Maximising Social Interactions and Effectiveness within Distance Learning Courses: Cases from Construction

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Abstract

Advanced Internet technologies have revolutionised the delivery of distance learning education. As a result, the physical proximity between learners and the learning providers has become less important. However, whilst the pervasiveness of these technological developments has reached unprecedented levels, critics argue that the student learning experience is still not as effective as conventional face-to-face delivery. In this regard, surveys of distance learning courses reveal that there is often a lack of social interaction attributed to this method of delivery, which tends to leave learners feeling isolated due to a lack of engagement, direction, guidance and support by the tutor. This paper defines and conceptualises this phenomenon by investigating the extent to which distance-learning programmes provide the social interactions of an equivalent traditional classroom setting. In this respect, two distance learning case studies were investigated, covering the UK and Slovenian markets respectively. Research findings identified that delivery success is strongly dependent on the particular context to which the specific distance learning course is designed, structured and augmented. It is therefore recommended that designers of distance learning courses should balance the tensions and nuances associated with commercial viability and pedagogic effectiveness.

Key Words: Distance Learning, Construction Education, Synchronous, Asynchronous Tools, Social Interactions

Introduction

The use of learning technologies has continued to develop and evolve. The market share for learning technologies is currently worth around £2.6bn in Europe, and £16.7bn worldwide (Watson and Ahmed, 2004). Furthermore, an increased proliferation of pedagogy-rich e-learning material has started to change society with regard to training and learning (Alshawi *et al.*, 2006; Santos and Ramos, 2004), and distance learning methodologies can now (under the 'right' circumstances) offer significant benefits to learners who are physically prevented from attending face-to-face classroom lectures. This approach enables the facilitation of learning within a setting of each learner's choice, aligned with a pace with which learners can cope, and in this context, recent technological developments and pedagogical understanding have helped to leverage significant benefits in this area. Evidence suggests that distance learning education not only exists in western countries, but has also spread to countries such as Hong Kong (see Chung *et al.*, 2006), China (Tu, 2004), and Taiwan (Warden *et al.*, 2005). The globalisation of information and communication technology (ICT) enabled learning has revolutionised the way distance learning is delivered in terms of instructional content, method of assessment, and overall presentation/sharing – the veracity of which presents learners with greater and emerging opportunities to learn online.

Various terminologies are used to represent the many forms of online distance learning approaches, the nuances of which include terms such as technology-based learning, computer based learning, computer aided learning (CAL), computer mediated communication, and web-based learning. These approaches usually embrace Virtual Learning Environments (VLE) to partially/wholly supplement face-to-face classroom instruction using various ICT based mechanisms to deliver the programmes over the Internet. In this context, many higher education institutes in the UK offer distance learning as an alternative mode of delivery to conventional class-based lecture/tutorial approaches. This phenomenon is not exclusive to the UK, as distance learning expansion can be evidenced elsewhere (Chung *et al.*, 2006; Zou *et al.*, 2003). However, whilst advocates of distance learning often extol the benefits of this approach, the social interactions of a classroom setting often tend to be ignored. This setting, where social interactions emerge is argued to be exceptionally important to the development of learners (Fulford and Zhang, 1993; Bates, 2000); and, in the context of this paper, the term 'social interactions' is taken as meaning "an appropriate guidance and support network to learners, face-to-face eye contact, body language, feedback to and from learners, and interactions with co-learners" (Ingirige *et al.*, 2005, p. 8). Thus, the lack of social interactions often attributed to distance learning programmes can tend to leave learners feeling isolated, thereby missing engagement, direction, guidance and support (Ham and Davey, 2005; Salmon, 2002).

The aim of this paper is to identify the extent to which the social interactions of a classroom setting are considered a priority within ICT enabled distance learning programmes and to investigate what measures and interventions are put in place to enhance these social interactions. From this standpoint, the paper examines the developments in distance learning and ICT based mechanisms and their virtual platforms that facilitate social interactions. The paper then conducts case studies to explore the measures and interventions taken by tutors

and learners within ICT based distance learning programmes in the construction industry for reflection and analysis. Finally, a context specific ICT based distance learning delivery model is presented together with conclusions and recommendations for further research.

