of built environment education, and allows academics to analyse the benefits of using such a model. The introduction of a collaborative project will enhance the profile of the courses it is being delivered to and help attract the most competent and ambitious student and, this is turn should help in student retention.

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