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Improving co-learner interactions through web based online assessments within distant learning settings

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SCHOOL OF THE BUILT ENVIRONMENT

IMPROVING CO-LEARNER INTERACTIONS THROUGH WEB BASED ONLINE ASSESSMENTS WITHIN DISTANT LEARNING SETTING

Teaching Learning Quality Improvement Scheme (TLQIS)

FINAL REPORT

NOVEMBER 2009

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Table of Contents

1. Introduction	3
2. Project Team	3
3. Rational and Background	4
4. Aims and Objectives	6
5. Final Progress and Achieved Outcomes	7
6. Research Methodology	13
7. Case Study Findings15
8. Research Dissemination29
9. Conclusion29
10. References	30
11. Appendices	
<i>Appendix A: Literature Review</i>	33
<i>Appendix B: Interim Report</i>	48
<i>Appendix C: Paper from BEAR Conference</i>	71
<i>Appendix D: Paper on T & L Workshop</i>	84
<i>Appendix E: Attachments from Assessment Week</i>	91
<i>Appendix F: Conference Paper from IPGRC.....</i>	93
<i>Appendix G: Journal Paper</i>	104

1. Introduction

This document represents the final report for the research project titled: “Improving Co-Learner Interactions through Web Based Online Assessments within Distant Learning Setting”, carried out by the School of Built Environment at the University of Salford. The project was funded by the Teaching and Learning Quality Improvement Scheme (TLQIS) and this report has been produced in partial fulfilment of the set guidelines of TLQIS. This document was designed to initially discuss the background to the project, justifying the reasons undertaking the research project, together with brief details on project aims and objectives; and the final progress and achieved outcome highlighted. This was then followed by the literature review section, research methodology section, the presentation of results section, discussion and findings, the conclusion section, and culminating with the dissemination of the research section. The detailed literature review section is attached as per Appendix A.

2. PROJECT TEAM

This project comprises of the following team members:

Project Leader:

Dr. Bingunath Ingirige, Lecturer, School of the Built Environment (Programme Director, MSc Project Management in Construction)

Other team members:

Dr. Dilanthi Amaratunga

Mr. David Dowdle

Mr. Kaushal Keraminiyage

Dr. Jack Goulding

Mr. David Baldry

Prof. Mel Lees

3. RATIONALE AND BACKGROUND

Distance Learning (DL) education has improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005). With respect to the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at the postgraduate level. The new developments in technology have impacted the overall delivery process of the DL construction programmes. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments. Formative assessments attempt to provide feedback to learners, whereas the summative assessments refer to the actual assessed component. Formative and summative methods of assessment are included under the umbrella term 'assessment strategy' and are interwoven with one another and often inseparable (Dunn *et al*, 2004).

In offering DL programmes, the School of the Built Environment (SOBE) recognises that learners pursuing their qualifications in geographical isolation have a powerful need to form a community of co-learners which would enhance and enrich their learning experience and support their continuing participation. In addition, the learning outcomes of the Masters programmes delivered by SOBE (in line with 'M' level descriptors within QAA's FHEQ framework and specific subject benchmark statements relevant to the field), often specify "that students will be able to *lead and work effectively with project teams and communicate effectively in a variety of forms*" and develop transferable skills such as "*Interactive and Group Skills and taking part in group discussions*". Therefore the overall assessment strategies of Masters DL programmes identify the achievement of these learning outcomes as key goals.

SOBE currently offers seventeen Masters DL programmes and it forms a major part of the portfolio of investment within SOBE to improve the effectiveness and efficiency. Several online assessments are being utilised in line with the learning outcomes. The Masters programmes utilise blackboard virtual environments in the asynchronous mode. Previously, the 'Horizonwimba' was used in the synchronous mode to deliver the modules to the distance learners up until September 2009, where the 'Horizonwimba' was then replaced by the 'Elluminate Bridge'. Some of the programmes utilise the Blackboard VLE at different levels for both formative and summative assessments. 'Elluminate Bridge' enables learners to easily and seamlessly integrate live, synchronous distance learning and collaboration into their coursework. This means that instructors would be able to schedule and deliver classes using the 'Elluminate *Live*', which is an application within the 'Elluminate Bridge' through the Internet-based, real-time, multi-platform eLearning tool that includes superior voice over the Internet, video, shared whiteboards, text messaging, breakout rooms, application sharing, PowerPoint import, and many others. Furthermore, learners can launch a synchronous session or recording using 'Elluminate *Live!*' directly from the Blackboard Learning System.

The MSc in Project Management at SOBE had been observed, and, it was found that learners sometimes have online meetings outside formal contact hours (see Allen, 2005 for more details on online learning communities). Learners often express their need for more empowerment within some of their modules to enhance their active engagement within the programmes. With all types of learning, including web based learning; it is useful for students to receive constructive, timely, and relevant feedback on their progress even within distance learning settings. Therefore a mix of computer marked and tutor marked essays could be adopted for summative assessments. Online assessment is sometimes constrained by the medium in which it is operating. Computer marked assessments alone are not appropriate for marking or giving feedback on assignments such as essays or projects that require more than the mere reproduction of knowledge. With the increase of DL programmes being offered there has been a corresponding increase in both synchronous and asynchronous mechanisms being developed to facilitate these assessments (Dede, 1996; Wilson and Whitelock, 1997).

Despite addressing the needs of the programmes in developing a regime of assessment strategies most learning communities express a feel of isolation. However, barriers in the form of resource constraints, sometimes affect the provision of pedagogic requirements such as maintaining appropriate co-learner interactions within the masters DL programmes. With this respect, it was proposed that there was a need to raise awareness in this area by identifying the importance of online assessments and co-learner interactions among SOBE Masters Programme Leaders. This research involved the Masters Programme leaders in order to assist in gaining insights on the various strategies adopted in their respective programmes to address online assessments and co-learner interactions. These results were compared to develop a guideline in order to improve co-learner interactions by case studies with other schools and faculties at the University of Salford and other universities within the UK that were identified to be included as case studies.

4. AIM AND OBJECTIVES

The overall aim of this research is to improve co-learner interactions through online assessments within distance learning settings pertaining to existing distance learning Masters Programmes at SOBE and to share results with other schools and faculties. The objectives of this proposal are as follows:

- i) Identify the currently available web based online assessment tools within DL;
- ii) Identify barriers in improving co-learner interactions within DL;
- iii) Formulate a methodology for linking online assessment tools with encouraging co-learner interaction;
- iv) Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- v) Recommend appropriate guidelines for improvement both in terms of assessment tools as well as possible facilitator and learner interventions; and
- vi) Disseminate Results

5. FINAL PROGRESS AND ACHIEVED OUTCOMES

Table 1 shows the tasks that were determined at the beginning of the research, and the achieved outcomes.

TASK	PLANNED DELIVERABLES	ACHIEVED OUTCOMES
1. Extend the initial literature review on online assessments and online communities undertaking higher degrees.	A report summarising current literature within the subject area. (e.o 3 rd month)	Conference Papers and Journal Paper (Refer Appendix B, Appendix C, and Appendix F), and See Section 6 of this final report.
2. Case studies within SOBE and other schools and faculties supplemented by interviews with facilitators of DL programmes. This task will be divided into: <ul style="list-style-type: none"> • Initial pilot interviews with 3 interviewees • Detailed case studies / interviews (Salford and participants in other UK universities) and initial dissemination 	2.1 Interview summaries and analysis (end of the 5 th month) Interim progress report (e.o 6 th month) 2.2 A case study report (e.o. 7 th month)	Findings presented as part of final report in case study findings. Findings presented as part of final report in case study findings.
	2.3 1 conference paper (based on literature review and preliminary case study results)	The paper prepared did not make the submission for the CIB W78 conference as planned; however the paper was submitted, accepted and, presented at the BEAR 2008 conference in Sri Lanka.

* Note: e.o refers to: End Of

Table 1: Planned Deliverables and Achieved Outcomes

In addition to the above planned deliverables and their achieved outcomes, the followings are identified as the additional achieved outcomes from this research explained in further detail:

i. Literature Review

The literature review was designed to address the following issues on the overview of DL, the definitions and characteristics of DL, the issue of interactivity and feedback within DL settings, assessments and the types of web-based online assessments available.

Précis of the Literature Review

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies, hence triggering distance education technologies to become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Distance Learning (DL) education has also improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005); which now has become a major source by which many Higher Education (HE) institutes conduct their courses, particularly at the postgraduate level. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments. Refer the literature review section for an in-depth understanding of DL, assessments, and co-learner interactions.

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as "instruction and learning practice utilising technology and involving students and teachers who are separated by time and space". Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time

during at least a majority of the instructional process (Refer Appendix A for further definitions and characteristics of DL).

Another issue within DL is interactivity and feedback. Feedback is considered essential to learners towards effective learning (Gagne, 1985). Hence, in a DL setting, feedbacks are considered important as it is a mean of interaction and communication; i.e. between learners with instructors and learners with co-learners. DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). (Refer Appendix A and Appendix B for more detail on DL, interactivity and feedback).

In addition to interaction and feedback, assessment is also considered an indispensable part of teaching and learning (Govindasamy, 2002). It can also be considered as a way of interaction and providing feedback from the co-learner (e.g. instructor) to the learner. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al*, 2007). This is especially more important in a DL

programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen et al, 2007).

According to Govindasamy (2002), assessment is typically divided into two types, namely the summative assessment and formative assessment. Many researchers (Brown and Knight, 1994; Buchanan, 2000; Henly, 2003) have emphasised the importance of formative assessment in student learning achievement. A learning environment with formative assessment has numerous benefits for learners. Many studies indicate that integrating the DL environment with web-based assessment have positive results (Velan *et al*, 2002; Henly, 2003). Summative assessment is what students tend to focus on. It is the assessment, usually on completion of a course or module, which says whether or not you have "passed". It is usually undertaken with reference to all the objectives or outcomes of the course, and is usually fairly formal.

For the benefit of readers, please refer to Appendix A of this report for full detail of literature review conducted.

ii. Interview Guidelines

A set of interview guidelines were prepared for the interviews that were conducted within the month of September 2007 (Refer Appendix B - Interim Report)

iii. Pilot Interview

A pilot interview session was conducted in August 2007 with one of the DL tutors in a Masters programme within SOBE to get a broad overview of the followings:

- Identification of the delivery methods currently implemented within the DL settings;
- Identification of the methods of assessment currently implemented within DL;

- Identification of the available web-based online assessment tools used within DL;
- Identification of the gaps within the available tools and their capabilities in improving co-learner interactions;
- Identification of the barriers in improving co-learner interactions within DL;

iv. Case Studies Interviews

Contacts persons (tutors) involved in DL programmes within SOBE and other schools within the University of Salford were identified and interviewed as part of the research case study that contributed towards the main findings. Subsequent to the case studies from the University of Salford, four other universities within the UK were chosen as case studies. Several tutors of DL programmes within these four universities were contacted and interviewed, contributing towards the main findings of this research.

v. Paper Submitted to BEAR Conference 2008

A paper was submitted and presented at the International Conference on Building Educational Research (BEAR) 2008 under the theme Education (e-Learning) titled "Improving co-learner interactions through web-based online assessments within distance learning settings" which was held in February 2008 (Refer Appendix C – BEAR Conference Paper).

vi. Teaching and Learning Assessment Workshop – Scholarship Week

A Teaching and Learning Assessment Workshop was conducted during Scholarship Week 2008 within the School of Built Environment, University of Salford to (Refer Appendix D – Teaching and Learning Assessment Workshop Report).

vii. Paper Submitted to IPGRC

A paper was submitted and presented at the International Postgraduate Research Conference in Prague, 2008 titled "Personalised Learning Environments: A Diagnostic Questionnaire for Construction" (Refer Appendix E – IPGRC Conference Paper).

viii. Presentation on Assessment during the Assessment Week 2008

A presentation on assessment was conducted by Dr. Bingu Ingirige during the Assessment Week, 2008 at the University of Salford (Refer Appendix F – Presentation Slides).

ix. Journal Paper

A journal paper was written as part of the outcome from this research to be submitted to the International Journal of Instructional Technology and Distant Learning titled "Improving co-learner interactions through web-based online assessments within distance learning settings: Findings from Case Studies" (Refer Appendix G – Journal Paper).

6. Research Methodology

The following figure illustrates the methodology that was followed in conducting this research.

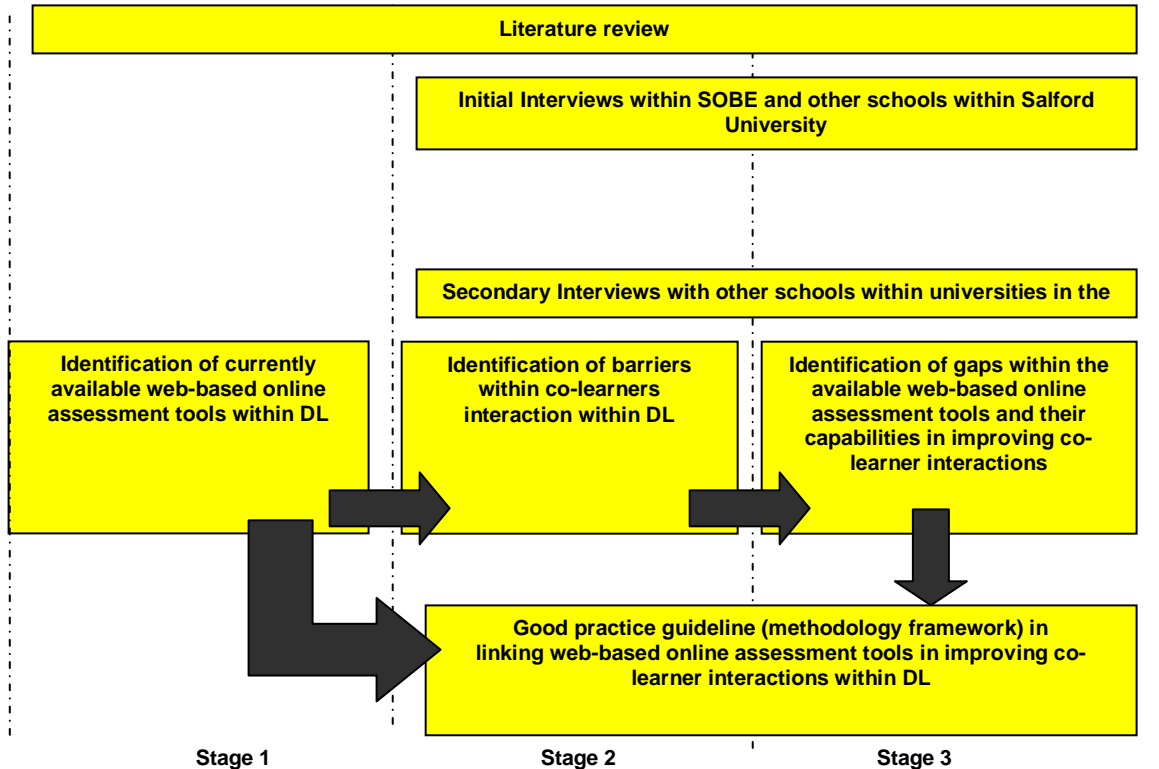


Figure 1: Research Methodology Flow

With reference to Figure 1, the initial literature review was employed with the intention of identifying the current available web-based online assessment tools within DL and their functionalities as well as their functionalities and capabilities in improving co-learner interactions. This is represented as stage 1 of the work. The literature review was continued throughout the whole duration of the research in keeping up to-date with the developments in the field. Initial interviews were then conducted within the second stage in identifying the barriers within co-learner interactions within a DL setting as well as identifying gaps within the available tools used and their capabilities in improving co-learner interactions. Within the third stage, a secondary interview was conducted with other schools within the four universities in the UK that were identified as part of this

research's case studies. The gaps identified from the current DL tools obtained from the initial interview were compared against DL scenarios within other universities in the UK as per conducted in the secondary interviews. A good practice guideline was developed in order to link web-based online assessment tools with improving co-learner interactions. These findings were then disseminated through various channels (see Section 8 of this report).

From the research methodology planned, seven Masters Programmes, and one undergraduate taught course were looked into, and interviews were conducted with each of the programme leaders. See Table 2 for summary of interviews conducted throughout this research process.

MASTERS PROGRAMME		NUMBERS OF INTERVIEWS CONDUCTED	MODE OF STUDY
Within The University of Salford	Within SOBE (Case Study MSc 1 and Case Study MSc 2)	2	Distance Learning
	Within the School of Law (Case Study MSc 3)	1	Distance Learning
	Within the School of Computing and Engineering (Case Study MSc 4)	1	Distance Learning
Four Identified Universities Within the UK	Case Study MSc 5	1	Distance Learning
	Case Study BSc 1	1	Full Time
	Case Study 7 MSc 6)	1	Distance Learning
	Case Study MSc 7	1	Full Time

Table 2: Summary of Interviews Conducted

7. Case Study Findings

The previous section detailed the research methodology adopted for this research. This section analyses and presents the qualitative feedback from the case studies that had been conducted. Case study MSc 1 to Case study MSc 4 was conducted within

schools at the University of Salford, whilst Case Study MSc 5 to Case study MSc 7; and Case study BSc 1 were conducted within four of the identified universities within the UK.

Case Study MSc 1

This Masters programme delivers lectures through “Horizonwimba” and corresponds with the distance learners through emails generally. “Horizonwimba” is being used to accommodate for the need of using audio and visual modes of communication between the tutor and the learner. The visual and audio communication is accomplished through a web conferencing based system capable of establishing video and audio based communications between the tutor and the learner. It uses the voice transfer, application transfer and chatting facilities to deliver synchronous lectures. One of the problems both tutors and learners encounter in utilising web conferencing is the time that it takes to learn the various functionalities of the tool (Keraminiyage *et al*, 2006).

As mentioned in the previous heading, electronic paper and project submissions are seen to be one of the web-based assessment tools made available to provide feed-back and improve co-learner interactions. This programme has adopted written coursework comprising legal scenarios as a method of assessment which students will then submit via Blackboard (Bb) once completed. Any questions or enquiries regarding the coursework can be discussed with the DL tutor through email. There was no emphasis on co-learners interactions when deciding on the method of assessment to be implemented for this programme. Although this type of assessment is considered to be one of the web-based assessment tool available; it does not really encourage co-learners interactions unless if the DL tutors promotes the students to discuss and interact with co-learners by starting up a discussion forum in conjunction with the coursework in a discussion board or any other means of communication medium.

According to the DL tutor, no other web-based assessment tools have been used within this programme. There have been reports from students regarding the late feedback that they get back from the DL tutors. From the interview conducted, the DL tutor

suggested that co-learners interactions through web-based assessment tools could be improved by conducting more group work assignments, support more interactions and discussions through discussion boards, emails and chat rooms.

Case Study MSc 2

This Masters programme is taught via the internet with support that takes the form of an induction and other events such as networks that are all optional, plus a summer school that has a compulsory attendance requirement. Lecture materials are presented in accessible format which comprise text, diagrams and drawings (for which descriptor alternatives are available) and video presentations (for which audio and text captioning are available). Tutor support is provided via online tutorials, group discussions and individual communication (i.e. through email). Learners not only can engage with other co-learners formally through tutorials and threaded group discussions but also informally through the student common room. The discussions and tutorial support will be both synchronous and asynchronous.

The method of assessment for this programme is designed to evaluate the student's abilities in achieving the intended learning outcomes for the module. During the start of the module, students will be provided with details of learning activities and assessment dates. Students then participate in learning activities and non-assessed formative feedback will be provided to them during the module to assist with motivational reinforcement. For each module, students will be required to complete a piece of end assessment and the nature of this varies according to the module. In one of the modules, students' work will be authenticated by practical assessment through an access appraisal and audit. The end assessment is considered as an electronic paper and project submission as submissions

Based on the information given by the DL tutor, although it is found that no specific web-based assessment tools have been used for this programme, interactions between co-learners is basically encouraged through tutorials and threaded group discussions as

mentioned before, as well as interacting through the student common room. This is inline with the web-based assessment tool made available to provide feed-back and improve co-learner interactions as mentioned by Ley (1999).

Case Study MSc 3

Case Study 3 is a Distance Learning (DL) Masters programme. Learners undertaking this programme are invited to a face-to-face teaching session, whereby lecture materials are then distributed. The assessment methods implemented for this programme are a balance of both summative, and formative. The summative assessment is in the form of a written coursework for each of the modules offered, whereby learners are required to submit an essay regarding a problem-based scenario. These written coursework are to be submitted straight to the school office. In addition to the coursework, learners are also required to submit a dissertation by the end of the programme. The formative assessment implemented within this programme is a self-assessed activity within the learners, through group discussions, etc.

Moreover, as part of the formative assessments being implemented, this programme also conducts chat-rooms, and discussion forums to encourage interactions within their learners. These types of assessments however, are not graded. Although this mechanism is considered as a way to encourage learners to interact with other co-learners, there are always issues such as time constraint within the learners; being geographically apart does not help, and the attitude of some learners just not bothered to participate as it is not graded, etc. Furthermore, some learners felt that it was best to communicate to the module instructors direct if they had any uncertainties, etc regarding the subject matter.