Literature Review

Distance learning developments

The Internet and other ICT developments have revolutionised communication and collaboration between people. This has had a significant impact on the delivery of online educational programmes, and on the 'quality' of learning (Warren and Rada, 1999). The higher education sector in particular has benefited significantly from these new developments; for example, Chung *et al.* (2006, p. 295) quoted Peterson's (2005) indicating that "in 1999 nearly 400 accredited colleges and universities in the US offered full online study programmes or used ICT to supplement the traditional mode of classroom instruction". Furthermore, the growth of the Internet has meant the proliferation of a multitude of web-based tools to address/improve issues such as communication, pace, convenience etc. (Lindner, 1999), geographic dispersal and inequity of access to resources (Morgan and O'Reilly, 1999). These issues reaffirm Moore's (1990) argument that transactional distance between tutors and learners in the present day context is limited by pedagogic needs and no longer constrained by geographic dispersal of learners. To meet the pedagogic challenges of distance learning in the modern day context, programmes need special organisation, and teaching procedures that require structure (e.g. linking learning material, creating protocols for giving feedback etc.) and dialogue (e.g. regular tutor support, response and participation at discussion forums, formative feedback on assessments etc.) within the delivery process. It is therefore important to distinguish an online distance learning programme which is perceived to have a less effective dialogue between tutors and learners and a structure from one that has a highly effective dialogue and a structure (Moore, 1990). Dialogue and structure are important characteristics of a programme as they help to determine the strategy that needs to be adopted to improve pedagogic effectiveness. In this context, specific functionalities of online environments as a whole have the potential to open up greater possibilities for interaction, collaboration and cross cultural dialogue (Dunn *et al.*, 2004). However, Laurillard (2002) noted that various gaps exist between the currently available delivery mechanisms of distance learning programmes and technological advancements; and that the current mechanisms mainly provided solutions to logistical problems (concerned with mitigating problems connected to geographical dispersion of learning communities) in lieu of pedagogical drivers. It is therefore important that managers of learning and programme leaders incorporate the needs of learners to facilitate greater dynamic interactions with the tutors and co-learners in order to leverage success.

ICT in distance learning: synchronous and asynchronous tools

To meet the challenges of distance learning, ICT based tools have developed both in synchronous (occurring at the same time) and in asynchronous (occurring at different times) modes. Communication services in some Virtual Learning Environments (VLE), operate asynchronous tools, which provide a multitude of solutions for tutors e.g. creating discussion

forums – the 'conversations' of which can take place asynchronously through the posting of messages to selected discussion forums (Barrett, 2003). In synchronous mode, web based tools such as [Skype](), [MSN messenger](), [Wimba,]() [webex]() and [Elluminate]() are available to deliver online lectures over the Internet. These tools facilitate online synchronous lectures and tutorials, and offer 'live virtual classroom' sessions over the Internet. Distance learning programmes that utilise synchronous tools support their delivery process with functionalities such as 'webcam support', interactive video and voice boards. However, the problem with synchronous delivery is a general reduction in flexibility, as it requires learners to get connected online at specified times, although it enhances social interaction. This might constrain participation by some of the distance learners due to their work commitments and inappropriate time zone coordination between recipient countries.

Although it might be difficult to maintain synchronous delivery of lectures due to some of the commercial realities, added functionalities such as 'near' face-to-face contact via video streaming and other technologies cater to a higher degree of pedagogic needs of the learners (Ham and Davey, 2005). Asynchronous delivery methods on the other hand, according to Chung *et al.* (2006), offer flexible advantages for learners. In addition to the flexibility of following the programme at a pace that is comfortable to learners (Collis and Moonen, 2001), asynchronous systems also provide solutions for tutors in managing different time zones. Some distance learning programmes combine both synchronous and asynchronous mechanisms to offer hybrid solutions to cater to both the learners' needs and achievement of commercial goals. Henri and Rigault (1996) saw the overall ICT enabled communication in an educational setting providing "more intense communication than face-to-face groups, where [students experience] the lack of social pressure and the greater freedom to express their views without struggling for the right of audience" (Henri and Rigault, 1996, p. 55). Maznevski and Chudoba (2000) provide the case of virtual teams in a new product development situation to highlight their very high degree of ICT usage over face-to-face meetings for virtual collaboration. Further, other studies (Massey *et al.,* 2003; McGath and Hollingshead, 1994; Meissner, 2005; Montoya-Weiss, *et al.,* 2001) undertaken in the information systems field have identified the value of online virtual collaboration as effective methods of enabling social interactions both synchronously and asynchronously. Several lessons can be learned from these studies and applied within appropriate distance learning contexts.

While several studies have confirmed the effectiveness of web based distance learning programmes based on their synchronous and asynchronous aspects (Chung *et al.*, 2006; Gubernick and Ebeling, 1997), some commentators have raised scepticism on judging the success of distance learning programmes on the basis of the delivery mechanisms (face-to-face, synchronous online or asynchronous online) alone. For instance, Gal-Ezer and Lupo (2002) and Hodson *et al.* (2001) advocate that effectiveness of distance learning approaches depends more on the nature of the learners' ability for self studying, ability to integrate well with tutors and the overall discipline that is required of learners and tutors in the distance learning programme. This view places both learners and tutors performing a key role in influencing the effectiveness of the distance learning programme. Therefore, whilst structure

and dialogue are important considerations in designing a distance learning programme, the consideration of both the tutor and learner context are also important factors. Furthermore, some of the collaborating partners might prefer online virtual collaboration platforms as presented in the new product development situation earlier (see Maznevski and Chudoba, 2000). Within a distance learning environment, the degree of face-to-face contact could act as a motivation, but it is a contextually dependent variable and sometimes acts as a physical barrier if it is inappropriately aligned with the tutor – learner context. Therefore the lack of face-to-face provision should not necessarily deter the element of enhancing 'social interactions' (Fulford and Zhang, 1993; Bates, 2000). Web based online mechanisms can play a major role in providing a virtual platform to enable the necessary social interactions to take place in distance learning programmes to motivate the learners and tutors.

Social interaction: distance learning provision in the construction industry

Facilitating social interactions is of particular importance within training and up-skilling in the construction industry. First, various initiatives within construction have identified training gaps and skills shortages in general among construction workers (Dainty and Edwards, 2003; Dainty *et al.*, 2004). Therefore distance learning programmes, particularly at the postgraduate level, offer unique opportunities to construction professionals to improve their capabilities amidst their dynamic work commitments. The distance learning option provides learners with the potential to develop their skills without having to undertake day release, part-time or full-time courses. Secondly, providing opportunities for distance learners to socialise and make available various mechanisms to develop online learning communities is of importance because it addresses some of the problems endemic within the construction industry. The construction industry is said to have a fragmented structure and supply chain (Latham, 1993; Anderson *et al.*, 2000). Therefore addressing issues related to social interaction, and thereby providing desirable scenarios for a diverse student community to socialise, could help in tackling some of the industry problems at the grassroots level. There is only a remote possibility of total solutions being achieved as, according to industry practitioners and academics, the proposed transformation is perceived as a steep learning curve.

Problem definition: research questions

The review of literature shows the importance of structure, dialogue and the tutor-learner context affecting the design of ICT based distance learning course provision. The extent to which social interactions emerge depends on these variables. However, the overall course provision should also be commercially viable and therefore any shifts in the priority attached to social interactions will no doubt fall in line with some of the commercial realities of the programmes. It was also argued that within the perspective of construction projects, social interactions and skills development is likely to be valued as having a possible link in promoting the development of good team working and relationship building among construction professionals in real life. It is therefore pertinent that a study in this area will contribute towards the ICT based distance learning provision in the construction industry. Based on these arguments and within this context, we raise the following research question:

"To what extent are the social interactions between learners and tutors considered a priority in designing ICT based distance learning programmes?"

The above research question is divided into the following three areas:

a) What ICT based mechanisms are used by distance learning communities?

b) What interventions do the tutors and learners use to incorporate social interactions?

c) What are the drawbacks of interventions and tools in practice when emphasising social interactions as a priority?

The next section of this paper details the methodology by which the above research questions are addressed.

Research Methodology

Research approach

This research adopts a multi-case study approach to test the theoretical proposition. Case study research consists of a detailed investigation that attempts to provide an analysis of the context and the processes involved in the phenomenon under study (Yin, 1994). The exploratory nature of this study as articulated through the research questions, justifies the adoption of this approach for this research. The unit of analysis for this study is taken as the "delivery process of Masters level distance learning programmes and its key stakeholder interests (the tutors and learners)". Two case studies were conducted based on the replication logic using the multi-case study methodology (Yin, 1994). The chosen case studies demonstrated the alternative ways of designing ICT based distance learning courses where the broader spectrum of emerging social interactions could be studied. The two case studies chosen are therefore appropriate for this purpose.

Both case studies relate to higher education institutes; the first is a construction school in the UK, and the second case study details a distance learning programme involving several universities with the key partner based in Slovenia.

Case study selection criteria

The case study courses chosen were all at postgraduate level and had a dedicated ICT based distance learning element in them. The selection criteria also considered adequate coverage of alternative ways of structuring and dialogue mechanisms and both synchronous and asynchronous delivery mechanisms within the design. The multiple case studies also included a number of tutor–learner contexts to investigate a variety of scenarios. The case studies were all construction sector specific and this choice was influenced mainly due to the research questions stated in the paper. Therefore the results can be generalised to embrace learner sets from two case studies only. Despite this selection, some of the results could be relevant within distance learning courses in other sectors. The findings and the contexts have to be carefully analysed and compared before commenting on any further applications.