Some of the learners enrolled in this programme did not know what to expect in a DL environment, i.e. expecting it to be the same as a traditional classroom setting. Based on the interview conducted, the instructor within this programme thought that having a tutorial session online via the discussion board would help encourage learners to

interact with other co-learners, although still with the opinion that humans are not easy to be instructed. Encouragements can always be given to help them interact more with other co-learners, especially through web-based online assessment tools, but at the end of the day, it is the attitude of the learners themselves that would determine how they interact with others. The DL instructor still thought that although the programme conducted was a DL programme, a face-to-face lecture session should still be conducted at least during the beginning of the module to encourage learners to interact, especially during break-time. In addition, having 'group-clusters' within areas of interest might also help to encourage learners interact more.

Case Study MSc 4

This Masters programme delivers lectures based on a traditional classroom setting, which is conducted through summer school sessions. During the summer school sessions, tutorials and practical works are also conducted. In addition to the lecture sessions, learners are also distributed with learning materials at the beginning of the session.

The assessments methods implemented within this programme are mostly on summative type of assessment. Learners are required to submit written coursework, undergo a practical session, and undertake a final examination within the end of each semester. The submission of the course is also done the traditional way, through submission to the school office. In addition to the assessments mentioned, learners are also required to submit a dissertation as part of the partial fulfilment of the requirements of the Masters degree. Currently, no web-based online assessment tools, or computer aided assessment tools are being implemented within the programme.

The instructor of the DL programme thought that the barriers within DL settings were communication, and interaction within co-learners. It was under the impression that learners rely more on co-workers (as a majority of the learners are working full time in the industry), rather than interact with other co-learners within the programme.

Furthermore, the instructor within this programme thought that the web-based online assessment tools were not suitable for this programme, as it emphasises more on summative assessments rather than formative assessments, and the among the summative assessment implemented and graded is the practical work. The instructor feels that it would be difficult to programme a mechanism within the web-based online assessment tools for practical works.

Among the recommendation that were made to help improve co-learners interaction within the programme was to put into practice more group work rather than individual work, but having a constraint of 'free-riders' within the group members.

Case Study MSc 5

Case Study 5 is a Distance Learning (DL) Masters programme. Similar with Case Study 4, learners within this programme are also invited to a face-to-face teaching session, whereby lecture materials are then distributed in addition to the learning materials put online. Tutor support is also provided via online tutorials, group discussions and individual communication (i.e. through email). Learners are encouraged to use the online tutorials, group discussions and chat rooms provided as a medium of interaction with other co-learners enrolling within the same programme. The discussions and tutorial support will be both synchronous and asynchronous.

The assessment methods implemented for this programme are a balance of both summative, and formative. The summative assessment is in the form of a written coursework for each of the modules offered, whereby learners are required to submit an essay regarding a problem-based scenario, or a current issue. These written coursework are to be submitted through email to the course instructor. In addition to the coursework, learners are also required to submit a dissertation by the end of the programme. The formative assessment implemented within this programme is a self-assessed activity within the learners, through group discussions, etc.

Moreover, as part of the formative assessments being implemented, this programme also conducts chat-rooms, and discussion forums to encourage interactions within their learners. These types of assessments however, are not graded. Although this mechanism is considered as a way to encourage learners to interact with other co-learners, similar to the findings from the previous case studies, there are always issues such as time constraint within the learners; being geographically apart does not help, and the attitude of some learners just not bothered to participate as it is not graded, etc. Furthermore, some learners felt that it was best to communicate to the module instructors direct if they had any uncertainties, etc regarding the subject matter.

Some of the learners enrolled in this programme did not know what to expect in a DL environment, i.e. expecting it to be the same as a traditional classroom setting. Some of the learners, according to the instructor, have complexities of working alone at different times and in different locations; which then leads to certain stresses. Furthermore, some were not even sure of the technological problems that they were going to be exposed to until they had really enrolled on the DL programme, which lead to frustration due to the absence of personnel to provide them with technical support. Based on the interview conducted, the instructor within this programme thought that having a tutorial session online via the discussion board would help encourage learners to interact with other co-learners, although still with the opinion that humans are not easy to be instructed. Encouragements can always be given to help them interact more with other co-learners, especially through web-based online assessment tools, but at the end of the day, it is the attitude of the learners themselves that would determine how they interact with others. The DL instructor still thought that although the programme conducted was a DL programme, a face-to-face lecture session should still be conducted at least during the beginning of the module to encourage learners to interact, especially during break-time. In addition, having 'group-clusters' within areas of interest might also help to encourage learners interact more.

Case Study BSc 1

This full time undergraduate programme is taught via the internet with support, as well as providing learners with lecture materials which are presented online in an accessible format. The tutor support is provided via online tutorials, group discussions and individual communication (i.e. through email) whereby learners not only can engage with other co-learners formally through tutorials and threaded group discussions but also informally through the student common room. The discussions and tutorial support will be both synchronous and asynchronous.

Within this programme, learners are introduced with electronic portfolio (e-Portfolio), whereby learners create an electronic portfolio using a template and HTML authoring tools to be posted to the portfolio server. The in-house software then would allow a tutor to select the learner's name and review their work and complete a scoring rubric. This assessment data is collected and stored in a database that can be used for aggregation of data. The e-Portfolio approach is said to be more learner-centred as compared to the normal summative and formative assessment approach.

Since this programme is a full time course, it does not have the common stated barriers within a DL environment. However, the tutor was in line that online assessments play an important part on co-learners communication and interactions. The instructor within this programme was also in the same opinion as the instructor within CaS 4; whereby group work would be able to help improve co-learners interaction within the DL community. The use of technology with the programme was considered to be ideal for this programme, as the programme mainly attracted fresh learners, and not many from the industry; being a full time programme.

Case Study MSc 6

This Masters programme is taught via the internet with support, as well as providing learners with lecture materials which are presented online in an accessible format. In

addition to the online learning materials provided, learners are also supplied with text books, and software related to the programme of study. Tutor support is provided via online tutorials, group discussions and individual communication (i.e. through email).

This programme implements a mix of both summative and formative assessments, although more weight is towards the summative assessment. The types of summative assessment implemented are written coursework, which is to be submitted via email, and the dissertation. Formative assessments are not graded, only conducted as an initiative to encourage learners to engage and interact with other co-learners through tutorials and group discussions forums via 'skype'. 'Skype' is a software application that allows users to make telephone calls over the Internet. Skype allows users to communicate by both voice, and more traditional textual instant messaging.

Among the barriers in a DL environment were identified; i.e. communication barriers caused by the nature of the learners taking the programme, as a majority of the learners are working in the industry, making their time schedule packed and tight. In addition to that, a DL environment which implements a lot of technology might not be able to attract 'older' learners who are not comfortable with the use of technology as a medium of interaction within co-learners. The instructor expressed his opinion that group work would be able to help improve co-learners interaction within the DL community.

CASE STUDY MSc 7

This Masters programme is a full time Masters programme. The lectures are delivered across 12 weeks within one semester during the evenings. The face-to-face lectures combine part-time and full-time learners within the programme. Learners are also involved in tutorial sessions within the time allocated to enhance their understanding within the modules involved.

The assessments methods involve both an equally balanced of formative, and summative. The formative assessments that are being implemented are working group

activities during lectures, presentations, and a session from the tutors to provide feedback to the learners regarding their activities and presentation. The summative assessments that are being practiced are the normal individual coursework and examination during the end of each semester. The number of coursework given varies depending on each module the students take. In addition to that, each learner is also required to submit a dissertation by the end of their programme.

Although this is a full-time Masters programme, the programme leader that was interviewed gave his views towards a DL Masters programme. He felt that learners within the DL programme would often feel isolated due to being geographically apart from other co-learners enrolling in the same programme. Learners need to meet often, and interact with other co-learners and instructors to have a more 'healthier' learning environment. Due to the nature of DL programme, instructors should be more innovative in providing initiatives to help improve interactions within co-learners.

The programme leader of this programme is by the opinion that elderly staff tend to shy away from the technology side, perhaps younger staff would be more enthusiastic with the 'new' technology (online assessment tools) being offered within higher education nowadays. He also feels that online assessment tools should be dealt more with undergraduate levels-because MSc assessments should be more complex, detailed, and critical essay coursework. Even if deciding on the implementation of online assessment tools, it should be more towards formative assessment, but then there would be the issue on participation of learners if the assessments are not graded. As a conclusion, the programme leader interviewed was in the view that learners should often meet, and interact with other co-learners, therefore not really supportive of the DL settings.

8. Discussion and Findings

Table 3 shows the summary of findings for all the case studies conducted within this research. The summary of findings was narrowed down into five main criteria, i.e.: (i)

method of delivery, (ii) method of interaction, (iii) method of assessment, (iv) problems faced by learners within DL setting, and (v) suggestions to improve co-learners interactions within a DL setting.

From table 3, it can be seen that there was a mix of method of delivery within the case studies conducted, i.e. some lectures were delivered face-to-face (through summer school sessions), and some were delivered and taught online with the support of the Internet. The common method of interaction was through the use of emails and online tutorial support, as well as discussion boards and chat rooms. The case studies implemented both a mixture of summative and formative assessments methods. The common summative assessments identified were written coursework, project paper and dissertation. The written coursework and project paper were usually submitted via email or straight through the school office. The formative assessment method practised by most of the case studies is through learning activities with other co-learners. However, it can be concluded that almost all of the case studies conducted did not implement a specific web-based online assessment tools within the assessment method to be used in the MSc and BSc programme. This might be due to the problems that have been raised by some of the course instructors within the case studies, whereby the course instructors felt that an MSc programme should implement a much more critical, complex, and detailed written coursework. The web-based online assessment tool is said to be more suitable for undergraduates' level.

Some of the problems that were being faced by the learners within a DL setting are identified as: the lack of interaction between co-learners within the programme, as well as late feedback obtained from the instructor on any enquiries or assessments taken. The learners also found it difficult to work in isolation based upon the geographical and time constraint being faced by the learners enrolled in a DL setting. Almost all the case studies were in the perception that in order to improve co-learners interaction within a DL setting, a face-to-face lecture should also be conducted within the period of study. This would give learners the opportunity to get-together and interact with other learners within the programme. This conforms to the findings from the literature review that

many educators feel that the face-to-face iterative interaction with learners is an important part of the learning process (Bergstrom et al., 2006). More group works assessments were recommended as an initiative to encourage co-learners interactions, although extra care should be addressed to minimise the threat of 'free-riders' among group members. Programme instructors should also ensure that there is sufficient technology support for learners, so that learners do not feel isolated and stressed due to the nature of the DL setting. This further conforms the finding from literature as highlighted by Naglieri et al., (2004) that learners have different technology abilities. Learners who perceive themselves as being I.T. illiterate may find online assessments within the DL setting as an advantage. In addition, one of the recommendations made by the instructors within the case studies were to develop 'group-clusters' within learners' area of interest, to encourage learners of the same 'circle' would interact more within the discussion boards and chat rooms provided.

Criteria	CS MSc 1	CS MSc 2	CS MSc 3	CS MSc 4	CS MSc 5	CS BSc 1	CS MSc 6	CS MSc 7
1. Method of Delivery	<ul style="list-style-type: none"> Lectures through Horizonwimba 	<ul style="list-style-type: none"> Lectures delivered via the Internet Summer school – attendance compulsory 	<ul style="list-style-type: none"> Face-to-case teaching session 	<ul style="list-style-type: none"> Classroom setting – conducted through summer schools Conduct tutorials and practical works 	<ul style="list-style-type: none"> Face-to-face teaching session 	<ul style="list-style-type: none"> Taught via the Internet 	<ul style="list-style-type: none"> Taught via the Internet Lecture materials presented online 	<ul style="list-style-type: none"> Lectures delivered face-to-face Tutorial sessions
2. Method of Interaction	<ul style="list-style-type: none"> Via email Using audio and visual modes between tutor and learners Discussion forums/boards for learners to interact 	<ul style="list-style-type: none"> Online tutorials, group discussions and email Threaded group discussion board Student common room 	<ul style="list-style-type: none"> Email Chat rooms Discussion forums 	<ul style="list-style-type: none"> Face-to-face Email 	<ul style="list-style-type: none"> Tutor support through online tutorials, discussions and individual communication (via email) 	<ul style="list-style-type: none"> Tutor support via online tutorials Learners are introduced with e-portfolio – more learner-centred 	<ul style="list-style-type: none"> Tutor support via online tutorials, email 	<ul style="list-style-type: none"> Face-to-face
3. Method of Assessment	<ul style="list-style-type: none"> Written coursework submitted via email dissertation No use of web-based online assessment tool 	<ul style="list-style-type: none"> Learning activities Formative feedback Electronic paper and project submission dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Formative – self assessed learning activities Summative – written coursework submitted to school office Dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Mostly summative Written coursework submitted through school office Practical session Final examination Dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Balance of both summative and formative Essay/ written coursework Submitted via email Formative assessment conducted through learning activities within learners through group discussions No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Summative assessment submitted via email Dissertation Formative assessment was held to encourage learners to interact using 'skype' No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> A balance of formative and summative Formative – working group activities, presentations Feedback from tutors to learners – a special session is conducted Summative assessment – individual coursework Dissertation No use of specific web-based online assessment tool – not appropriate for MSc level

<p>4. Problems faced by learners within DL setting (complaints made by learners)</p>	<ul style="list-style-type: none"> Late feedback from instructors Lack of interaction between co-learners 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Time constraint Geographical constraint Participation of other learners 	<ul style="list-style-type: none"> Interactions between co-learners – learners rely more on co-workers Difficult to grade learner's practical session through web-based online assessment tools 	<ul style="list-style-type: none"> Complexities of working alone based on different times and location – causing stress Lack of technical support – leading to frustration 	<ul style="list-style-type: none"> Not a DL setting 	<ul style="list-style-type: none"> Communication barriers caused by the nature of the learners taking the programme – working learners Packed schedule Technology – can be a disadvantage and an advantage – generation of learners 	<ul style="list-style-type: none"> Technology shy Learners feel isolated
<p>5. Suggestions to improve co-learners interactions within a DL setting</p>	<ul style="list-style-type: none"> To increase group work assessments Support more interactions and discussions through discussion boards, chatrooms 	<ul style="list-style-type: none"> Encourage discussions and interaction through student common room 	<ul style="list-style-type: none"> To have tutorial sessions online Support and encouragement The necessity of a face-to-face classroom to encourage interactions – although it is a DL setting Having 'group-clusters' within area of interests. 	<ul style="list-style-type: none"> Put more practice on group works rather than individual works – constraint: 'free-riders' among team members 	<ul style="list-style-type: none"> To have online tutorial sessions Encouragements To still conduct face-to-face lectures to encourage learners interaction (the opportunity to meet-up) To have 'group-clusters' so that learners group together within their own 'circle of friends' 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> To increase group work assessment to encourage and improve co-learners interactions To provide 'appropriate' technology support 	<ul style="list-style-type: none"> Learners should meet and interact with other co-learners In support of face-to-face lecture

- CS = Case Study

Table 3: Summary of Findings

9. Research Dissemination

The following outcomes have been disseminated from this research, identified as follows:

- Conference Paper from the BEAR Conference, 2008;
- Teaching and Learning Assessment Workshop held during the Scholarship Week 2008;
- Presentation on Assessment during the Assessment Week 2008; and,
- Conference Paper presented at the International Post Graduate Research Conference (IPGRC), 2008.

The detailed outcomes from this research are attached as Appendix C, Appendix D, Appendix E, and Appendix F respectively.

10. Conclusion

Findings from the case studies revealed that most of the DL programmes deliver lecture materials in accessible format which comprise text, diagrams and drawings (for which descriptor alternatives are available) and video presentations (for which audio and text captioning are available) through online environments such as the “Horizonwimba” and ‘Elluminate Bridge’. The delivery methods currently used within the programmes are both synchronous and asynchronous. The result from this research identifies that there is a lacking in the implementation of specific web-based assessments tools within the DL settings, since none of the case studies have actually implemented a specific web-based online assessment tool as an assessment mechanism. However, the aid of technology is used within the assessment method implemented, i.e. most of the submission of coursework and project papers was done via email. However, the use of web-based online assessment tools is not denied as a way forward towards a paradigm shift in DL community as a means to encourage co-learners interactions (O’Reilly and Morgan, 1999).

Based on the in depth literature, web-based assessments tools have been found to help improve co-learners interactions within DL settings. Most DL programmes have just gone for the traditional assessment method, which is the written coursework due to lack of emphasis on co-learners interactions when deciding on the method of assessment to be implemented. The findings from the case studies highlighted the following recommendations in general to improve co-learners interactions within a DL setting with the aid of online assessments methods:

- More group works/ assessments are recommended to encourage co-learners to interact more. However, being in a Masters level, the assessments should be more complex, detailed, and critical; hence, close attention should be given to learners in avoiding ‘free-riders’ within team members.
- More support should be given to learners through discussion boards, emails, and chat rooms in order to encourage learners’ interactions.
- I.T. support should also be taken into ‘proper’ consideration to attract ‘matured’ learners, or learners who are not comfortable with the use of technology as a medium of interaction within co-learners.
- Having ‘group-clusters’ within areas of interest to encourage learners within the same level of interest so that chat rooms and discussion boards can be catered to address learners’ personalised interests.

The highlighted recommendations should be used as a way forward for all DL setting programmes so that web-based online assessment tools could really be used in order to improve co-learner interactions.

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LITERATURE REVIEW

Literature Review

Introduction

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies. Distance education technologies have become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Distance Learning (DL) education has improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005). In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at the postgraduate level. The new developments in technology have impacted the overall delivery process of the DL construction programmes. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments. Formative assessments attempt to provide feedback to learners, whereas the summative assessments refer to the actual assessed component. Formative and summative methods of assessment are included under the umbrella term 'assessment strategy' and are interwoven with one another and often inseparable (Dunn *et al*, 2004).

In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at postgraduate level. At the University of Salford, the School of Built Environment (SOBE) itself utilises the distance education technology tools in delivering Masters and PhD programmes over the Internet (Ingirige *et al*, 2005). The new developments in technology have impacted the overall delivery process of the DL construction programmes. It has been considered that one of the major influencing factor for achieving the intended learning outcomes of these programmes within an overall

information and communication technology (ICT) enabled delivery process is the assessment strategy adopted.

Definitions and Characteristics of Distant Learning

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as “instruction and learning practice utilising technology and involving students and teachers who are separated by time and space”. Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time during at least a majority of the instructional process.

Hall and Snider (2000) characterised DL with three criteria; (i) a geographical distance that separates the communication between the trainer and the participant, (ii) the communication is two-way and interactive and (iii) some form of technology is used to facilitate the learning process. Keraminiyage *et al* (2006) supported this view by considering the two significant characteristics of DL; which is (i) the distance between the tutor and the learner (either geographically or timely) and (ii) the learner centred learning mechanisms as opposed to the teacher centred learning in a traditional classroom based learning environment.

The additional characteristics of DL that has been discussed by Keegan (1986) include:

- The influence of an educational organisation both in planning and preparation of learning materials and in the provision of student support services; which distinguishes DL from the private study and teach-you programme;
- The use of technical media, print, audio, video or computer to unite teaching and learner and carry the content of the course;
- The provision of a two-way communication so that the learner may benefit or even initiate dialogue; a characteristic which distinguishes DL from the other uses of technology in education; and

- The quasi-permanent separation of the learning group throughout the length of the learning so that people are usually taught as individuals and not as groups, with the possibility of occasional meeting for both didactic and socialisation purposes.

There are many terms in relation to distance education and training – see Table 1 (Du Mont, 2002):

Term	Definition	Source
Asynchronous learning (sometimes referred to as Networked learning)	“A type of learning in which learners and instructors use computers to exchange messages, engage in dialogue and access resources” at any time and any place.	Commonwealth of Learning (2000) and Schocken (2001).
Distance education	“Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques and special instructional techniques, and special method of communication by electronic and other technology, as well as special organisational and administrative arrangements.”	Moore and Kearsley (1996)
Distance learning	“Instructional and learning practice utilising technology and involving students and teachers who are separated by time and space.”	Majdalany and Guiney (1999)
Distributed learning	“Learning environment [which] exists among a dispersed student population, is structured according to learner needs, and tends to	Oblinger and Maruyama (1996)

	integrate traditional institutional functions (e.g. classroom and library)...through both synchronous and asynchronous communication.”	
e-Learning	“Can be a subset of distributed learning. Relies on digital content, experiences through a technology interface, and is network-enabled. Collaboration is a desirable feature of e-Learning...”	Lundy, Harris, Igou and Zastrocky (2002)
Open learning	“An arrangement in which learners work primarily from self-instruction, completing courses structured around specially prepared, printed teaching materials, supplemented with face-to-face tutorials and examinations.”	William, Paprock and Covington (1999)

Table 1: Terms and Definitions within Distant Learning (Du Mont, 2002)

According to Du Mont (2002), definitions of DL exist which emphasise the *process* of educational delivery; focusing on DL as a transaction between teacher and learner based on dialogue and structure. Sherry (1996) noted that the terms “distance education” or “distance learning” have been applied interchangeably by many different researchers to a great variety of programs, providers, audiences and media. Berge (1998) however note that there is a difference between the term ‘distance education’ and ‘distance learning’. According to Berge (1998), distance education is seen as the formal process of DL, with information being broad in scope; e.g. college courses. DL however is seen as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. In addition, Gotschall (2000) described DL as a broadcast of lectures to distant locations, usually through video presentations.

Interactivity and Feedback within Distant Learning Setting

Butler and Winne (1995) define feedback as information that a learner receives about his or her learning processes and learning outcomes. Moreover, Gagne (1985) mentioned that learners may find frequent feedbacks useful and feedback to learners may be essential for effective learning (Reiser and Dick, 1996). DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Planning for adequate and useful feedback through web-based online assessments can lessen the DL instructor's feedback burden, hence, improving co-learner interactions within the DL settings. Moreover, according to Ley (1999), without a feedback system in place, distance students engage in learning under the handicap of inadequate or no feedback at all. In traditional distance education settings, learners are often left to go through the process of learning in isolation with very little contact with tutors and peers, thus are confined to basic, 'static' interaction with material delivered through one-way media in the form of printed text, audio cassettes and/or video (Karaliotas, 1998). In addition, according to Karaliotas (1998), with the advent of new media and technologies, the use of affordable and well integrated two-way communication is now possible in distance learning, which in turn enables dynamic interactions.

According to Moore (1989), interactions take place in the learning environment in three ways; e.g. (i) with contents, (ii) with other co-learners and (iii) with instructors. This particular research concentrates more on the interactivity between co-learners in a DL setting. Karaliotas (1998) mentioned that DL environments offer plenty of opportunities for interaction with other learners, far more likely to be productive and complete than in traditional HE learning environments as they are independent of time and place due to

their asynchronous nature, and more in line with the learning to learn process as they can be highly motivated and goal oriented. Interaction with learners takes place within collaborative activities, in threads of sociable exchanges, or philosophical and self-searching discussions. They are generated as; (i) asynchronous, Bulletin Board System (BBS) and email interactions and (ii) real-time 'moo' and chat interactions. Asynchronous, BBS and email interactions seem to offer a more in depth discourse as responses are spread over time, to the convenience of the participants, while real-time, 'moo' and chat interactions offer a fuller experience and rich content for a later asynchronous follow-up.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). Online interactions take into consideration the characteristics of the learners as well as the communication technology. The interactive features of the current computer-mediated communication (CMC) systems, such as two-way video and instant feedback, have provided more options for learner interactions. Moreover, Gunawardena *et al* (1998, pp. 141) have interpreted interaction as "the process through which negotiation of meaning and co-creation of knowledge occurs in a constructivist learning environment". Wagner (1998) however argues that interaction can serve as a means to an end of enhancing learning and performance.

Learner interactions require planning and structure in order to achieve the goal of active learning. According to Rohfeld and Hiemstra (1995), tasks such as debates, guest lecturers/discussants, polling, brainstorming, or student-moderated discussions via CMC networks can help to increase student interactions for learning. The principles of student-centered discussion accord the students the responsibilities of facilitating online conversations. When the activities and tasks become an integral part of the learning process, learner interactions can be conducive to learning (Chou, 2000). This is where

this research emphasises that web-based online assessments would be able to help enhance co-learners interactions within a DL setting.

Definitions of Assessments

Assessment is an indispensable part of teaching and learning (Govindasamy, 2002). It can also be considered as a way of interaction and providing feedback from the co-learner (e.g. instructor) to the learner. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al*, 2007). This is especially more important in a DL programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen *et al*, 2007).

To most learners and teachers, the term 'assessment' is traditionally associated with the concept of tests, grades, reports, and standards (Bartley, 2006). The body of literature has revealed that there is an assessment movement in education, which has been evolving through cycles of reform and expansion (Herman *et al.*, 1992; Kulieke *et al.*, 1990; Lazerson *et al.*, 2000; National Research Council, 2001). Assessment has also been defined broadly, to include all activities that teachers and learners undertake to get information that can be used diagnostically to alter teaching and learning (Liang and Kim, 2004). The core to this definition is the notion of systematic process of gathering and interpreting information, in order to provide feedback (Bartley, 2006). Mac Alpine (2002) noted that assessment can also be described as a form of communication involving a number and variety of sources, such as:

- I. assessments may be directed to the learners, as a form of feedback on their learning;

- II. assessments may be directed to teachers, as a form of feedback on their teaching;
- III. assessments may be directed to the curriculum designer as a form of feedback towards the curriculum;
- IV. assessments may be directed to the administrator as a form of feedback on the use of resources; and,
- V. assessments may be directed to the employers as a form of feedback on the quality of applicants.

Online Assessments in the Online Learning Environment

Mason (1998) discussed the phenomenon of the online learning environment (in the context of this research is Distant Learning) for learning in relation to the three main elements of asynchronous group and individual messaging, access to course materials, and real time (synchronous) interactive events. One of the important considerations for effective online assessments is to ensure that the tool incorporates these elements, fits the mode of delivery, and legitimately measures the desired outcome. It has been identified that one of the main advantages of using assessment software over manually assessing performance is primarily the savings in cost and time (Dowsing et al., 2000; Weisburgh, 2003). Online assessment is a method of using the Internet to deliver, analyse, and report exam content; and when appropriately used, it can enhance the efficiency of online learning (Bergstrom and Lopes, 2003).

Assessments in general can be classified into three broad categories, according to their general use (Bergstrom et al., 2006). They can be used prior to, during, and following learning (Swearingen, 2004), and classified as follows:

- I. Diagnostic assessment
- II. Formative assessment
- III. Summative assessment

Diagnostic assessment identifies learners' strengths and weaknesses, and can be used to identify specific personality characteristics or traits (e.g. motivation for success, personality type, etc), or allow individuals to self-assess their ability to complete a task or demonstrate knowledge of a particular subject area.

Formative assessments take place during the learning process. Formative assessments involve the delivery of multiple-choice or short quizzes administered at the end of a textbook chapter, learning module, or other learning benchmark in a course or training programme. Feedback is usually provided during or following the delivery of these assessments, and opportunities for self-remediation may also be available.

Summative assessments frequently take place in the middle or end of a learning or evaluation programme and can be used for grading, certification, and high stakes evaluation. Summative certification, licensure and some cognitive ability tests are administered with the purpose of identifying the best candidates to be awarded some form of credential.

The majority of assessments used in the online learning environment are in the asynchronous environment, where the assessment is completed in delayed time, and outside the present of an instructor (Bourne et al., 1997; Mason, 1998; Morley, 2000). The online asynchronous tools may involve alternating interactions between instructors and individual learners or entire groups through computer conferencing software and modem or network connections (Brem, 2002; Morley, 2000). In this context, the assessments can take many different forms, from traditional examinations of written assignments, case studies, research projects, and multiple choice examinations, to alternative measures such as portfolios, learner diaries, or journals to assess higher order abilities (Bourne et al., 1997; Morley, 2000; Muirhead, 2002).

Synchronous assessment models also play an important role within the DL process because dishonesty is minimised and the instructor has continual management of the testing environment (Morley, 2000). Online synchronous assessments may be

mediated by two-way interactive conferencing systems with telephone connections (Morley, 2000; Palloff and Pratt, 1999). An example of a typical exam format involves asking learners one question at a time, similar to oral examinations requiring learners to type in answers within a limited time frame (Kouki and Wright, 2005). According to Morley (2000), accreditation agencies prefer this method of synchronous testing because the instructor has significant interaction with the remote learners during examination.

A great deal now has been written which confirms that assessment is the key to learning in traditional settings (Ramsden, 1992). In all forms of DL contexts today, print-based, mediated via video or teleconferencing or supplement by computer-based communications; assessment tasks can be seen as the active components of study (O'Reilly and Newton, 2008). Assignments provide learners with opportunities to discover whether or not they understand, if they are able to perform competently and demonstrate what they have learnt in their studies. In a DL context, not only assessments have been identified as a performance measure, it has also been identified as means and ways to encourage co-learners interactions within a DL environment (O'Reilly and Morgan, 1999). Online learners should take the advantage of the opportunities to interact, to form social networks that are contributing to a learning network.

Disadvantages and Advantages of Online Assessments

Some drawbacks have been identified to offering assessments online (Bergstrom et al., 2006). Many educators feel challenged by the tasks and costs of producing high-end coursework delivered with reliable technology to learners, and may be unequipped to meet the level of standard required. In the face of market pressure to offer DL and e-Learning courses, it can be very difficult to ensure that learners receive the same kind of protections obtained in traditional classrooms or training facilities with regard to certain types of assessments, particularly high stakes assessments. Further to this, the other

issue that has been raised is support. It has been identified expensive and time consuming to provide round-the-clock support to learners who are now learning and testing at all hours. Many educators feel that the face-to-face, iterative interaction with students is an important part of the learning process. Whilst it is said that learners get immediate feedback on some of the online assessments available, educators do not always get the feedback of what topics learners find confusing or not clear. This is when the appropriateness and meaningfulness of the feedback becomes an issue, as it is as important as the assessment itself.

Loss of connectivity can also be an issue with online assessment. Therefore, learners utilising online courses and assessment should be provided with reliable Internet connectivity. Assessments must be designed so that loss of connectivity does not result in loss of data, so that tests can be restarted at the exact point of interruption. In addition, learners who perceive themselves as being I.T. illiterate may find online assessment as a disadvantage. Extensive preparation and support may be required when introducing learners to these forms of education and testing (Naglieri et al., 2004).

There are also advantages of using web-based online assessments, especially for busy adult learners. Online assessments can be made available 24 hours a day, seven days a week from any computer with access to the Internet. Furthermore, in a traditional paper-and-pencil testing and assessment programme, examinees normally receive their scores and interpretive reports after a certain period of time taking the assessment. With online assessments, learners often receive feedback within a few seconds after completion (this classic scenario is for an multiple choice question (MCQ) type of assessment). Web-based online assessment lends itself to a pedagogical approach to learning in which assessment is integrated with learning processes. For now, online assessments enable instructors to obtain feedback about how a learner is performing, as well as to evaluate the effectiveness of the e-Learning environment. In many ways, online assessment, like online teaching, is still very much in an embryonic state. Today, the most common online assessment strategies involve the use of computer communications as simply a transfer medium to submit and comment upon assigned

work such as essays, submit and compile portfolios, and deliver traditional paper-and-pencil tests in a computer testing environment (i.e. MCQ). As mechanisms for learning paradigms change, assessments delivery methods would also change within time.

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INTERIM REPORT

Table of Contents

Introduction	1
Project Team	1
Rational and Background	1
Aims and Objectives	5
Anticipated Outcomes and benefits	5
Research Methodology	6
Progress to Date	7
General	7
Literature Review	9
Introduction	9
Definitions and Characteristics	9
Distance Learning, Interactivity and Feedback	11
Assessments	12
Conferences and Publications	14
Evaluation of Progress	14
Way Forward	14
References	15
Appendices	
Appendix 1	18
Appendix 2	19
Appendix 3	22

INTRODUCTION TO THE REPORT

This document represents the interim report for the research project titled: “Improving Co-Learner Interactions through Web Based Online Assessments within Distant Learning Setting”, carried out by the School of Built Environment at the University of Salford. The project is funded by Teaching and Learning Quality Improvement Scheme (TLQIS) and this report has been produced in partial fulfillment of the set guidelines of TLQIS. This document has been designed to initially discuss the background to the project, justifying the reasons to undertake the research project, together with brief details on project aims and objectives, research methodology, planned output etc. followed by the progress to date. Future work is followed by appendices illustrating some of the output relating to work carried out to date.

PROJECT TEAM

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RATIONALE AND BACKGROUND

Distance Learning (DL) education has improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005). In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at the postgraduate level. The new developments in technology have impacted the overall delivery process of the DL construction programmes. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments. Formative assessments attempt to provide feedback to learners, whereas the summative assessments refer to the actual assessed component. Formative and summative methods of assessment are included under the

umbrella term ‘assessment strategy’ and are interwoven with one another and often inseparable (Dunn *et al*, 2004).

In offering DL programmes, the School of the Built Environment (SOBE) recognises that learners pursuing their qualifications in geographical isolation have a powerful need to form a community of co-learners which would enhance and enrich their learning experience and support their continuing participation. In addition, the learning outcomes of the Masters programmes delivered by SOBE (in line with ‘M’ level descriptors within QAA’s FHEQ framework and specific subject benchmark statements relevant to the field), often specify “that students will be able to *lead and work effectively with project teams and communicate effectively in a variety of forms*” and develop transferable skills such as “*Interactive and Group Skills and taking part in group discussions*”. Therefore the overall assessment strategies of Masters DL programmes identify the achievement of these learning outcomes as key goals.

SOBE currently offers seven Masters DL programmes and it forms a major part of the portfolio of investment within SOBE to improve the effectiveness and efficiency. Several online assessments are being utilised in line with the learning outcomes. The Masters programmes utilise blackboard virtual environments in the asynchronous mode and Horizonwimba in the synchronous mode to deliver the modules to the distance learners. Some of the programmes utilise the Blackboard VLE at different levels for both formative and summative assessments. Horizonwimba is utilised to deliver online tutorials and formative feedback to the students. Specifically in the MSc in Project Management we have observed that the students sometimes have online meetings outside formal contact hours (see Allen, 2005 for more details on online learning communities). However, some of their online collaborations are affected due to various control issues due to the non-participation of the tutors. Learners often express their need for more empowerment within some of their modules to enhance their active engagement within the programmes. With all types of learning, including web based learning, it is useful for students to receive constructive, timely, and relevant feedback on their progress even within distance learning settings. Therefore a mix of computer marked and tutor marked essays could be adopted for summative assessments. Online assessment is sometimes constrained by the medium in which it is operating. Computer marked assessments alone are not appropriate for marking or giving feedback on assignments such as essays or projects that require more than the mere reproduction of knowledge. With the increase of DL programmes being offered there has been a corresponding increase in both synchronous and asynchronous mechanisms being developed to facilitate these assessments (Dede, 1996; Wilson and Whitelock, 1997).

Despite addressing the needs of the programmes in developing a regime of assessment strategies most learning communities express a feel of isolation. However, barriers in the form of resource constraints, sometimes affect the provision of pedagogic requirements such as maintaining appropriate co-learner interactions within the masters DL programmes. First it is proposed to raise awareness in this area by identifying the importance of online assessments and co-learner interactions among SOBE Masters Programme Leaders. Then by involving the Masters Programme leaders, it is expected to gain insights on the various strategies adopted in their respective programmes to address online assessments and co-learner interactions. These results will be compared and frameworks will be developed to improve co-learner interactions by case

studies with other schools and faculties at Salford and other universities against the overall context of DL course delivery.

3.1 *AIMS AND OBJECTIVES*

The overall aim of the proposal is to improve co-learner interactions through online assessments within distance learning settings pertaining to existing distance learning Masters Programmes at SOBE and to share results with other schools and faculties. The objectives of this proposal are as follows:

- vii) Identify the currently available web based online assessment tools within DL;
- viii) Identify barriers in improving co-learner interactions within DL;
- ix) Formulate a methodology for linking online assessment tools with encouraging co-learner interaction;
- x) Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- xi) Recommend appropriate guidelines for improvement both in terms of assessment tools as well as possible facilitator and learner interventions; and
- xii) Disseminate results.

3.2 *Anticipated outcomes and benefits envisaged (including operational outputs)*

- i) Improving teaching and learning practices within distance learning settings by initially popularising online assessments and their potential link in promoting co-learner interactions;
- ii) Proposing a framework for improving the achievement of learning outcomes within distance learning masters programmes through a regime of formative and summative online assessments;
- iii) Produce good practice case study reports of other schools and faculties; and
- iv) Disseminate results to a wider academic community by producing journal articles and a conference papers. .

3.3 RESEARCH METHODOLOGY

The following figure illustrates the methodology planned in conducting this research.

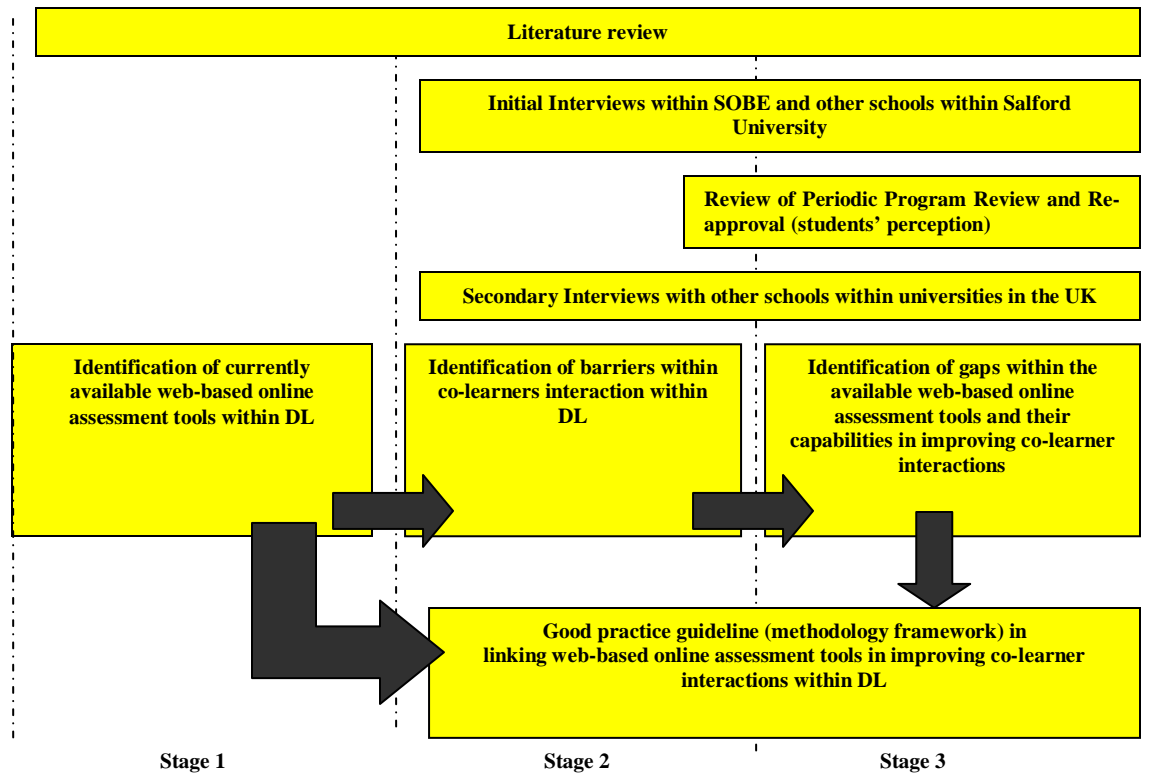


Figure 1: Research Methodology Flow

3.4 With reference to the above figure, the initial literature review is employed with the intention of identifying the current available web-based online assessment tools within DL and their functionalities as well as their functionalities and capabilities in improving co-learner interactions. This is represented as stage 1 of the work. The literature review is to be continued throughout the whole duration of the research in keeping up to-date with the developments in the field. Initial interviews will be conducted within the second stage in identifying the barriers within co-learner interactions within a DL setting as well as identifying gaps within the available tools used and their capabilities in improving co-learner interactions. Findings obtained from the initial interviews will then help in the review of the periodic programme review and re-approval (PPRR) phase taking into consideration of the students' perception. Within the third stage, a secondary interview is intended to be done within other schools in other universities in the UK. The gaps identified from the current DL tools obtained from the initial interview will be compared against DL scenarios within other universities in the UK as per conducted in the secondary interviews. A good practice guideline (methodology framework) in linking web-based online assessment tools with improving co-learner

interactions is anticipated as an outcome of this research. These findings will then be expected to be disseminated through various channels.

PROGRESS TO DATE

General

The following are among the work progress to date that have been achieved thus far (from April 2007 until August 2007):

x. Extension of Literature Review

Introduction

The literature review done have been designed to address the following issues on the overview of DL, the definitions and characteristics of DL, the issue of interactivity and feedback within DL settings, assessments and the types of assessments available.

Summary of the Literature Review

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies, hence triggering distance education technologies to become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Distance Learning (DL) education has also improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005); which now has become a major source by which many Higher Education (HE) institutes conduct their courses, particularly at the postgraduate level. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments (Refer Appendix A for in-depth explanation of formative and summative assessment).

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as “instruction and learning practice utilising technology and involving students and teachers who are separated by time and space”. Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time during at least a majority of the instructional process (Refer Appendix A for further definitions and characteristics of DL).

Another issue within DL is interactivity and feedback. Feedback is considered essential to learners towards effective learning (Gagne, 1985). Hence, in a DL setting, feedbacks are considered important as it is a mean of interaction and communication; i.e. between learners with instructors and learners with co-learners. DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). (Refer Appendix A for more detail on DL, interactivity and feedback).

In addition to interaction and feedback, assessment is also considered an indispensable part of teaching and learning (Govindasamy, 2002). It can also be considered as a way of interaction and providing feedback from the co-learner (e.g. instructor) to the learner. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al*, 2007). This is especially more important in a DL programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen *et al*, 2007).

According to Govindasamy (2002), assessment is typically divided into two types, namely the summative assessment and formative assessment. Many researchers (Brown and Knight, 1994; Buchanan, 2000; Henly, 2003) have emphasised the importance of formative assessment in student learning achievement. A learning environment with formative assessment has numerous benefits for learners. Many studies indicate that integrating the DL environment with web-based assessment have positive results (Velan *et al*, 2002; Henly, 2003). Summative assessment is what students tend to focus on. It is the assessment, usually on completion of a course or module, which says whether or not you have "passed". It is usually undertaken with reference to all the objectives or outcomes of the course, and is usually fairly formal.

For the benefit of readers, please refer to Appendix A for full detail of literature review done thus far.

xi. Interview Guidelines

A set of interview guidelines were prepared for the interviews that will be conducted within the month of September 2007 (Refer Appendix C for list of interviewees).

xii. Pilot Interview

A pilot interview session was conducted in August 2007 with Brodie McAdams (one of the DL tutors in a Masters programme within SOBE) to get a broad overview of the followings:

- Identification of the delivery methods currently implemented within the DL settings;
- Identification of the methods of assessment currently implemented within DL;
- Identification of the available web-based online assessment tools used within DL;
- Identification of the gaps within the available tools and their capabilities in improving co-learner interactions;
- Identification of the barriers in improving co-learner interactions within DL;

xiii. Interview

Contacts persons (tutors) involved in DL programmes within SOBE and other schools within the University of Salford have been identified and contacted in arranging for an interview (Refer Appendix B for list of contact person and Appendix C for interview guidelines set).

xiv. Abstract Submitted to BEAR Conference 2008

An abstract was submitted and accepted by the International Conference on Building Educational Research (BEAR) 2008 under the theme Education (e-Learning) entitled "Improving co-learner interactions through web-based online assessments within distance learning settings" to be held in February 2008, based on which a paper will be submitted for future publication within conference proceedings (Refer Appendix D for abstract submitted). The preparation of the paper is currently ongoing.

Regular progress meetings were held to shape up the activities conducted so far. Table 1 is a detailed progress to date for all the tasks outlined in the proposal and proposed actions to be taken:

TASK	TIMESCALE	DELIVERABLES	PROGRESS TO DATE	PROPOSED ACTIONS TO BE TAKEN
3. Extend the initial literature review on online assessments and online communities undertaking higher degrees.	1M to 3M (3 months)	A report summarising current literature within the subject area. (e.o 3 rd month)	Literature review has been extended and is still on-going (Refer Appendix A)	Continue with the literature review.
4. Case studies within SOBE and other schools and faculties supplemented by interviews with	2M to 5M (3	2.1 Interview summaries and analysis (end of the 5 th month) Interim progress report (e.o 6th	Identified contact facilitators (contact persons) in DL MSc Programmes within SOBE and other schools within	Start sending questionnaire surveys to contact persons in DL MSc Programmes within SOBE by early August and completing

1. It is planned to conduct a steering committee meeting during the last week in November or early December depending on the availability of the team members.
2. Meetings have been held regularly between project leader and researcher to keep an up-date of the progress of work being done.

WAY FORWARD

- Literature review within this research will be continually extended to enhance the understanding of the subject area as well as identifying the concerns and issues revolving around it.
- The initial interviews will include DL tutors (within the Master programmes offered – Refer Appendix A for contact details) to get further understanding and insights to the problems within co-learners interactions and how online assessments can help to improve the problems identified. The interviewees have already been identified and contacted by the research team.
- With the feedback received from the initial pilot interviews, a set of secondary interviews will be conducted out side the University of Salford, but within the UK DL based higher education institutes. With these interviews it is expected to identify the good practices of using web-based online assessment tools to address the problems within co-learners interactions within DL settings.
- Good practice guidelines, conference presentations, CEBE and journal papers will be used to disseminate the research outcomes.
- The findings and results obtained from the research outcomes is hoped to be distributed among all DL tutors (within the Masters programme identified) with the hope that it will improve and enhance the current usage and practice of web-based assessment tools in improving co-learner interactions.

Appendix A

Literature Review

Introduction

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies. Distance education technologies have become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Distance Learning (DL) education has improved significantly during the recent years mainly due to the major developments that have taken place in application of information and communication technologies (ICT) (Salmon, 2000; Zhang *et al*, 2004; Ingirige *et al*, 2005). In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at the postgraduate level. The new developments in technology have impacted the overall delivery process of the DL construction programmes. A major influencing factor for achieving the intended learning outcomes of these programmes within an overall ICT enabled delivery process is the assessment strategy adopted. Tutors in DL programmes adopt various methods of assessments and these could be broadly classified as formative and summative assessments. Formative assessments attempt to provide feedback to learners, whereas the summative assessments refer to the actual assessed component. Formative and summative methods of assessment are included under the umbrella term 'assessment strategy' and are interwoven with one another and often inseparable (Dunn *et al*, 2004).

In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at postgraduate level. At the University of Salford, the School of Built Environment (SOBE) itself utilises the distance education technology tools in delivering Masters and PhD programmes over the Internet (Ingirige *et al*, 2005). The new developments in technology have impacted the overall delivery process of the DL construction programmes. It has been considered that one of the major influencing factor for achieving the intended learning outcomes of these programmes within an overall information and communication technology (ICT) enabled delivery process is the assessment strategy adopted.

Definitions and Characteristics

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as “instruction and learning practice utilising technology and involving

students and teachers who are separated by time and space”. Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time during at least a majority of the instructional process.

Hall and Snider (2000) characterised DL with three criteria; (i) a geographical distance that separates the communication between the trainer and the participant, (ii) the communication is two-way and interactive and (iii) some form of technology is used to facilitate the learning process. Keraminiyage *et al* (2006) supported this view by considering the two significant characteristics of DL; which is (i) the distance between the tutor and the learner (either geographically or timely) and (ii) the learner centred learning mechanisms as opposed to the teacher centred learning in a traditional classroom based learning environment.

The additional characteristics of DL that has been discussed by Keegan (1986) include:

- The influence of an educational organisation both in planning and preparation of learning materials and in the provision of student support services; which distinguishes DL from the private study and teach-you programme;
- The use of technical media, print, audio, video or computer to unite teaching and learner and carry the content of the course;
- The provision of a two-way communication so that the learner may benefit or even initiate dialogue; a characteristic which distinguishes DL from the other uses of technology in education; and
- The quasi-permanent separation of the learning group throughout the length of the learning so that people are usually taught as individuals and not as groups, with the possibility of occasional meeting for both didactic and socialisation purposes.

There are many terms in relation to distance education and training, defined as follows in the following table (Du Mont, 2002):

Term	Definition	Source
Asynchronous learning (sometimes referred to as Networked learning)	“A type of learning in which learners and instructors use computers to exchange messages, engage in dialogue and access resources” at any time and any place.	Commonwealth of Learning (2000) and Schocken (2001).
Distance education	“Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques and special instructional techniques, and special method of communication by electronic and other technology, as well as special organisational and administrative arrangements.”	Moore and Kearsley (1996)
Distance learning	“Instructional and learning practice utilising technology and involving students and teachers who are separated by time and space.”	Majdalany and Guiney (1999)
Distributed learning	“Learning environment [which] exists among a dispersed student population, is structured according to learner needs, and tends to integrate traditional institutional functions (e.g. classroom and library)...through both synchronous and asynchronous communication.”	Oblinger and Maruyama (1996)
e-Learning	“Can be a subset of distributed learning. Relies on digital	Lundy, Harris, Igou and

	content, experiences through a technology interface, and is network-enabled. Collaboration is a desirable feature of e-Learning...”	Zastrocky (2002)
Open learning	“An arrangement in which learners work primarily from self-instruction, completing courses structured around specially prepared, printed teaching materials, supplemented with face-to-face tutorials and examinations.”	William, Paprock and Covington (1999)

According to Du Mont (2002), definitions of DL exist which emphasise the *process* of educational delivery; focusing on DL as a transaction between teacher and learner based on dialogue and structure. Sherry (1996) noted that the terms “distance education” or “distance learning” have been applied interchangeably by many different researchers to a great variety of programs, providers, audiences and media. Berge (1998) however note that there is a difference between the term ‘distance education’ and ‘distance learning’. According to Berge (1998), distance education is seen as the formal process of DL, with information being broad in scope; e.g. college courses. DL however is seen as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. In addition, Gotschall (2000) described DL as a broadcast of lectures to distant locations, usually through video presentations.

Distance Learning, Interactivity and Feedback

Butler and Winne (1995) define feedback as information that a learner receives about his or her learning processes and learning outcomes. Moreover, Gagne (1985) mentioned that learners may find frequent feedbacks useful and feedback to learners may be essential to effective learning (Reiser and Dick, 1996). DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Planning for adequate and useful feedback through web-based online assessments can lessen the DL instructor’s feedback burden, hence, improving co-learner interactions within the DL settings. Moreover, according to Ley (1999), without a feedback system in place, distance students engage in learning under the handicap of inadequate or no feedback at all. In traditional distance education settings, learners are often left to go through the process of learning in isolation with very little contact with tutors and peers, thus are confined to basic, 'static' interaction with material delivered through one-way media in the form of printed text, audio cassettes and/or video (Karaliotas, 1998). In addition, according to Karaliotas (1998), with the advent of new media and technologies, the use of affordable and well integrated two-way communication is now possible in distance learning, which in turn enables dynamic interactions.

According to Moore (1989), interactions take place in the learning environment in three ways; e.g. (i) with contents, (ii) with other co-learners and (iii) with instructors. This particular research concentrates more on the interactivity between co-learners in a DL setting. Karaliotas (1998) mentioned that DL environments offer plenty of opportunities for interaction with other learners, far more likely to be productive and complete than in traditional HE learning

environments as they are independent of time and place due to their asynchronous nature, and more in line with the learning to learn process as they can be highly motivated and goal oriented. Interaction with learners takes place within collaborative activities, in threads of sociable exchanges, or philosophical and self-searching discussions. They are generated as; (i) asynchronous, Bulletin Board System (BBS) and email interactions and (ii) real-time moo and chat interactions. Asynchronous, BBS and email interactions seem to offer a more in depth discourse as responses are spread over time, to the convenience of the participants, while real-time, moo and chat interactions offer a fuller experience and rich content for a later asynchronous follow-up.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). Online interactions take into consideration the characteristics of the learners as well as the communication technology. The interactive features of the current computer-mediated communication (CMC) systems, such as two-way video and instant feedback, have provided more options for learner interactions. Moreover, Gunawardena *et al* (1998, pp. 141) have interpreted interaction as "the process through which negotiation of meaning and co-creation of knowledge occurs in a constructivist learning environment". Wagner (1998) however argues that interaction can serve as a means to an end of enhancing learning and performance.

Learner interactions require planning and structure in order to achieve the goal of active learning. According to Rohfeld and Hiemstra (1995), tasks such as debates, guest lecturers/discussants, polling, brainstorming, or student-moderated discussions via CMC networks can help to increase student interactions for learning. The principles of student-centered discussion accord the students the responsibilities of facilitating online conversations. When the activities and tasks become an integral part of the learning process, learner interactions can be conducive to learning (Chou, 2000). This is where this research emphasises that web-based online assessments would be able to help enhance co-learners interactions within a DL setting.

Assessment

Assessment is an indispensable part of teaching and learning (Govindasamy, 2002). It can also be considered as a way of interaction and providing feedback from the co-learner (e.g. instructor) to the learner. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al*, 2007). This is especially more important in a DL programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen *et al*, 2007).

According to Govindasamy (2002), assessment is typically divided into two types, namely the summative assessment and formative assessment. While summative assessment is used to grade students to demonstrate students' achievement and involves in making a final judgment of the students' achievement relative to the predetermined objectives; formative assessment is used as a diagnostic tool for students and teachers to identify and improve areas of weakness (Williams, 2000). Efforts to implement DL will eventually move towards total automation of administering the teaching and learning processes by means of software known as Learning Management Systems (LMS). According to Govindasamy (2002), generally LMS include test builder tools that automate the process of authoring questions. In addition, most of these tools offer easy-to-use templates for authoring automatically scored questions; e.g. multiple-choice questions (MCQ), true/false questions (TFQ), matching questions (MQ), or short answer questions (SAQ). However, essay questions, projects, assignments, and case studies have been totally omitted, yet this should not be taken to mean that these forms of assessment are not needed to perform valid and reliable assessment, as computer marked assessments alone are not appropriate for marking or giving feedback. Having additional developers of current LMS were probably driven by technology in choosing the question builders to be included in the system (Govindasamy, 2002). Creating quiz questions, possible answer options, assigning weights to the answers, automatically scoring the answers, and programming appropriate feedback for different answers provided by learners require a working knowledge of HTML, Java Script, and other programming languages. This is definitely too much to expect of instructors, therefore, the developers of the LMS probably felt it was necessary to provide instructors with these tools. In order to assess students by means of projects, case studies, assignments, and other artefacts of learning, what the instructor would normally do is to post the message on the bulletin board. Students would then be able to complete their assignments and submit their work to the instructor via e-mail or upload it as a web page for the instructor to assess manually (Govindasamy, 2002).

Formative Assessment

Many researchers (Brown and Knight, 1994; Buchanan, 2000; Henly, 2003) have emphasised the importance of formative assessment in student learning achievement. A learning environment with formative assessment has numerous benefits for learners. Many studies indicate that integrating the DL environment with web-based assessment have positive results (Velan *et al*, 2002; Henly, 2003). Formative assessments refer to activities that are used to help students learn, e.g. short tests and quizzes, question and answer in a lesson, assignments, homework and so on. Buchanan (2000) showed that a web-based formative assessment strategy is able to improve student learning interest and scores. Moreover, according to Nicol (1997), formative assessment, including such practices as self and peer assessment, has positive implications for student learning and allows students to play a more active role in the management of their own learning.

Summative Assessment

Summative assessment is what students tend to focus on. It is the assessment, usually on completion of a course or module, which says whether or not you have "passed". It is usually

undertaken with reference to all the objectives or outcomes of the course, and is usually fairly formal.

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Appendix B – Contact Person

Contact Persons- Facilitators involved in DL Programmes within SOBE**Contact Persons- Facilitators involved in DL Programmes within the Salford Business School**

CONTACT PERSON	PROGRAMME
Dr. Bingu Ingirige	MSc Project Management
Prof Farzad Khosrowshahi	MSc IT Management in Construction
David Dowdle	MSc in Facilities Management
Dr. Bingu Ingirige	MSc in Quantity Surveying/ M & E in Quantity Surveying
Mark Shepherd/ Brodie McAdams	MSc in Property Management and Investment
Prof Mike Kagioglou	MSc Healthcare in the Built Environment
Rita Newton/ Prof Marcus Ormerod	MSc Accessibility and Inclusive Design
CONTACT PERSON	PROGRAMME
Dr. Joanne Taylor	MSc HACCP

Contact Persons- Facilitators involved in DL Programmes within Salford Law School

CONTACT PERSON	PROGRAMME
Victoria Howes	MA Health Care Law/LLM Health Law MA/LLM Health and Safety Law and Environmental Law

Contact Persons- Facilitators involved in DL Programmes within School of Computing, Science and Engineering

CONTACT PERSON	PROGRAMME
Mark Avis	MSc Audio Acoustics
Dr. Richard Pilkington	MSc Vacuum Engineering and Applications

Appendix C – Interview Guidelines

SURVEY:

IMPROVING CO-LEARNER INTERACTIONS THROUGH WEB-BASED ONLINE ASSESSMENTS WITHIN DISTANCE LEARNING SETTINGS

This study is funded and supported by the Teaching and Learning Quality Improvement Scheme (TLQIS) within the University of Salford in achieving the following aim and objectives:

AIM

To Improve co-learner interactions through online assessments within distance learning settings pertaining to existing distance learning Masters programmes at SOBE and to share results with other schools and faculties

OBJECTIVES

- i) To identify the delivery methods currently implemented within the DL settings;
- ii) To identify the methods of assessment currently implemented within DL;
- iii) To identify the available web-based online assessment tools used within DL;
- iv) Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- v) Identify barriers in improving co-learner interactions within DL;

PLEASE ANSWER ALL THE QUESTIONS.

1. What distance learning programme are you conducting within the school?

2. What are the delivery methods that are currently implemented for the distance learning programme?

3. What are the intended learning outcomes for the programme conducted?

4. Within the programme, what methods of assessment that is currently implemented?

5. Is there a balance between the formative assessment and summative assessment implemented within DL programme conducted?

6. What were the criteria that were considered when deciding on implementing the methods of assessments as stated in question 4? Was it made in line with the intended learning outcomes?

7. What web-based assessment tool is your programme currently implementing?

8. List the types of assessments that the web-based tools offer students.

9. How does the web-based assessment tool function?

10. Have there been any reports (or complaints) from learners regarding the feedbacks that the web-based assessment tool is conducting? How long does it normally take for a learner to get feedback from the assessments done?

11. From your observation, do you see any available gaps or flaws within the web-based assessment tool implemented in minimising the co-learner interactions within the programme? If yes, what do you recommend in minimising the gaps or flaws in improving the co-learner interactions?

12. Have there been any reports from students regarding the issue of student isolation, lack of interaction between co-learners, etc in relation to the programme that you are conducting?

13. In relation to question no. 11, if yes, how do recommend learners to enhance their active involvement and interactions between co-learners within the programme?

14. In your opinion, how can web-based online assessment help in improving co-learner interactions within a distance learning settings?

Thank you for your time and co-operation

Appendix D – Abstract for the BEAR 2008 conference

IMPROVING CO-LEARNER INTERACTIONS THROUGH WEB-BASED ONLINE ASSESSMENTS WITHIN DISTANCE LEARNING SETTINGS

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Abstract

Distance Learning (DL) is an educational model in which the student and instructor are separated by time and space is currently the fastest growing model of domestic and international education which has come into prominence during the last two decades of the 20th century.

One of the major influencing factors for achieving intended learning outcomes in a programme is the assessment strategy adopted. Tutors in DL programmes have adopted various methods of assessments that could broadly be described as formative and summative assessments. A well documented formative and summative feedback for learners, especially early on in a course, will facilitate in their learning and provides opportunities for students to gain insight into their understanding of the course content.

Learners often express their need for more empowerment within their modules to enhance their active involvement and interactions within the programmes. This is the main focus of this ongoing research under the Teaching Learning Quality Improvement Scheme (TLQIS) of the University of Salford.

This paper will firstly look into the literature within the area and set out the overall methodology of the paper. Then, through a survey of DL courses within the School of Built Environment, University of Salford, it is intended to identify currently used web-based online assessment tools within the DL settings and other issues within the area in improving the co-learner interactions within the DL (e.g. *factors and barriers in improving co-learner interactions, gaps and flaws within the available tools, etc*).

The result and conclusion from this paper will recommend guidelines in improving co-learner interactions within DL settings.

Keywords: Distance Learning (DL), co-learner interactions, web-based online assessments

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PAPER FROM BEAR CONFERENCE

**Improving Co-Learner Interactions through Web-Based Online Assessments within
Distance Learning Settings**

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Abstract

Distance Learning (DL) is an educational model in which the student and instructor are separated by time and space is currently the fastest growing model of domestic and international education which has come into prominence during the last two decades of the 20th century. One of the major influencing factors for achieving intended learning outcomes in a programme is the assessment strategy adopted. Tutors in DL programmes have adopted various methods of assessments that could broadly be described as formative and summative assessments. A well documented formative and summative feedback for learners, especially early on in a course, will facilitate in their learning and provides opportunities for students to gain insight into their understanding of the course content. Learners often express their need for more empowerment within their modules to enhance their active involvement and interactions within the programmes. This is the main focus of this ongoing research under the Teaching Learning Quality Improvement Scheme (TLQIS) of the University of Salford.

This paper will firstly look into the literature within the area and set out the overall methodology of the paper. Then, through a survey of DL courses within the School of Built Environment (SOBE), University of Salford, it is intended to identify currently used web-based online assessment tools within the DL settings and other issues within the area in improving the co-learner interactions within the DL (e.g. *factors and barriers in improving co-learner interactions, gaps and flaws within the available tools, etc*). The result and conclusion from this paper will recommend guidelines in improving co-learner interactions within DL settings.

Keywords: Distance Learning (DL), co-learner interactions, web-based online assessments

1. Introduction

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies. Distance education technologies have become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Moreover, Chen *et al* (2001) noted that the application of IT have allowed universities to deliver multimedia course contents and enable students to communicate with their instructors and fellow students in both synchronous and asynchronous formats; hence making distance learning (DL) possible. DL, an educational model in which the student and the instructor are separated by time and space, is considered the current fastest growing model of domestic and international education (Poley, 2000).

Distance education had been around for more than a century, which according to Belanger and Jordon (2000, p.6), the history of technology-based DL was correspondence education, which started in Europe and the United States in the mid 19th century. Web-based technologies (WBT) in particular have expanded the interactive capabilities of distance education from solely asynchronous communications with long delays in response to highly interactive class meetings via text, e-mail, video and many more (Murphrey, 2001).

In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at postgraduate level. At the University of Salford, the School of Built Environment (SOBE) itself utilises the distance education technology tools in delivering Masters and PhD programme over the Internet (Ingirige *et al*, 2005). The new developments in technology have impacted the overall delivery process of the DL construction programme. It has been considered that one of the major influencing factors for achieving the intended learning outcomes of these programmes within an overall information and communication technology (ICT) enabled delivery process is the assessment strategy adopted.

Assessments can be considered as a significant way of interaction and providing feedback from the instructor to the learner and a medium for the co-learners to interact with each other. And, due to the significance of this area, SOBE received funding to conduct a one year study to improve the interactions of co-learners through web-based online assessments tools within DL settings through the Teaching and Learning Quality Improvement Scheme (TLQIS) within the University of Salford. This paper reviews literature within the field area and try to find gaps within the available tools and their capabilities in improving co-learner interactions.

This paper has been designed and structured as follows; first, it will describe the methodology adopted. Then, it will look into research problems and subsequently the literature within the area; e.g. definitions and characteristics of DL and enlisting available web-based assessment tools within the DL settings. Then, through two case studies of DL courses within the School of Built Environment, University of Salford, it is intended to identify currently used web-based online assessments tools within the DL settings and other issues within the area in improving the co-learner interactions within the DL. Lastly, this paper concludes by suggesting the way forward.

2. Methodology

The research methodology approach adopted for this paper embraces the distillation of core research material gathered from a detailed literature review. The literature review encompassed concepts and issues surrounding DL. Two DL Master programmes (MSc 1 and MSc 2) within the School of Built Environment, University of Salford were looked into and used as case studies to achieve the following objectives:

- vi) To identify the delivery methods currently implemented within the DL settings;
- vii) To identify the methods of assessment currently implemented within DL;
- viii) To identify the available web-based online assessment tools used within DL;
- ix) Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- x) Identify barriers in improving co-learner interactions within DL;

Interviews were conducted with the DL tutors in achieving the above mentioned objectives. The result and conclusion from this paper will recommend the way forward in improving co-learner interactions within DL settings.

3. Research Problem

Learners often express their need for more empowerment within some of their modules to enhance their active engagement. With all types of learning, including web-based learning, it is useful for students to receive constructive, timely and relevant feedback on their progress even within DL settings. Therefore, a mix of computer marked and tutor marked essays could be adopted for summative assessments. Online marked assessment is sometimes constrained by the medium in which it is operating. Computer marked

assessments alone are not appropriate for marking or giving feedback on assignments such as essays or projects that require more than the mere production of knowledge. With the increase of DL programmes being offered there has been a corresponding increase in both synchronous and asynchronous mechanisms being developed to facilitate these assessments (Dede, 1996; Wilson and Whitelock, 1997).

Despite addressing the needs of the programme in developing a regime of assessment strategies, most learning communities express a feel of isolation. However, barriers in the form of resource constraints, sometimes affect the provision of pedagogic requirements such as maintaining appropriate co-learner interactions within the masters DL programmes. This paper aims to address issues within the area in improving the co-learner interactions within the DL (e.g. factors and barriers in improving co-learner interactions, gaps and flaws within the available tools, etc) and proposing a way forward.

4. Distance Learning

4.1 Definitions and Characteristics

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as “instruction and learning practice utilising technology and involving students and teachers who are separated by time and space”. Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time during at least a majority of the instructional process.

Hall and Snider (2000) characterised DL with three criteria; (i) a geographical distance that separates the communication between the trainer and the participant, (ii) the communication is two-way and interactive and (iii) some form of technology is used to facilitate the learning process. Keramiyige *et al* (2006) supported this view by considering the two significant characteristics of DL; which is (i) the distance between the tutor and the learner (either geographically or timely) and (ii) the learner centred learning mechanisms as opposed to the teacher centred learning in a traditional classroom based learning environment.

The additional characteristics of DL that has been discussed by Keegan (1986) include:

- The influence of an educational organisation both in planning and preparation of learning materials and in the provision of student support services; which distinguishes DL from the private study and teach-you programme;
- The use of technical media, print, audio, video or computer to unite teaching and learner and carry the content of the course;
- The provision of a two-way communication so that the learner may benefit or even initiate dialogue; a characteristic which distinguishes DL from the other uses of technology in education; and
- The quasi-permanent separation of the learning group throughout the length of the learning so that people are usually taught as individuals and not as groups, with the possibility of occasional meeting for both didactic and socialisation purposes.

There are many terms in relation to distance education and training, defined as follows in Table 1 (Du Mont, 2002):

Table 1: Definitions of Terms(Du Mont, 2002)

Term	Definition	Source
Asynchronous learning (sometimes referred to as Networked learning)	“A type of learning in which learners and instructors use computers to exchange messages, engage in dialogue and access resources” at any time and any place.	Commonwealth of Learning (2000) and Schocken (2001).
Distance education	“Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques and special instructional techniques, and special method of communication by electronic and other technology, as well as special organisational and administrative arrangements.”	Moore and Kearsley (1996)
Distance learning	“Instructional and learning practice utilising technology and involving students and teachers who are separated by time and space.”	Majdalany and Guiney (1999)
Distributed learning	“Learning environment [which] exists among a dispersed student population, is structured according to learner needs, and tends to integrate traditional institutional functions (e.g. classroom and library)...through both synchronous and asynchronous communication.”	Oblinger and Maruyama (1996)
e-Learning	“Can be a subset of distributed learning. Relies on digital content, experiences through a technology interface, and is network-enabled. Collaboration is a desirable feature of e-Learning...”	Lundy, Harris, Igou and Zastrocky (2002)
Open learning	“An arrangement in which learners work primarily from self-instruction, completing courses structured around specially prepared, printed teaching materials, supplemented with face-to-face tutorials and examinations.”	William, Paprock and Covington (1999)

According to Du Mont (2002), definitions of DL exist which emphasise the *process* of educational and structure. Sherry (1996) noted that the terms “distance education” or “distance learning” have been applied interchangeably by many different researchers to a great variety of programmes, providers, audiences and media. Berge (1998) however note that there is a difference between the term ‘distance education’ and ‘distance learning’. According to Berge (1998), distance education is seen as the formal process of DL, with information being broad in scope; e.g. college courses. DL however is seen as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. In addition, Gotschall (2000) described DL as a broadcast of lectures to distant locations, usually through video presentations.

5. Distance Learning, Interactivity and Feedback

Butler and Winne (1995) define feedback as information that a learner receives about his or her learning processes and learning outcomes. Moreover, Gagne (1985) mentioned that learners may find frequent feedbacks useful and feedback to learners may be essential to effective learning (Reiser and Dick, 1996).

DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Planning for adequate and useful feedback through web-based online assessments can lessen the DL instructor's feedback burden, hence, improving co-learner interactions within the DL settings. Moreover, according to Ley (1999), without a feedback system in place, distance students engage in learning under the handicap of inadequate or no feedback at all. In traditional distance education settings, learners are often left to go through the process of learning in isolation with very little contact with tutors and peers, thus are confined to basic, 'static' interaction with material delivered through one-way media in the form of printed text, audio cassettes and/or video (Karaliotas, 1998). In addition, according to Karaliotas (1998), with the advent of new media and technologies, the use of affordable and well integrated two-way communication is now possible in distance learning, which in turn enables dynamic interactions.

According to Moore (1989), interactions take place in the learning environment in three ways; e.g. (i) with contents, (ii) with other co-learners and (iii) with instructors. This particular research concentrates more on the interactivity between co-learners in a DL setting. Karaliotas (1998) mentioned that DL environments offer plenty of opportunities for interaction with other learners, far more likely to be productive and complete than in traditional HE learning environments as they are independent of time and place due to their asynchronous nature, and more in line with the learning to learn process as they can be highly motivated and goal oriented. Interaction with learners takes place within collaborative activities, in threads of sociable exchanges, or philosophical and self-searching discussions. They are generated as; (i) asynchronous, Bulletin Board System (BBS) and email interactions and (ii) real-time moo and chat interactions. Asynchronous, BBS and email interactions seem to offer a more in depth discourse as responses are spread over time, to the convenience of the participants, while real-time, moo and chat interactions offer a fuller experience and rich content for a later asynchronous follow-up.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). Online interactions take into consideration the characteristics of the learners as well as the communication technology. The interactive features of the current computer-mediated communication (CMC) systems, such as two-way video and instant feedback, have provided more options for learner interactions. Moreover, Gunawardena *et al* (1998, pp. 141) have interpreted interaction as "the process through which negotiation of meaning and co-creation of knowledge occurs in a constructivist learning environment". Wagner (1998) however argues that interaction can serve as a means to an end of enhancing learning and performance. Learner interactions require planning and structure in order to achieve the goal of active learning. According to Rohfeld and Hiemstra (1995), tasks such as debates, guest lecturers/discussants, polling, brainstorming, or student moderated discussions via CMC networks can help to increase student interactions for learning. The principles of student-centered discussion accord the students the responsibilities of facilitating online conversations. When the activities and tasks become an integral part of the learning process, learner interactions can be conducive to learning (Chou, 2000). This is where this research emphasises that web-based online assessment would be able to help enhance co-learners interactions within a DL setting.

6. Assessment

In addition to interaction and feedback, assessment is also considered an indispensable part of teaching and learning (Govindasamy, 2002). It can be considered as a way of interaction and providing feedback from the instructor to the learner and a medium for the co-learners to interact with each other. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al*, 2007). This is especially more important in a DL programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen *et al*, 2007).

According to Govindasamy (2002), assessment is typically divided into two types, namely the summative assessment and formative assessment. While summative assessment is used to grade students to demonstrate students' achievement and involves in making a final judgment of the students' achievement relative to the predetermined objectives; formative assessment is used as a diagnostic tool for students and teachers to identify and improve areas of weakness (Williams, 2000). In short, the purpose of a summative assessment is to justify students' grades and a formative assessment help to gather information on what students know and what they can do.

Many researchers (Brown and Knight, 1994; Buchanan, 2000; Henly, 2003) have emphasised the importance of formative assessment in student learning achievement. A learning environment with formative assessment has numerous benefits for learners. Many studies indicate that integrating the DL environment with web-based assessment have positive results (Velan *et al*, 2002; Henly, 2003). Formative assessments refer to activities that are used to help students learn, e.g. short tests and quizzes, question and answer in a lesson, assignments, homework and so on. Buchanan (2000) showed that a web-based formative assessment strategy is able to improve student learning interest and scores. Formative assessment is often done at the beginning or during a programme, thus providing the opportunity for immediate evidence for student learning in a particular course or at a particular point in a programme.

Summative assessment is what students tend to focus on. It is the assessment, usually on completion of a course or module, which says whether or not you have "passed". It is usually undertaken with reference to all the objectives or outcomes of the course, and is usually fairly formal (<http://www.dmu.ac.uk/~jamesa/teaching/assessment.htm>) and comprehensive in nature which provides accountability and is used to check the level of learning at the end of the programme (<http://www.provost.cmich.edu/assessment/toolkit/formativesummative.htm>). For example, if upon completion of a programme, students will have the knowledge to pass an accreditation test, taking the test would be summative in nature since it is based on the cumulative learning experience. Programme goals and objectives often reflect the cumulative nature of the learning that takes place in a programme. Thus the programme would conduct summative assessment at the end of the programme to ensure students have met the programme goals and objectives and attention should be given to using various methods and measures in order to have a comprehensive plan. Summative assessments can be seen as necessary for accountability and guiding instructions, whereas formative assessments are necessary for learning.

Efforts to implement DL will eventually move towards total automation of administrating the teaching and learning processes by means of a software known as Learning Management Systems (LMS). According to Govindasamy (2002), generally LMS include test builder tools that automate the process of authoring questions. In addition, most of these tools offer easy-to-use templates for authoring

automatically scored questions; e.g. multiple-choice questions (MCQ), true/false questions (TFQ), matching questions (MQ), or short answer questions (SAQ). However, essay questions, projects, assignments, and case studies have been totally omitted, yet this should not be taken to mean that these forms of assessment are not needed to perform valid and reliable assessment, as computer marked assessments alone are not appropriate for marking or giving feedback.

Having additional developers of current LMS were probably driven by technology in choosing the question builders to be included in the system (Govindasamy, 2002). Creating quiz questions, possible answer options, assigning weights to the answers, automatically scoring the answers, and programme appropriate feedback for different answers provided by learners require a working knowledge of HTML, Java Script, and other programming languages. This is definitely too much to expect of instructors, therefore, the developers of the LMS probably felt it was necessary to provide instructors with these tools. In order to assess students by means of projects, case studies, assignments, and other artefacts of learning, what the instructor would normally do is to post the message on the bulletin board. Students would then be able to complete their assignments and submit their work to the instructor via e-mail or upload it as a web page for the instructor to assess manually (Govindasamy, 2002).

Upon receiving ‘non-standardised’ comments from tutors, students would then be encouraged to discuss the comments made with other co-learners within the DL community through discussion board participations and other medium of interactions. This is considered as a way to encourage co-learner interactions within the DL settings. Even while in the process of completing the projects, case studies, assignments and other forms of assessments, students are encouraged to discuss and interact with other co-learners within the DL community.

7. Web-Based Assessment Tools Available For DL

Educators usually spend a lot of time in creating assessments to measure students’ knowledge and comprehension. Among the advantages of educational technologies are the web-based assessment tools made available to provide feed-back and improve co-learner interactions listed as follows (Ley, 1999):

- *Discussion board participation*
According to Savage (1999), students seem to perform better when the discussion boards (or asynchronous communication) are required, where participation is ‘rewarded’ by a grade. This incentive of a grade brings a higher level of participation to the discussion, where students engage in dialogue begun by the instructor but often taking off on its own soon after (Greenlaw and DeLoach, 2003). Moreover, students then become co-constructors of the materials, examine alternative viewpoints and reach a consensus on a topic together (Greenlaw and DeLoach, 2003). Hence, discussion board participations can be seen as a mechanism in improving the interactions between co-learners within the distance learning settings.
- *Online quizzes*
Online quizzes enables the instructor to regularly assess student understanding of the materials presented (Martyn, 2003), thus keeping the instructor on track of the students’ performance.
- *Electronic paper and project submissions*
Paper and project submissions can be performed using the Digital Drop Box, or file sharing. By submitting the paper electronically, students do not have to make physical contact with a particular location in order to submit, and, there is less chance of the instructor losing the paper (Ley, 1999). In

addition, an electronic receipt is automatically generated when the instructor receives the submission, enabling accurate records to be kept of who submitted the assignment and when (Thomas *et al*, 2002).

- *Reading outside of the assigned textbook (including hyperlinks and electronic formatted documents)*
By posting hyperlinks to sources of information, and labelling them as required or recommended, the instructor can share these sources of information with students very quickly and easily at any point during the course (Horton, 2000; Palloff and Pratt, 2001). This therefore also encourages discussions and interactions between co-learners on the topics and information shared by the instructor.

The internet also offers helpful resources that can be used to reduce the time it takes to create rubrics for projects, experiments, portfolios, and other performance-based items. There are also online resources to generate traditional, formative and summative assessments such as True/False and multiple choice questions.

8. Web-Based Assessment Tools within the School of Built Environment, University of Salford.

Based on the case studies conducted on the two DL Master programmes within SOBE, the following results have been achieved:

8.1 MSc 1

This programme delivers lectures through “Horizonwimba” and corresponds with the distance learners through emails generally. “Horizonwimba” is being used to accommodate for the need of using audio and visual modes of communication between the tutor and the learner. The visual and audio communication is accomplished through a web conferencing based system capable of establishing video and audio based communications between the tutor and the learner. It uses the voice transfer, application transfer and chatting facilities to deliver synchronous lectures. One of the problems both tutors and learners encounter in utilising web conferencing is the time that it takes to learn the various functionalities of the tool (Keraminiyage *et al*, 2006).

As mentioned in the previous heading, electronic paper and project submissions are seen to be one of the web-based assessment tools made available to provide feed-back and improve co-learner interactions. This programme has adopted written coursework comprising legal scenarios as a method of assessment which students will then submit via Blackboard (Bb) once completed. Any questions or enquiries regarding the coursework can be discussed with the DL tutor through email. There was no emphasis on co-learners interactions when deciding on the method of assessment to be implemented for this programme. Although this type of assessment is considered to be one of the web-based assessment tool available; it does not really encourage co-learners interactions unless if the DL tutors promotes the students to discuss and interact with co-learners by starting up a discussion forum in conjunction with the coursework in a discussion board or any other means of communication medium.

According to the DL tutor, no other web-based assessment tools have been used within this programme. There have been reports from students regarding the late feedback that they get back from the DL tutors. From the interview conducted, the DL tutor suggested that co-learners interactions through web-based assessment tools could be improved by conducting more group work assignments, support more interactions and discussions through discussion boards, emails and chat rooms.

8.2 MSc 2

This programme is taught via the internet with support that takes the form of an induction and other events such as networks that are all optional, plus a summer school that has a compulsory attendance requirement. Lecture materials are presented in accessible format which comprise text, diagrams and drawings (for which descriptor alternatives are available) and video presentations (for which audio and text captioning are available). Tutor support is provided via online tutorials, group discussions and individual communication (i.e. through email). Learners not only can engage with other co-learners formally through tutorials and threaded group discussions but also informally through the student common room. The discussions and tutorial support will be both synchronous and asynchronous.

The method of assessment for this programme is designed to evaluate the student's abilities in achieving the intended learning outcomes for the module. During the start of the module, students will be provided with details of learning activities and assessment dates. Students then participate in learning activities and non-assessed formative feedback will be provided to them during the module to assist with motivational reinforcement. For each module, students will be required to complete a piece of end assessment and the nature of this varies according to the module. In one of the modules, students' work will be authenticated by practical assessment through an access appraisal and audit. The end assessment is considered as an electronic paper and project submission as submissions

Based on the information given by the DL tutor, although it is found that no specific web-based assessment tools have been used for this programme, interactions between co-learners is basically encouraged through tutorials and threaded group discussions as mentioned before, as well as interacting through the student common room. This is inline with the web-based assessment tool made available to provide feed-back and improve co-learner interactions as mentioned by Ley (1999).

9. Conclusion and Way Forward

The literature review along with the findings from the initial interviews done on DL programmes within the School of Built Environment, University of Salford, UK have provided the methodological basis for this paper.

Most of the DL programmes within SOBE delivers lecture materials in accessible format which comprise text, diagrams and drawings (for which descriptor alternatives are available) and video presentations (for which audio and text captioning are available) through online environments such as the "Horizonwimba". The delivery methods currently used within the programmes are both synchronous and asynchronous. The result from this research identifies that there is a lacking in the implementation of specific web-based assessments tools within the DL settings.

Based on the in depth literature, web-based assessments tools have been found to help improve co-learners interactions within DL settings. Most DL programmes have just gone for the traditional assessment method, which is the written coursework due to lack of emphasis on co-learners interactions when deciding on the method of assessment to be implemented. Co-learners interactions within this method of assessment could be improvised by encouraging learners' interactions and discussions through discussion boards, chat rooms, etc. Written coursework could also be done as a group work instead of individual.

Further interviews will be continued within SOBE for all the other DL Master programmes to enhance the guidelines in improving co-learner interactions within DL settings. The next phase will concentrate on

other schools, faculties at University of Salford and finally on other universities in the UK. As part of this research initiative, results obtained will be disseminated and shared.

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REPORT ON THE TEACHING AND LEARNING ASSESSMENT WORKSHOP

REPORT ON THE TEACHING & LEARNING ASSESSMENT WORKSHOP

Session 1: ONLINE/ e-ASSESSMENTS

30th June 2008 (9:00AM – 11.15AM)

1. Introduction

This document represents a report on the Teaching & Learning Assessment Workshop conducted on the 30th June 2008, entitled “Online/ e-Assessments.”. This workshop was conducted as part of the Scholarship week of the School of the Built Environment. The main objective of this session was to disseminate some of the important findings of the Teaching and Learning Quality Improvement Scheme (TLQIS), titled: “Improving Co-Learner Interactions through Web Based Online Assessments within Distant Learning Settings” project.

This workshop had managed to attract quite a large number of participants within the School of Built Environment (SOBE). The attendees were a balanced of support staff, as well as academic staff servicing the undergraduates, and postgraduates courses within SOBE. The main area of discussion was e-Assessments. Although this is the case, e-Assessments can be seen as not only useful and applicable to Distant Learning settings, but also for all full-time and part-time undergraduates and postgraduates courses.

2. Agenda Of The Workshop

The workshop was divided into a presentation session with four presenters, each with topics of discussions on types of ‘Online Assessments’; welcoming debates, and discussions on the subject matter.

- **Bingu Ingirige** presented on the TLQIS Project, findings from the TLQIS Project 1, which was the social outcomes in the delivery of the DL programmes. The social

outcomes from this project characterises the need for personalised learning environments, the need for appropriate guidance and support, face-to-face contact, body language, and the issue on response and feedback. Bingu also presented on e-Distance Learning, which highlights on the method of delivery, and describing on Horizon Wimba (a voice technology used for online interactive language teaching and learning). The TLQIS Project 1 was continued with a research entitled ‘Improving co-learner interactions through web-based online assessment tools’, under the TLQIS Project 2. This project was determined to find the link between web-based online assessment tools and how this could be used in improving co-learner interactions. Although having increased both synchronous and asynchronous mechanisms in facilitating delivery and assessments, there were still reports from most learning communities on the issue of isolation. Hence, web-based online assessments tools have been seen as an initiative in improving co-learner interactions. Bingu then presented a summary on the list of online assessments via pool manager in Blackboard, as well as their functionalities. In addition, Bingu did a presentation on how he conducted an assessment in one of his modules, and subsequently the results coming out of the assessment method implemented. There was also a discussion on the issues, strengths and enablers on the assessment implemented, and finally the problems encountered. A message from David Dowdle was also highlighted during this presentation (See Appendix A on David Dowdle’s slides on how to construct an online assessment on Blackboard).

- **Sharifah Khuzzan** presented on the findings based on the interviews conducted thus far under the TLQIS Project 2. Interviews were conducted within the School of Built Environment (SOBE), University of Salford, two other schools within the University of Salford, and 4 other universities within the UK. The aim of this research was to identify the followings:
 - Identify the currently available web based online assessment tools within DL;
 - Identify barriers in improving co-learner interactions within DL;
 - Formulate a methodology for linking online assessment tools with encouraging co-learner interaction;

- Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- Recommend appropriate guidelines for improvement both in terms of assessment tools as well as possible facilitator and learner interventions; and
- Disseminate results.

Although the main aim was to focus on programmes within the DL settings, a few interviews conducted were based upon full time programmes. The findings from these interviews could also be used in establishing and improving the types of assessments implemented within DL settings in improving co-learner interactions.

- **Brodie McAdams** presented on WIKIS and the possible use of WIKIS in online assessments. Brodie started his session by defining the term WIKIS, and promoting on how WIKIS could be used in helping improve co-learner interactions. Brodie had also presented the lessons that should be learnt from successful implementation of WIKIS. In this session, Brodie had also mentioned on how he was going to use WIKIS on his forthcoming modules, as well as the aim in implementing WIKIS within the modules.
- **Charles Egbu** presented a set of criteria in assessing discussion board contributions. This presentation comprises the key challenges faced in assessing discussion board contributions, faced by the students and staff conducting the module or programme. Charles gave an example of a module, and how the assessments were going to be conducted within the module. Within this presentation, a set of proposed assessments criteria were presented to be discussed and debated.
- **David Baldry** acted as the facilitator for the discussion.

3. Discussions and Way Forward

The workshop helped raised discussions on the areas that were presented; issues as follows:

No.	Description	Remarks
1.	<p><u>Highlights</u> A few discussions were highlighted during the session. Details of issues raised in the session are listed as follows:</p> <ul style="list-style-type: none"> • Would HorizonWimba (HW) be able to monitor large number of students’ interactions (students’ engagements)? • Assessments in General • Types of questions – there’s always an issue whether the right level of difficulty in the question has been set. • Multiple Choice Questions (MCQ) – there was an issue in the findings of the TLQIS project that MCQ types of questions were not really suitable for postgraduate Masters Level. • E-Discussion Forums • The attendees raised the issue on whether contributions on discussion forums should be marked, or not – within distant learning settings perhaps it is the way students interact with other co-learners, but what about full time programmes? • Workload – a lot of contribution to read and analyse 	<ul style="list-style-type: none"> • At the moment, SOBE has only licence for monitoring only 50 students at a time. The number of licence can be increased, but there was an issue of what help it would be. • The attendees were all quite satisfied with MCQ type of questions – reason being that it can also be at a certain level of critical thinking. • There was an issue raised, whereby students attending a full time programme in a traditional classroom setting that have interacted and participated in discussions in class not being marked for their contribution – should they be marked as well? • Has to have the right mechanism in marking the contributions/discussion s made by students – Prof. Charles Egbu presented a template for a possible marking scheme of an e-discussion forum. • To be discussed with the working group within

<p>2.</p> <p>3.</p>	<p><u>Discussions & Suggestions</u></p> <ul style="list-style-type: none"> • There was a suggestion to implement assessments based on the ‘American’ way, whereby students are given 3 assessments to complete, but only the best 2 out of 3 scores are taken into account. • There was a discussion on students’ IT literacy – something to find out. • A suggestion was made to open a ‘face book’ account in order to encourage communication and interaction between students/ learners. <p><u>Conclusion</u></p> <p>All the discussions and issues brought forward and highlighted during this session will be discussed further with the working group to be formed within the school.</p> <p>The session ended at around 11.15AM.</p>	<p>the school</p>
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4. Conclusion and the Way Forward

The final outcome of this workshop was to bring in all the issues raised in sub-heading 3 to a working group committee to be formed at the School level. One of the main issues to be considered upon is whether interactions to be encouraged within co-learners (especially on DL settings), are totally based on academic discussions, and interactions; or it can also be on other issues as well, as long as they interact with each other.

As a conclusion, the summaries of issues raised during this workshop are as follows:

- i) E-Discussion Forums – whether participations in e-Discussion Forums should be marked or not (DL and traditional face-to-face classroom settings). If yes, then a suitable scoring mechanism should be discussed in addressing this issue.
- ii) Types, level, and suitability of online assessments (MCQ, T/F, WIKIS, etc). The level of assessments for each modules or programmes should address the issue of suitability, in terms of level of difficulty, etc.
- iii) Numbers of online assessments that should be taken, and graded in encouraging participations from students.
- iv) Students’ IT literacy. This issue should be taken into consideration, as not all students are comfortable with using IT as a medium of interactivity.
- v) Use of ‘Facebook’ as means of interaction ‘tool’. This suggestion should be taken into consideration as a lot of people are using it nowadays, and it can be seen as a good medium of interaction, especially within DL courses.
- vi) Explore Horizon Wimba or alternative as a delivery tool – given the increasing student numbers for postgraduate courses

**ATTACHMENTS
FROM
ASSESSMENT
WEEK**

See attached pdf files.

CONFERENCE PAPER FROM IPGRC

Personalised Learning Environments: A Diagnostic Questionnaire for Construction

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Abstract: Learners learn in so many ways – by seeing and hearing; reflecting and acting; reasoning logically and intuitively; memorising and visualising, etc. Providing learners with learning environments that suit their learning style can have a positive impact on learning effectiveness. Due to this; many learning styles inventories and similar instruments have been defined in previous works which have attempted to ‘match’ learners’ learning styles with learning methods. However, literature findings have also established many flaws and criticisms on the existing inventories and similar instruments available in terms of reliability and validity, as well as the extensive research behind the models of learning styles. This paper looks into the process of amalgamating three existing models of learning styles; namely Kolb Learning Style Inventory, Honey and Mumford Learning Style Questionnaire, and Felder and Solomon Inventory of Learning Style, to develop a newly proposed learning style inventory to be known as the ‘Diagnostic Questionnaire’. This ‘Diagnostic Questionnaire’ amalgamates similar characteristics of learning styles of the three models and teases out four core learning styles (identified as Learning Style A, B, C and D), the rubrics of which will then be mapped into a Personalised Learning Environment prototype. This paper reports on findings to date in the development of the ‘Diagnostic Questionnaire’.

Keywords: learning styles inventories, models of learning styles, Diagnostic Questionnaire, Personalised Learning Environment prototype.

Introduction

While learning styles (LS) and their effect have been mentioned as a complex research field (Coffield *et al*, 2004); these individual differences are still considered to be important in the field of education (Manochehr, 2006). Research on LS has consistently shown that incorporating personality attributes (i.e. learning styles) into delivery media can significantly improve the learning process (Dwyer, 1998). Moreover, a study undertaken by Lindsay (1999) found that a match between learning styles and teaching style increases a learner’s achievement and satisfaction. Although there have been issues whereby some psychologists (Holodnaya, 2002) consider learning in mismatched conditions in some cases to be beneficial in the sense that it helps to develop new skills; it is also considered that the application of LS in the wider context of learning per se needs further research (in order to fully appreciate the nuances and interrelationships further).

Even though the LS theory is widely accepted amongst educational theorists in the context of traditional classroom environments, there is still little research done on the adaptation to individual styles in an e-Learning environment. In view of the fact that e-Learning has influenced a great deal in the field of teaching, training and development, and has augmented a growing number of courses over the web, with an increasing number of students (Chang, 2001); however, LS have not yet been fully incorporated into these environments.

This paper describes the development of a Diagnostic Questionnaire (a newly enhanced LS inventory). This questionnaire will later be mapped into a Personalised Learning Environment (PLE) prototype. As such, first time users accessing an e-Learning module will undergo this questionnaire to be directed into their own personalised learning environment. This paper will only highlight the development part of the questionnaire and not the PLE prototype.

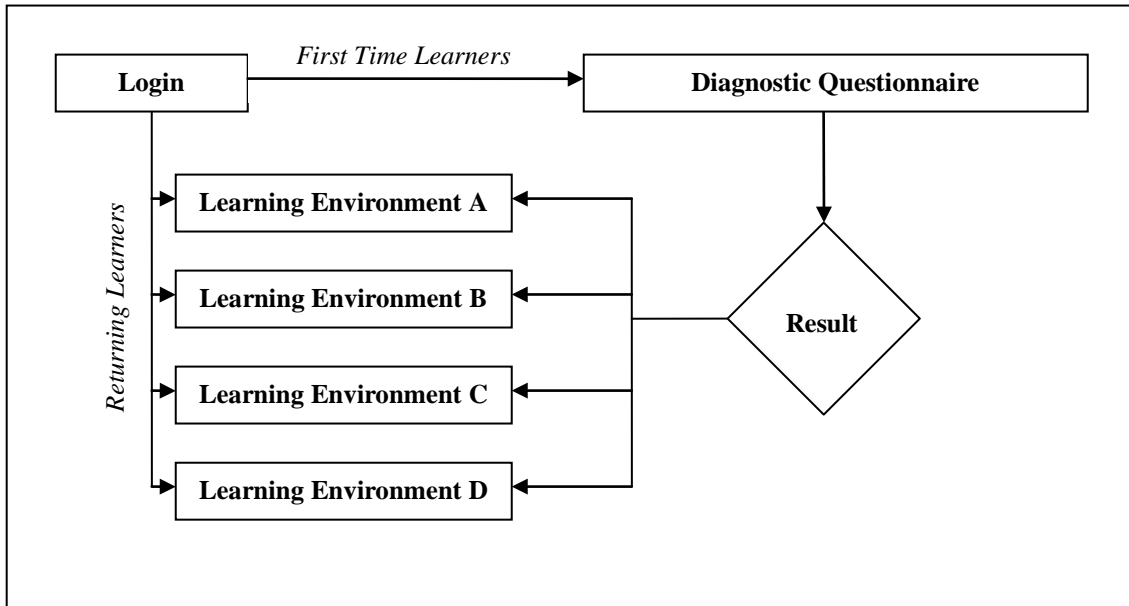
Background Research

There is no single way to describe learning styles, as a number of definitions appear in the literature (Sampson *et al.*, 2002). For example, Conner (2005) defines learning styles as “...the ways you prefer to approach new information”. Kolb (1976) saw learning styles as “the unique learning method presented by the learner during the learning process and situation” while Dunn (1990) described learning styles as “...the way each learner begins to concentrate, process and retain new and difficult information”. In addition, Honey and Mumford (1992) defined learning styles as “....a description of the attitudes and behaviour which determine an individual’s preferred way of learning”. Moreover, Felder (1996) describes learning styles as “a person’s characteristic strengths and preferences in the ways they take in and process information”.

However, the aim of any e-Learning programme is to help learners achieve the prescribed learning objectives (Larocque and Faucon, 1997). Thus, in a traditional classroom environment, the instructor is present to guide the learners towards the objectives through a variety of teaching strategies and learning activities; which is the opposite of e-Learning. Due to the independent learning in e-Learning, the learners need to be more self-motivated and self directed in order to achieve the objectives of the programme; therefore, the responsibility for learning is transferred from the instructor to the learner (Martinez, 2002). In this context, there is no single right way to teach; many instructors naturally confine their teaching to the method that reflects their own learning style to the exclusion of others (Entwistle, 1981; Davidson *et al.*, 1999). Smith and Kolb (1986) argued that learners may reject a learning environment that does not match their learning styles. Williams (2004) supported this by pointing out that designing a learning environment that accommodates learners’ LS is essential for effective learning.

A number of systems have been implemented recently to provide support for LS; whereby the implementers of the systems choose a particular model of learning styles and implement the corresponding LS into their systems (Stash *et al.*, 2004). In the context of this research, it was felt that the module within an e-Learning environment would be enhanced by adopting a model of learning styles which better reflect the learners’ needs. Upon the formation of the newly proposed model of learning styles, a Diagnostic Questionnaire was developed to classify a learner’s LS preference. This questionnaire was developed on the theory that each learner has an individual learning style profile (Wolf, 2002) and that learning styles are somewhat stable.

Figure 1 shows the conceptual approach of the PLE prototype. This is presented to first time learners only. Upon completion of the Diagnostic Questionnaire, learners are directed into one of four learning environments (A, B, C or D).

Figure 1: Overall Flow of the PLE prototype

Research Methodology

The research methodology approach adopted for this paper embraces the distillation of core research material gathered from a detailed literature review. The literature review encompassed concepts and issues surrounding the development of a learning style inventory (Diagnostic Questionnaire), specifically within the context of the management and social sciences fields. A qualitative approach was used in this research, as this was considered more suitable for studying social and cultural phenomena (Berger and Luckman, 1966). The development of this questionnaire is divided into three stages. The first stage explores the families of LS as defined in the literature and identifies three models of LS based on the criteria set by DeBello (1990). Each characteristic of learning styles within the three models were identified. The second stage of the development amalgamates the similar characteristics of learning styles within the three models; teasing out 4 core themes (identified as Learning Style A, B, C and D). The final stage forms questions for each of the 4 core themes of LS. This questionnaire comprises of 24 questions; 6 for each core themes of LS.

Learning Styles Instruments

According to Hayes and Allinson (1996), Learning Styles Inventories and similar instruments are commonly used to match learners' learning style with learning methods. There are several different instruments for measuring individuals' learning styles (Kovačić, 2004). In the 1960s and 1970s, a number of instruments for measuring learning styles began to emerge (Williams, 2004); which most are based on self-analysis and learners' perceptions of how they learn. The learning style instruments are fairly concise and simple to complete. According to Williams (2004), some learning style theories have been the subject of debate, and their validity has been questioned. From the early 1970s onwards, a wide variety of instruments for measuring a learners' learning style preferences were developed – for example:

- Cranfield Learning Style Inventory (CLSI) – a 30 item instrument that measures a number of variables including preferences for listening, reading, iconics and hands-on-experience (Coggins, 1988).

- Kolb Learning Style Inventory (Kolb-LSI) – a 12 item self-scoring instrument in a form of ‘tick and flick’; defining four learning styles: diverging, assimilating, converging and accommodating (Kolb, 1984).
- Honey and Mumford’s Learning Style Questionnaire (H&M-LSQ) – which builds upon Kolb’s LSI; defining four learning styles: activist, reflector, theorist and pragmatist (Honey and Mumford, 1992).
- Gardner’s Multiple Intelligence – a 70 question multiple intelligence test.
- Felder and Solomon’s Index of Learning Styles (F&S-ILS) – a 44 item questionnaire which builds upon the Felder and Silverman model of learning styles

Coffield *et al* (2004) identified 69 models of LS that were “worthy” of consideration and further divided the family of learning styles into five main categories (Coffield *et al*, 2004). Nevertheless, the competing theories and techniques of measuring LS and the effectiveness of such measures are varied and contested that simple choices about the most suitable one are difficult to substantiate (Coffield *et al*, 2004). Moreover, for some researchers, a reliable and valid measure of learning styles has not been developed; and for some, the perfect learning style instrument is just a fantasy. Furthermore, Maochehr (2006) mentioned that not all researchers and writers agree with all the available models of LS. Due to these reasons, this Diagnostic Questionnaire is considered as a viable initiative in trying to fill in the gaps within the existing learning styles instruments available.

Criteria in Considering a Model of LS for the Diagnostic Questionnaire

According to Coffield *et al* (2004), it is difficult to teach students if we do not know what their learning preferences are. In this context, this questionnaire aims to identify a learner’s learning style preference.

The questionnaire was formed by amalgamating three models of learning styles determined from the literature; namely Kolb’s model of LS, Honey and Mumford’s model of LS and Felder and Silverman model of LS. It was formed with the basis that a learning style comprises the following activities:

- Perceive and process information (Kolb-LSI) (Kolb, 1984)
- Process and Organise information (H & M-LSQ) (Honey and Mumford, 2006)
- Process and Receive (or Remember) information (FS-ILS) (Felder and Solomon, 1988)

For the benefit of the readers, the three core model of learning styles were identified after a detailed synthesis of the literature review. These were considered the most suitable for this research as being the most cited and commonly used in a web-based learning environment; i.e. INSPIRE (Honey and Mumford model of LS), CS388, LSAS and Tangow (Felder and Silverman model of LS) (see Stash *et al*, 2004 for full detail). These models have been also successfully implemented in traditional classroom scenarios. The models were also chosen based upon the criteria as outlined in Table 2. These models were then amalgamated based upon their similarities in characteristics. According to DeBello (1990), there are a few factors that have to be considered before deciding on a LS instrument; such as (see Table 2 for details):

- i. Is the model and instrument reliable and valid?
- ii. Is there widespread practitioner use?
- iii. Is there extensive research behind the models?

Diagnostic Questionnaire Functionality

The rubrics and augmentation of the Diagnostic Questionnaire aimed to function as a learning styles inventory test which is formed to diagnose a learner’s learning style preference. This was

developed from the amalgamation of three models of learning styles; namely Kolb model of LS, Honey and Mumford model of LS and Felder and Silverman model of LS. The amalgamation of the three models teased out four core themes of learning styles; identified as Learning Style A, B, C and D.

The main outcome of this questionnaire is to direct learners to an environment which ‘better’ suits to their own learning preference. Kwok and Jones (1995) have also carried out an experimental study with a computerised ‘front-end’ study preference questionnaire in order to suggest to the user a suitable navigation method through the system. As a result of their study; they found that students at the far extremes of the learning style spectrum needed the navigational guidance, and it helped them raise their interest in the materials.

Following also the theory of learning styles (Entwistle, 1988; Kolb, 1984; McLoughlin, 1999), how much individuals learns, i.e. the effectiveness of instructional manipulations, is mainly influenced by the educational experiences geared toward their particular style of learning. This questionnaire therefore serves as a ‘one-off’ activity whereby only first time learners would have to fill in all the questions to enable the system to capture and store their learning preference. This will form a ‘front-end’ to the PLE prototype that will be developed in the later stage of this research.

Development of the Diagnostic Questionnaire for Learning Styles

Upon choosing the three models of LS, the overall development process of the Diagnostic Questionnaire was divided into the following three stages:

Development Stage 1:

Identification of the types of learning styles for all the three models of learning styles and each of their characteristics.

Development Stage 2

Identification of similar characteristics of each learning styles in the three models and amalgamating them together, teasing out four core themes (identified as Learning Styles A, B, C and D).

Development Stage 3

Identification of questions within the four core themes and constructing new questions which covers all three models (examples taken from Kolb-LSI, H&M-LSQ and F&S-ILS).

Table 1: Justification for Choosing Kolb-LSI, H & M-LSQ and FS-ILS (based on the criteria set by De Bello, 1990)

Criteria	Kolb-LSI	Honey & Mumford-LSQ	Felder and Solomon-ILS
Reliability/Measurability	<ul style="list-style-type: none"> • Changes to the instrument have increased its reliability (Coffield <i>et al.</i>, 2004) • Is respected for its validity and reliability (Brock and Cameron., 1999) 	<ul style="list-style-type: none"> • The face validity of the LSQ is not in doubt (Coffield <i>et al.</i>, 2004) 	<ul style="list-style-type: none"> • Reliable in detecting preferred learning styles among students (Zywno, 2003) • Zywno (2003) and Livesay <i>et al</i> (2002) concluded that their reliability and validity data justified a claim that the ILS is a suitable instrument to measure learning styles.
Validity	<ul style="list-style-type: none"> • The validity of the LSI version 1985 scale is much higher than the 1976 version (Leonard <i>et al.</i>, 1999) 	<ul style="list-style-type: none"> • Given its popularity amongst British trainers and developers, the LSQ should be enhanced to show stronger construct validity (Swales and Senior, 1999) 	<ul style="list-style-type: none"> • Has good validation results (Zywno, 2003)
Use in Research	<ul style="list-style-type: none"> • Kolb's model has been widely used to measure learning styles (Duff and Duffy, 2002) • Use of the LSI in more than 150 studies by the turn of the previous decade (Geiger, 1991). • The theory which has received the most attention in the management literature (Furnham, 1992) 	<ul style="list-style-type: none"> • Since its development, the LSQ has attracted considerable interest, application and research (Coffield <i>et al.</i>, 2004) 	<ul style="list-style-type: none"> • The instrument has been widely used in research and tested (Kovačić, 2004)
Extensive Research Behind Models	<ul style="list-style-type: none"> • Has widespread support, and further psychometric investigation of the instrument in various forms (Honey and Mumford, 1992, etc) 	<ul style="list-style-type: none"> • The LSQ has been widely applied in the fields of management training and education (Duff and Duffy, 2002) • Being used in educational and psychological research as a valid measure of learning style (Furnham, 1992) 	<ul style="list-style-type: none"> • Most appropriate model for hypermedia courseware and used very often in in research related to learning styles in learning technologies (Carver <i>et al.</i>, 1999)

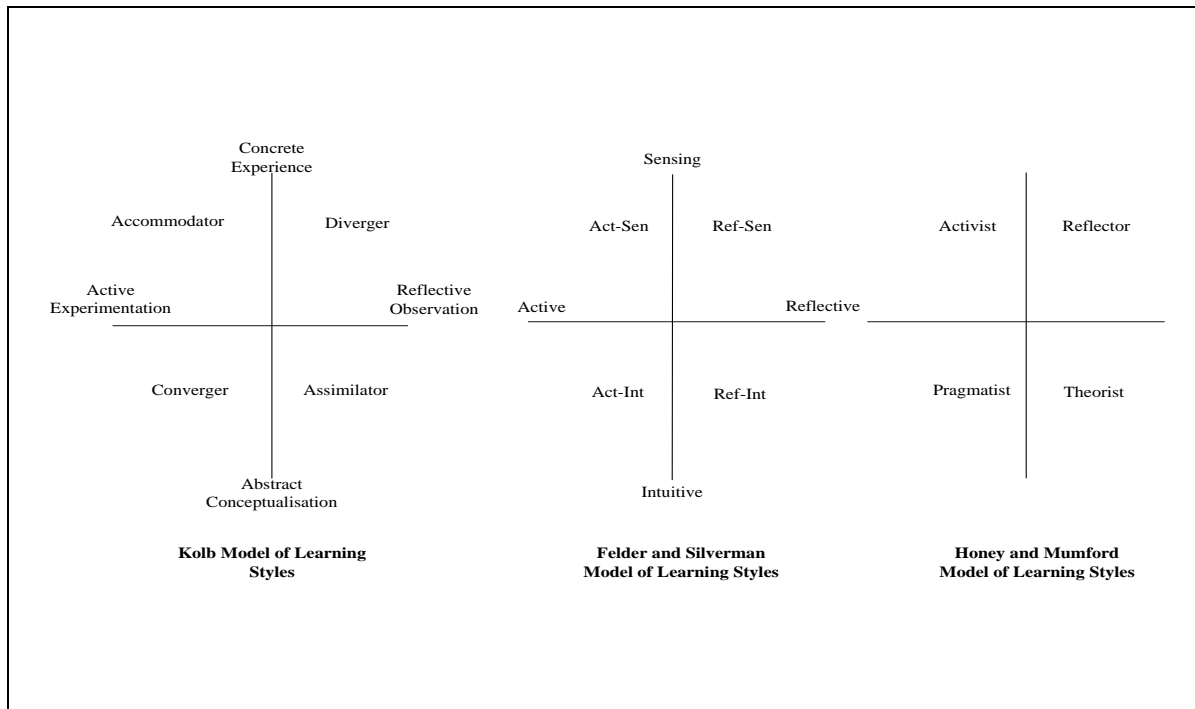
Development Stage 1

The first stage in the development of this questionnaire was to identify and understand all the learning styles for the three models of learning styles; subsequently to identify their characteristics. In Kolb’s model of LS, four types of learning styles were identified; namely (i) converging learning style (a combination of abstract and active), (ii) the diverging style (a combination of concrete and reflective), (iii) the assimilating style (a combination of abstract and reflective) and (iv) the accommodating style (a combination of concrete and active) (See Figure 2).

Honey and Mumford’s model of LS was produced in 1992 after spending four years experimenting with different approaches to assessing individual differences in learning preferences. This model’s link with Kolb’s work remains strong (Coffield *et al.*, 2004) as it is connected to a revised version of Kolb’s experiential learning cycle. And perhaps due to this reason, Honey and Mumford’s model of LS have also identified four types of learning styles; namely (i) activists, (ii) reflectors, (iii) theorists and (iv) pragmatists (see Figure 2).

Felder and Solomon ILS is used to determine the learning styles that have been identified in the Felder and Silver model of LS. There are four axes to assess learners in the F&S-ILS; namely (i) whether a learner perceive information better visually or verbally, (ii) does a learner progress towards understanding globally or sequentially, (iii) whether a learner prefers sensory or intuitive types of information; (iv) does the learner prefer to process the information actively through engaging in physical activities or discussions or reflectively – through introspection (see Figure 2). In this scope of research, the axes that have been put into consideration are how the learners process and receive information.

Figure 2: Kolb, Honey and Mumford and Felder and Solomon Model of Learning Styles

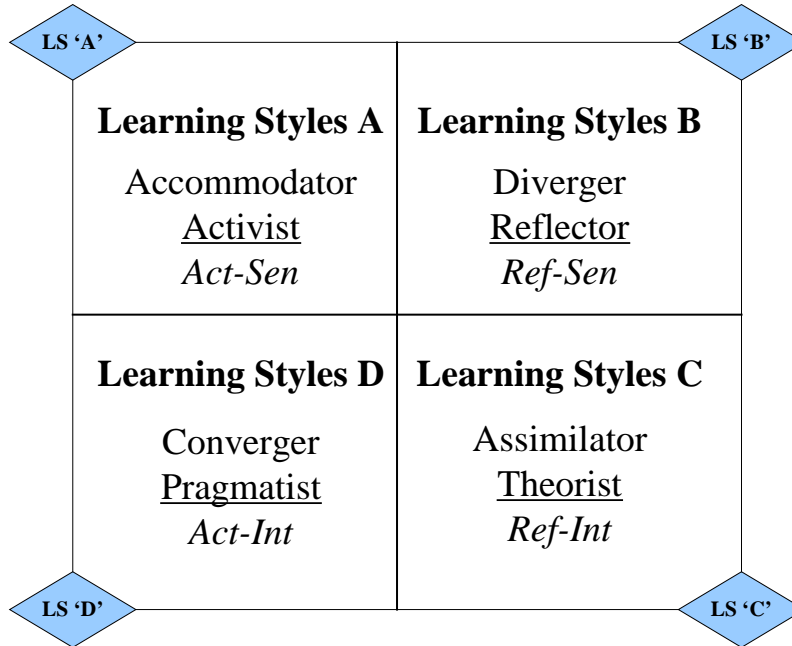


Each learning styles from the three models of LS were identified and disaggregated in detail.

Development Stage 2

This stage identifies similar characteristics of each LS within the three models of LS. Each similar LS were grouped together and amalgamated according to their suitability; teasing out four core themes (identified as LS A, B, C and D). Figure 3 shows the amalgamated/synthesised model, the abstract conceptualisation of which shows the four core themes, i.e.; (i) Accommodator, Activist, and Active-Sensing (LS A), (ii) Diverger, Reflector, and Reflective-Sensing (LS B), (iii) Assimilator, Theorist, and Reflective-Intuitive (LS C), and (iv) Converger, Pragmatist, and Active-Intuitive (LS D).

Figure 3: Amalgamated/synthesised model-abstract conceptualisation
 (adapted from Kolb, 1984; Honey and Mumford, 2006; and Felder and Silverman, 1988)



Based on the amalgamated/synthesised model shown in Figure 1, the characteristics of each core themes were then identified. Each core theme was classified with a specific characteristic of learning styles. See Table 2 for each of the characteristics of the core themes.

Table 2: Learning Styles Characteristics formed for the New Proposed Model of LS

LS Core Themes	Learning Styles Characteristics formed for New Proposed Model Of LS
A	<ul style="list-style-type: none"> • Likes to have a go on things spontaneously and try out • Likes direct independent actions (based on personal believes and feelings) • Likes to be in the centre of attention; but may learn better by themselves • Accepts failure as part of an experience in the learning process – look forward. • Outgoing and enthusiastic – likes to explore complexities, crisis and excitement • Bored by details (don't like repetitions) – likes new opportunities and experiences
B	<ul style="list-style-type: none"> • Likes to think in detail before taking any actions - prefer a thoughtful approach and thorough evaluation • Very patient with detail – very careful when it comes to work • Likes to listen and observe • A low profile person when learning in groups; prefer to work alone • Likes repetition in learning • Prefer to discuss specific issues as opposed to engaging in social discussions

C	<ul style="list-style-type: none"> • Likes logical ideas, theories and concepts • Likes organised and structured understanding – prefers materials that are fundamentally understanding • Likes to see the overall picture first; then pay attention to the details (very patient with details) • Likes focused and structured situation with a clear purpose – can define problems and propose possible solutions • Prefer logical and thoughtful ideas – likes logical presentation of ideas • Tend to be a perfectionist – very careful and serious with details
D	<ul style="list-style-type: none"> • Believe in getting straight to the point • Likes learning materials to be short and to the point • Will do whatever that is necessary to get something done. • Likes to see how things work in practise; relevancy with what has been learnt • Considered a realist – like activities to be real; likes proven techniques • When learning something new, likes to engage in the activities rather than

Development Stage 3

The final stage of this development process formulates the questions within the four core themes. Six questions were formed for each core theme, adding up to a total of 24 questions. See Appendix A for details of the 24 questions. The process in forming the questions was considered critical, as it represents a certain level of appropriateness regarding a learner's preferred learning style. All 24 questions have been validated by three domain experts as part of the pilot study of this research. These 24 questions will subsequently be mapped into a Personalised Learning Environment prototype.

Conclusion and Way Forward

This paper described the development of a Diagnostic Questionnaire as an instrument to diagnose a learner's learning style preference which will then be mapped into a PLE prototype (as a strategy to accommodate a combination of different learning styles in an e-Learning environment).

The results obtained from this questionnaire will be used to direct learners towards their personalised learning environment. The amalgamations of the three existing models of LS identified four core themes of LS. As a way forward, this questionnaire along with a short questionnaire survey was sent to three domain experts within the field of LS to provide feedback and views concerning:

- Questionnaire Content
- Questionnaire Validity
- Questionnaire Construct
- Questionnaire Format
- Type and level of questions used

Upon validation, the Diagnostic Questionnaire will then be 'mapped' into a PLE for further research and development work, including the augmentation to each of the four learning environments (A, B, C and D) identified at the outset of this paper.

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JOURNAL PAPER

Improving Co-Learner Interactions through Web-Based Online Assessments within Distance Learning Settings: Findings from Case Studies

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Abstract

Distance Learning (DL) is an educational model in which the student and instructor are separated by time and space is currently the fastest growing model of domestic and international education which has come into prominence during the last two decades of the 20th century. One of the major influencing factors for achieving intended learning outcomes in a programme is the assessment strategy adopted. Tutors in DL programmes have adopted various methods of assessments that could broadly be described as formative and summative assessments. A well documented formative and summative feedback for learners, especially early on in a course, will facilitate in their learning and provides opportunities for students to gain insight into their understanding of the course content. Learners often express their need for more empowerment within their modules to enhance their active involvement and interactions within the programmes. This is the main focus of this ongoing research under the Teaching Learning Quality Improvement Scheme (TLQIS) of the University of Salford.

This paper will firstly look into the literature within the area and set out the overall methodology of the paper. Then, through a survey of DL courses within the University of Salford and four other identified universities in the UK, it is intended to identify currently used web-based online assessment tools within the DL settings and other issues within the area in improving the co-learner interactions within the DL (e.g. *factors and barriers in improving co-learner interactions, gaps and flaws within the available tools, etc*). The result and conclusion from this paper will recommend guidelines in improving co-learner interactions within DL settings.

Keywords: Distance Learning (DL), co-learner interactions, web-based online assessments

1. Introduction

Advances in information technology (IT) is continually evolving; opening up additional channels for today's higher education (Chen *et al*, 2001), e.g. distance education technologies. Distance education technologies have become more prominent during the last decade of the 20th century (Ingirige *et al*, 2005). Moreover, Chen *et al* (2001) noted that the application of IT have allowed universities to deliver multimedia course contents and enable students to communicate with their instructors and fellow students in both synchronous and asynchronous formats; hence making distance learning (DL) possible. DL, an

educational model in which the student and the instructor are separated by time and space, is considered the current fastest growing model of domestic and international education (Poley, 2000).

Distance education had been around for more than a century, which according to Belanger and Jordon (2000, p.6), the history of technology-based DL was correspondence education, which started in Europe and the United States in the mid 19th century. Web-based technologies (WBT) in particular have expanded the interactive capabilities of distance education from solely asynchronous communications with long delays in response to highly interactive class meetings via text, e-mail, video and many more (Murphrey, 2001).

In the domain of higher education (HE) in the construction industry, DL has become a major source by which many HE institutes conduct their courses, particularly at postgraduate level. At the University of Salford, the School of Built Environment (SOBE) itself utilises the distance education technology tools in delivering Masters and PhD programme over the Internet (Ingirige *et al*, 2005). The new developments in technology have impacted the overall delivery process of the DL construction programme. It has been considered that one of the major influencing factors for achieving the intended learning outcomes of these programmes within an overall information and communication technology (ICT) enabled delivery process is the assessment strategy adopted.

Assessments can be considered as a significant way of interaction and providing feedback from the instructor to the learner and a medium for the co-learners to interact with each other. And, due to the significance of this area, SOBE received funding to conduct a one year study to improve the interactions of co-learners through web-based online assessments tools within DL settings through the Teaching and Learning Quality Improvement Scheme (TLQIS) within the University of Salford. This paper reviews literature within the field area and try to find gaps within the available tools and their capabilities in improving co-learner interactions.

This paper has been designed and structured as follows; first, it will describe the methodology adopted. Then, it will look into research problems and subsequently the literature within the area; e.g. definitions and characteristics of DL and enlisting available web-based assessment tools within the DL settings. Then, through two case studies of DL courses within the School of Built Environment, University of Salford, it is intended to identify currently used web-based online assessments tools within the DL settings and other issues within the area in improving the co-learner interactions within the DL. Lastly, this paper concludes by suggesting the way forward.

2. Methodology

The research methodology approach adopted for this paper embraces the distillation of core research material gathered from a detailed literature review. The literature review encompassed concepts and issues surrounding DL. Seven DL Master programmes and one Bachelors programme in total were looked into from the University of Salford and four other universities within the UK and used as case studies to achieve the following objectives:

- xi) To identify the delivery methods currently implemented within the DL settings;
- xii) To identify the methods of assessment currently implemented within DL;
- xiii) To identify the available web-based online assessment tools used within DL;
- xiv) Identify gaps within the available tools and their capabilities in improving co-learner interactions;
- xv) Identify barriers in improving co-learner interactions within DL;

Interviews were conducted with the DL tutors in achieving the above mentioned objectives. The result and conclusion from this paper will recommend the way forward in improving co-learner interactions within DL settings.

3. Research Problem

Learners often express their need for more empowerment within some of their modules to enhance their active engagement. With all types of learning, including web-based learning, it is useful for students to receive constructive, timely and relevant feedback on their progress even within DL settings. Therefore, a mix of computer marked and tutor marked essays could be adopted for summative assessments. Online marked assessment is sometimes constrained by the medium in which it is operating. Computer marked assessments alone are not appropriate for marking or giving feedback on assignments such as essays or projects that require more than the mere production of knowledge. With the increase of DL programmes being offered there has been a corresponding increase in both synchronous and asynchronous mechanisms being developed to facilitate these assessments (Dede, 1996; Wilson and Whitelock, 1997).

Despite addressing the needs of the programme in developing a regime of assessment strategies, most learning communities express a feel of isolation. However, barriers in the form of resource constraints, sometimes affect the provision of pedagogic requirements such as maintaining appropriate co-learner interactions within the masters DL programmes. This paper aims to address issues within the area in improving the co-learner interactions within the DL (e.g. factors and barriers in improving co-learner interactions, gaps and flaws within the available tools, etc) and proposing a way forward.

4. Distance Learning

4.1 Definitions and Characteristics

Several definitions have been cited for the term DL; among others; Majdalany and Guiney (1999) define DL as “instruction and learning practice utilising technology and involving students and teachers who are separated by time and space”. Jonassen (1992) defines DL as the volitional control of learning by the student rather than the distant instructor, while Perraton (1988) and Verduin and Clark (1991) define it as the separation of the teacher and the learner in space and / or time during at least a majority of the instructional process.

Hall and Snider (2000) characterised DL with three criteria; (i) a geographical distance that separates the communication between the trainer and the participant, (ii) the communication is two-way and interactive and (iii) some form of technology is used to facilitate the learning process. Keramiyige *et al* (2006) supported this view by considering the two significant characteristics of DL; which is (i) the distance between the tutor and the learner (either geographically or timely) and (ii) the learner centred learning mechanisms as opposed to the teacher centred learning in a traditional classroom based learning environment.

The additional characteristics of DL that has been discussed by Keegan (1986) include:

- The influence of an educational organisation both in planning and preparation of learning materials and in the provision of student support services; which distinguishes DL from the private study and teach-you programme;
- The use of technical media, print, audio, video or computer to unite teaching and learner and carry the content of the course;

- The provision of a two-way communication so that the learner may benefit or even initiate dialogue; a characteristic which distinguishes DL from the other uses of technology in education; and
- The quasi-permanent separation of the learning group throughout the length of the learning so that people are usually taught as individuals and not as groups, with the possibility of occasional meeting for both didactic and socialisation purposes.

There are many terms in relation to distance education and training, defined as follows in Table 1 (Du Mont, 2002):

Table 1: Definitions of Terms(Du Mont, 2002)

Term	Definition	Source
Asynchronous learning (sometimes referred to as Networked learning)	“A type of learning in which learners and instructors use computers to exchange messages, engage in dialogue and access resources” at any time and any place.	Commonwealth of Learning (2000) and Schocken (2001).
Distance education	“Planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques and special instructional techniques, and special method of communication by electronic and other technology, as well as special organisational and administrative arrangements.”	Moore and Kearsley (1996)
Distance learning	“Instructional and learning practice utilising technology and involving students and teachers who are separated by time and space.”	Majdalany and Guiney (1999)
Distributed learning	“Learning environment [which] exists among a dispersed student population, is structured according to learner needs, and tends to integrate traditional institutional functions (e.g. classroom and library)....through both synchronous and asynchronous communication.”	Oblinger and Maruyama (1996)
e-Learning	“Can be a subset of distributed learning. Relies on digital content, experiences through a technology interface, and is network-enabled. Collaboration is a desirable feature of e-Learning...”	Lundy, Harris, Igou and Zastrocky (2002)
Open learning	“An arrangement in which learners work primarily from self-instruction, completing courses structured around specially prepared, printed teaching materials, supplemented with face-to-face tutorials and examinations.”	William, Paprock and Covington (1999)

According to Du Mont (2002), definitions of DL exist which emphasise the *process* of educational and structure. Sherry (1996) noted that the terms “distance education” or “distance learning” have been applied interchangeably by many different researchers to a great variety of programmes, providers, audiences and media. Berge (1998) however note that there is a difference between the term ‘distance education’ and ‘distance learning’. According to Berge (1998), distance education is seen as the formal process of DL, with information being broad in scope; e.g. college courses. DL however is seen as the acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance. In addition, Gotschall (2000) described DL as a broadcast of lectures to distant locations, usually through video presentations.

5. Distance Learning, Interactivity and Feedback

Butler and Winne (1995) define feedback as information that a learner receives about his or her learning processes and learning outcomes. Moreover, Gagne (1985) mentioned that learners may find frequent feedbacks useful and feedback to learners may be essential to effective learning (Reiser and Dick, 1996). DL conditions usually constrain when, where and how DL feedback occurs, because feedback is a function of interactivity, and interactivity changes from traditional to DL environments (Wolcott, 1996). According to Ley (1999), an instructor in a traditional classroom can more easily interact with students by easily giving simple knowledge of result feedback with more complex feedback as students require or demand. In DL environments, most distance instructors lack the logistical support or the technology to return papers and answer questions during the same session.

Planning for adequate and useful feedback through web-based online assessments can lessen the DL instructor's feedback burden, hence, improving co-learner interactions within the DL settings. Moreover, according to Ley (1999), without a feedback system in place, distance students engage in learning under the handicap of inadequate or no feedback at all. In traditional distance education settings, learners are often left to go through the process of learning in isolation with very little contact with tutors and peers, thus are confined to basic, 'static' interaction with material delivered through one-way media in the form of printed text, audio cassettes and/or video (Karaliotas, 1998). In addition, according to Karaliotas (1998), with the advent of new media and technologies, the use of affordable and well integrated two-way communication is now possible in distance learning, which in turn enables dynamic interactions.

According to Moore (1989), interactions take place in the learning environment in three ways; e.g. (i) with contents, (ii) with other co-learners and (iii) with instructors. This particular research concentrates more on the interactivity between co-learners in a DL setting. Karaliotas (1998) mentioned that DL environments offer plenty of opportunities for interaction with other learners, far more likely to be productive and complete than in traditional HE learning environments as they are independent of time and place due to their asynchronous nature, and more in line with the learning to learn process as they can be highly motivated and goal oriented. Interaction with learners takes place within collaborative activities, in threads of sociable exchanges, or philosophical and self-searching discussions. They are generated as; (i) asynchronous, Bulletin Board System (BBS) and email interactions and (ii) real-time moo and chat interactions. Asynchronous, BBS and email interactions seem to offer a more in depth discourse as responses are spread over time, to the convenience of the participants, while real-time, moo and chat interactions offer a fuller experience and rich content for a later asynchronous follow-up.

Learners' abilities to interact with the instructor, the peers, and the content can affect their performance in DL. Acker and McCain (1993) mentioned that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (p. 11). Online interactions take into consideration the characteristics of the learners as well as the communication technology. The interactive features of the current computer-mediated communication (CMC) systems, such as two-way video and instant feedback, have provided more options for learner interactions. Moreover, Gunawardena *et al* (1998, pp. 141) have interpreted interaction as "the process through which negotiation of meaning and co-creation of knowledge occurs in a constructivist learning environment". Wagner (1998) however argues that interaction can serve as a means to an end of enhancing learning and performance. Learner interactions require planning and structure in order to achieve the goal of active learning. According to Rohfeld and Hiemstra (1995), tasks such as debates, guest lecturers/discussants, polling, brainstorming, or student moderated discussions via CMC networks can help to increase student interactions for learning. The principles of student-centered discussion accord the students the responsibilities of facilitating online conversations. When the activities and tasks become an integral part

of the learning process, learner interactions can be conducive to learning (Chou, 2000). This is where this research emphasises that web-based online assessment would be able to help enhance co-learners interactions within a DL setting.

6. Assessment

Assessment is an indispensable part of teaching and learning (Govindasamy, 2002). It can also be considered as a way of interaction and providing feedback from the co-learner (e.g. instructor) to the learner. Basically, assessment supports the learning approach a student adopts. According to Marcus (2006), a varied combination of assessment activities provides sufficient opportunity for the student to demonstrate learning, while several assessment options allow learners to respond to different evaluation strategies. The choice of assessment methods is an important decision in instructional design (Stephen *et al.*, 2007). This is especially more important in a DL programme, in which students often focus heavily on formal assessment requirements. In addition, assessment choices should support intended learning outcomes and also consistent with the desired learning approaches (Stephen *et al.*, 2007).

To most learners and teachers, the term ‘assessment’ is traditionally associated with the concept of tests, grades, reports, and standards (Bartley, 2006). The body of literature has revealed that there is an assessment movement in education, which has been evolving through cycles of reform and expansion (Herman *et al.*, 1992; Kulieke *et al.*, 1990; Lazerson *et al.*, 2000; National Research Council, 2001). Assessment has also been defined broadly, to include all activities that teachers and learners undertake to get information that can be used diagnostically to alter teaching and learning (Liang and Kim, 2004). The core to this definition is the notion of systematic process of gathering and interpreting information, in order to provide feedback (Bartley, 2006). Mac Alpine (2002) noted that assessment can also be described as a form of communication involving a number and variety of sources, such as:

- VI. assessments may be directed to the learners, as a form of feedback on their learning;
- VII. assessments may be directed to teachers, as a form of feedback on their teaching;
- VIII. assessments may be directed to the curriculum designer as a form of feedback towards the curriculum;
- IX. assessments may be directed to the administrator as a form of feedback on the use of resources; and,
- X. assessments may be directed to the employers as a form of feedback on the quality of applicants.

6.1 Online Assessments in the Online Learning Environment

Mason (1998) discussed the phenomenon of the online learning environment (in the context of this research is Distant Learning) for learning in relation to the three main elements of asynchronous group and individual messaging, access to course materials, and real time (synchronous) interactive events. One of the important considerations for effective online assessments is to ensure that the tool incorporates these elements, fits the mode of delivery, and legitimately measures the desired outcome. It has been identified that one of the main advantages of using assessment software over manually assessing performance is primarily the savings in cost and time (Dowsing *et al.*, 2000; Weisburgh, 2003). Online assessment is a method of using the Internet to deliver, analyse, and report exam content; and when appropriately used, it can enhance the efficiency of online learning (Bergstrom and Lopes, 2003).

Assessments in general can be classified into three broad categories, according to their general use (Bergstrom et al., 2006). They can be used prior to, during, and following learning (Swearingen, 2004), and classified as follows:

- IV. Diagnostic assessment
- V. Formative assessment
- VI. Summative assessment

Diagnostic assessment identifies learners' strengths and weaknesses, and can be used to identify specific personality characteristics or traits (e.g. motivation for success, personality type, etc), or allow individuals to self-assess their ability to complete a task or demonstrate knowledge of a particular subject area.

Formative assessments take place during the learning process. Formative assessments involve the delivery of multiple-choice or short quizzes administered at the end of a textbook chapter, learning module, or other learning benchmark in a course or training programme. Feedback is usually provided during or following the delivery of these assessments, and opportunities for self-remediation may also be available.

Summative assessments frequently take place in the middle or end of a learning or evaluation programme and can be used for grading, certification, and high stakes evaluation. Summative certification, licensure and some cognitive ability tests are administered with the purpose of identifying the best candidates to be awarded some form of credential.

The majority of assessments used in the online learning environment are in the asynchronous environment, where the assessment is completed in delayed time, and outside the present of an instructor (Bourne et al., 1997; Mason, 1998; Morley, 2000). The online asynchronous tools may involve alternating interactions between instructors and individual learners or entire groups through computer conferencing software and modem or network connections (Brem, 2002; Morley, 2000). In this context, the assessments can take many different forms, from traditional examinations of written assignments, case studies, research projects, and multiple choice examinations, to alternative measures such as portfolios, learner diaries, or journals to assess higher order abilities (Bourne et al., 1997; Morley, 2000; Muirhead, 2002).

Synchronous assessment models also play an important role within the DL process because dishonesty is minimised and the instructor has continual management of the testing environment (Morley, 2000). Online synchronous assessments may be mediated by two-way interactive conferencing systems with telephone connections (Morley, 2000; Palloff and Pratt, 1999). An example of a typical exam format involves asking learners one question at a time, similar to oral examinations requiring learners to type in answers within a limited time frame (Kouki and Wright, 2005). According to Morley (2000), accreditation agencies prefer this method of synchronous testing because the instructor has significant interaction with the remote learners during examination.

A great deal now has been written which confirms that assessment is the key to learning in traditional settings (Ramsden, 1992). In all forms of DL contexts today, print-based, mediated via video or teleconferencing or supplement by computer-based communications; assessment tasks can be seen as the active components of study (O'Reilly and Newton, 2008). Assignments provide learners with opportunities to discover whether or not they understand, if they are able to perform competently and demonstrate what they have learnt in their studies. In a DL context, not only assessments have been identified as a performance measure, it has also been identified as means and ways to encourage co-learners interactions within a DL environment (O'Reilly and Morgan, 1999). Online learners should take

the advantage of the opportunities to interact, to form social networks that are contributing to a learning network.

6.2 Disadvantages and Advantages of Online Assessments

Some drawbacks have been identified to offering assessments online (Bergstrom et al., 2006). Many educators feel challenged by the tasks and costs of producing high-end coursework delivered with reliable technology to learners, and may be unequipped to meet the level of standard required. In the face of market pressure to offer DL and e-Learning courses, it can be very difficult to ensure that learners receive the same kind of protections obtained in traditional classrooms or training facilities with regard to certain types of assessments, particularly high stakes assessments. Further to this, the other issue that has been raised is support. It has been identified expensive and time consuming to provide round-the-clock support to learners who are now learning and testing at all hours. Many educators feel that the face-to-face, iterative interaction with students is an important part of the learning process. Whilst it is said that learners get immediate feedback on some of the online assessments available, educators do not always get the feedback of what topics learners find confusing or not clear. This is when the appropriateness and meaningfulness of the feedback becomes an issue, as it is as important as the assessment itself.

Loss of connectivity can also be an issue with online assessment. Therefore, learners utilising online courses and assessment should be provided with reliable Internet connectivity. Assessments must be designed so that loss of connectivity does not result in loss of data, so that tests can be restarted at the exact point of interruption. In addition, learners who perceive themselves as being I.T. illiterate may find online assessment as a disadvantage. Extensive preparation and support may be required when introducing learners to these forms of education and testing (Naglieri et al., 2004).

There are also advantages of using web-based online assessments, especially for busy adult learners. Online assessments can be made available 24 hours a day, seven days a week from any computer with access to the Internet. Furthermore, in a traditional paper-and-pencil testing and assessment programme, examinees normally receive their scores and interpretive reports after a certain period of time taking the assessment. With online assessments, learners often receive feedback within a few seconds after completion (this classic scenario is for an multiple choice question (MCQ) type of assessment). Web-based online assessment lends itself to a pedagogical approach to learning in which assessment is integrated with learning processes. For now, online assessments enable instructors to obtain feedback about how a learner is performing, as well as to evaluate the effectiveness of the e-Learning environment. In many ways, online assessment, like online teaching, is still very much in an embryonic state. Today, the most common online assessment strategies involve the use of computer communications as simply a transfer medium to submit and comment upon assigned work such as essays, submit and compile portfolios, and deliver traditional paper-and-pencil tests in a computer testing environment (i.e. MCQ). As mechanisms for learning paradigms change, assessments delivery methods would also change within time.

7. Web-Based Assessment Tools Available For DL

Educators usually spend a lot of time in creating assessments to measure students' knowledge and comprehension. Among the advantages of educational technologies are the web-based assessment tools made available to provide feed-back and improve co-learner interactions listed as follows (Ley, 1999):

- *Discussion board participation*
According to Savage (1999), students seem to perform better when the discussion boards (or asynchronous communication) are required, where participation is ‘rewarded’ by a grade. This incentive of a grade brings a higher level of participation to the discussion, where students engage in dialogue begun by the instructor but often taking off on its own soon after (Greenlaw and DeLoach, 2003). Moreover, students then become co-constructors of the materials, examine alternative viewpoints and reach a consensus on a topic together (Greenlaw and DeLoach, 2003). Hence, discussion board participations can be seen as a mechanism in improving the interactions between co-learners within the distance learning settings.
- *Online quizzes*
Online quizzes enables the instructor to regularly assess student understanding of the materials presented (Martyn, 2003), thus keeping the instructor on track of the students’ performance.
- *Electronic paper and project submissions*
Paper and project submissions can be performed using the Digital Drop Box, or file sharing. By submitting the paper electronically, students do not have to make physical contact with a particular location in order to submit, and, there is less chance of the instructor losing the paper (Ley, 1999). In addition, an electronic receipt is automatically generated when the instructor receives the submission, enabling accurate records to be kept of who submitted the assignment and when (Thomas *et al*, 2002).
- *Reading outside of the assigned textbook (including hyperlinks and electronic formatted documents)*
By posting hyperlinks to sources of information, and labelling them as required or recommended, the instructor can share these sources of information with students very quickly and easily at any point during the course (Horton, 2000; Palloff and Pratt, 2001). This therefore also encourages discussions and interactions between co-learners on the topics and information shared by the instructor.

The internet also offers helpful resources that can be used to reduce the time it takes to create rubrics for projects, experiments, portfolios, and other performance-based items. There are also online resources to generate traditional, formative and summative assessments such as True/False and multiple choice questions.

8. Case Studies Findings

Based on the case studies conducted on seven DL Masters programme within the University of Salford and four other universities within the UK, the findings have been summarised and shown in Table 2.

Table 2: Summary of Case Study Findings

Criteria	CS MSc 1	CS MSc 2	CS MSc 3	CS MSc 4	CS MSc 5	CS BSc 1	CS MSc 6	CS MSc 7
6. Method of Delivery	<ul style="list-style-type: none"> Lectures through Horizonwimba 	<ul style="list-style-type: none"> Lectures delivered via the Internet Summer school – attendance compulsory 	<ul style="list-style-type: none"> Face-to-case teaching session 	<ul style="list-style-type: none"> Classroom setting – conducted through summer schools Conduct tutorials and practical works 	<ul style="list-style-type: none"> Face-to-face teaching session 	<ul style="list-style-type: none"> Taught via the Internet 	<ul style="list-style-type: none"> Taught via the Internet Lecture materials presented online 	<ul style="list-style-type: none"> Lectures delivered face-to-face Tutorial sessions
7. Method of Interaction	<ul style="list-style-type: none"> Via email Using audio and visual modes between tutor and learners Discussion forums/boards for learners to interact 	<ul style="list-style-type: none"> Online tutorials, group discussions and email Threaded group discussion board Student common room 	<ul style="list-style-type: none"> Email Chat rooms Discussion forums 	<ul style="list-style-type: none"> Face-to-face Email 	<ul style="list-style-type: none"> Tutor support through online tutorials, discussions and individual communication (via email) 	<ul style="list-style-type: none"> Tutor support via online tutorials Learners are introduced with e-portfolio – more learner-centred 	<ul style="list-style-type: none"> Tutor support via online tutorials, email 	<ul style="list-style-type: none"> Face-to-face
8. Method of Assessment	<ul style="list-style-type: none"> Written coursework submitted via email dissertation No use of web-based online assessment tool 	<ul style="list-style-type: none"> Learning activities Formative feedback Electronic paper and project submission dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Formative – self assessed learning activities Summative – written coursework submitted to school office Dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Mostly summative Written coursework submitted through school office Practical session Final examination Dissertation No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Balance of both summative and formative Essay/ written coursework Submitted via email Formative assessment conducted through learning activities within learners through group discussions No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> Summative assessment submitted via email Dissertation Formative assessment was held to encourage learners to interact using 'skype' No use of specific web-based online assessment tool 	<ul style="list-style-type: none"> A balance of formative and summative Formative – working group activities, presentations Feedback from tutors to learners – a special session is conducted Summative assessment – individual coursework Dissertation No use of specific web-based online assessment

								tool – not appropriate for MSc level
9. Problems faced by learners within DL setting (complaints made by learners)	<ul style="list-style-type: none"> Late feedback from instructors Lack of interaction between co-learners 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Time constraint Geographical constraint Participation of other learners 	<ul style="list-style-type: none"> Interactions between co-learners – learners rely more on co-workers Difficult to grade learner's practical session through web-based online assessment tools 	<ul style="list-style-type: none"> Complexities of working alone based on different times and location – causing stress Lack of technical support – leading to frustration 	<ul style="list-style-type: none"> Not a DL setting 	<ul style="list-style-type: none"> Communication barriers caused by the nature of the learners taking the programme – working learners Packed schedule Technology – can be a disadvantage and an advantage – generation of learners 	<ul style="list-style-type: none"> Technology shy Learners feel isolated
10. Suggestions to improve co-learners interactions within a DL setting	<ul style="list-style-type: none"> To increase group work assessments Support more interactions and discussions through discussion boards, chatrooms 	<ul style="list-style-type: none"> Encourage discussions and interaction through student common room 	<ul style="list-style-type: none"> To have tutorial sessions online Support and encouragement The necessity of a face-to-face classroom to encourage interactions – although it is a DL setting Having 'group-clusters' within area of interests. 	<ul style="list-style-type: none"> Put more practice on group works rather than individual works – constraint: 'free-riders' among team members 	<ul style="list-style-type: none"> To have online tutorial sessions Encouragements To still conduct face-to-face lectures to encourage learners interaction (the opportunity to meet-up) To have 'group-clusters' so that learners group together within their own 'circle of friends' 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> To increase group work assessment to encourage and improve co-learners interactions To provide 'appropriate' technology support 	<ul style="list-style-type: none"> Learners should meet and interact with other co-learners In support of face-to-face lecture

9. Discussion and Findings

Table 2 shows the summary of findings for all the case studies conducted within this research. The summary of findings was narrowed down into five main criteria, i.e.: (i) method of delivery, (ii) method of interaction, (iii) method of assessment, (iv) problems faced by learners within DL setting, and (v) suggestions to improve co-learners interactions within a DL setting.

From table 2, it can be seen that there was a mix of method of delivery within the case studies conducted, i.e. some lectures were delivered face-to-face (through summer school sessions), and some were delivered and taught online with the support of the Internet. The common method of interaction was through the use of emails and online tutorial support, as well as discussion boards and chat rooms. The case studies implemented both a mixture of summative and formative assessments methods. The common summative assessments identified were written coursework, project paper and dissertation. The written coursework and project paper were usually submitted via email or straight through the school office. The formative assessment method practised by most of the case studies is through learning activities with other co-learners. However, it can be concluded that almost all of the case studies conducted did not implement a specific web-based online assessment tools within the assessment method to be used in the MSc and BSc programme. This might be due to the problems that have been raised by some of the course instructors within the case studies, whereby the course instructors felt that an MSc programme should implement a much more critical, complex, and detailed written coursework. The web-based online assessment tool is said to be more suitable for undergraduates' level.

Some of the problems that were being faced by the learners within a DL setting are identified as: the lack of interaction between co-learners within the programme, as well as late feedback obtained from the instructor on any enquiries or assessments taken. The learners also found it difficult to work in isolation based upon the geographical and time constraint being faced by the learners enrolled in a DL setting. Almost all the case studies were in the perception that in order to improve co-learners interaction within a DL setting, a face-to-face lecture should also be conducted within the period of study. This would give learners the opportunity to get-together and interact with other learners within the programme. This conforms to the findings from the literature review that many educators feel that the face-to-face iterative interaction with learners is an important part of the learning process (Bergstrom et al., 2006). More group works assessments were recommended as an initiative to encourage co-learners interactions, although extra care should be addressed to minimise the threat of 'free-riders' among group members. Programme instructors should also ensure that there is sufficient technology support for learners, so that learners do not feel isolated and stressed due to the nature of the DL setting. This further conforms the finding from literature as highlighted by Naglieri et al., (2004) that learners have different technology abilities. Learners who perceive themselves as being I.T. illiterate may find online assessments within the DL setting as an advantage. In addition, one of the recommendations made by the instructors within the case studies were to develop 'group-clusters' within learners' area of interest, to encourage learners of the same 'circle' would interact more within the discussion boards and chat rooms provided.

10. Conclusion and Way Forward

Findings from the case studies revealed that most of the DL programmes deliver lecture materials in accessible format which comprise text, diagrams and drawings (for which descriptor alternatives are available) and video presentations (for which audio and text captioning are available) through online environments such as the "Horizonwimba" and 'Elluminate Bridge'. The delivery methods currently used within the programmes are both synchronous and asynchronous. The result from this research identifies that there is a lacking in the implementation of specific web-based assessments tools within the

DL settings, since none of the case studies have actually implemented a specific web-based online assessment tool as an assessment mechanism. However, the aid of technology is used within the assessment method implemented, i.e. most of the submission of coursework and project papers was done via email. However, the use of web-based online assessment tools is not denied as a way forward towards a paradigm shift in DL community as a means to encourage co-learners interactions (O'Reilly and Morgan, 1999).

Based on the in depth literature, web-based assessments tools have been found to help improve co-learners interactions within DL settings. Most DL programmes have just gone for the traditional assessment method, which is the written coursework due to lack of emphasis on co-learners interactions when deciding on the method of assessment to be implemented. The findings from the case studies highlighted the following recommendations in general to improve co-learners interactions within a DL setting with the aid of online assessments methods:

- More group works/ assessments are recommended to encourage co-learners to interact more. However, being in a Masters level, the assessments should be more complex, detailed, and critical; hence, close attention should be given to learners in avoiding 'free-riders' within team members.
- More support should be given to learners through discussion boards, emails, and chat rooms in order to encourage learners' interactions.
- I.T. support should also be taken into 'proper' consideration to attract 'matured' learners, or learners who are not comfortable with the use of technology as a medium of interaction within co-learners.
- Having 'group-clusters' within areas of interest to encourage learners within the same level of interest so that chat rooms and discussion boards can be catered to address learners' personalised interests.

The highlighted recommendations should be used as a way forward for all DL setting programmes so that web-based online assessment tools could really be used in order to improve co-learner interactions.

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