Data collection and sampling strategy

Three main data collection techniques were used within the multi case study approach. The main author of this paper had first hand experience in studying the various case study material and delivery techniques of both Case Study 1 and Case Study 2 by registering with the web based online portals and discussion forums. Further, the interview technique was used to interview the tutors of the programmes, and the survey technique was used to collect data from the learners.

For Case Study 1, the two programme leaders were interviewed and surveys undertaken with the learners registered on the MSc1 and MSc2 programmes. For Case Study 2, the course leader and another tutor were interviewed and a survey was carried out with learners registered with the Civil Engineering Faculty in Slovenia (main partner in the ICT based distance learning programme).

Data analysis

The interviews with the tutors and learners were analysed based on MS Excel worksheets. The survey guideline used for students is included in the appendix. The interviews with the tutors followed a more open ended style of questioning. In addition, some of the quotations by both tutors and learners were utilised to support the arguments in the case study discussion.

Case Study Background

Case Study 1: Postgraduate distance learning programmes: a UK construction school perspective
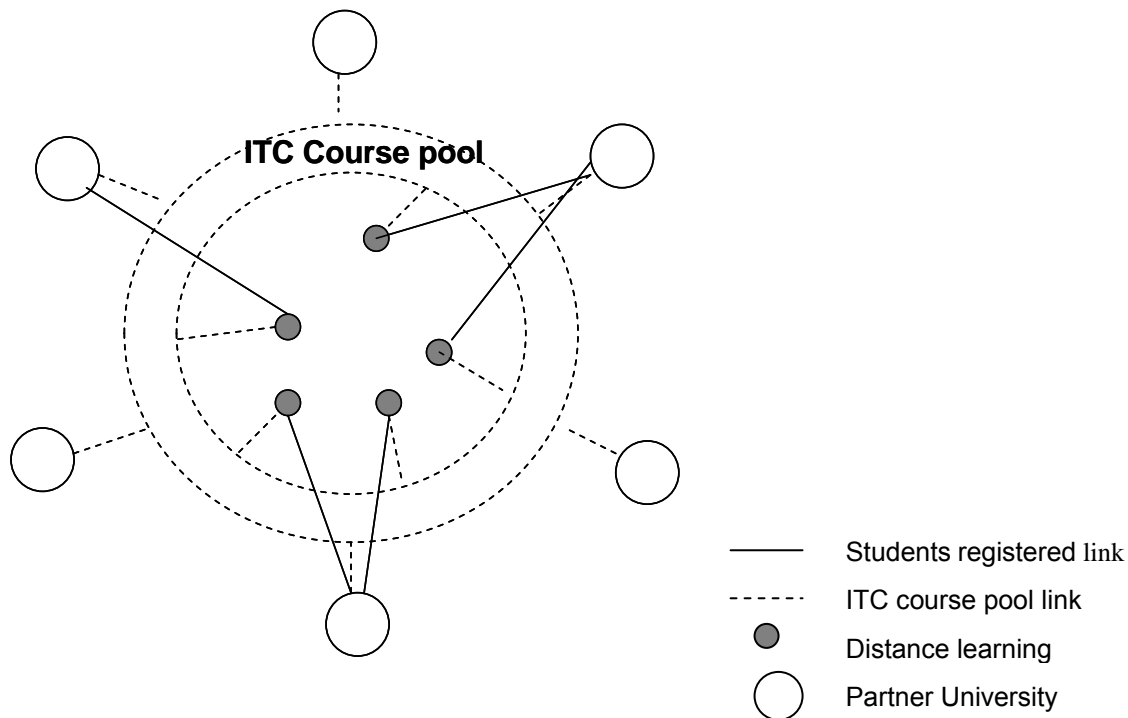
This case study relates to a UK HE Construction School, hereinafter, known as the 'School'. The School offers six distance learning Masters level programmes over the Internet, targeting a multitude of construction industry professionals such as Quantity Surveyors, Construction Managers, Property Managers, Facilities Managers, Architects, Civil Engineers and Project Managers. The main subjects for Case Study 1 were obtained from two of the Masters programmes, 'MSc1' and 'MSc2'.

The School adopts a centralised course management model whereby its postgraduate distance learning programmes are designed within the School and taught by in house staff. The students who subscribe to the programme are widely dispersed around the world with the majority coming from the UK. All distance learning courses cater to part-time students who are working in the construction industry in different capacities.

Case Study 2: Postgraduate distance learning programmes: a Slovenian construction school perspective

Case Study 2 relates to a European distance-learning programme involving nine universities, hereinafter referred to as ITCE. The distance learning programme was started in 2002 with the aim of developing an inter-university postgraduate Masters programme in IT in construction (Rebolj and Menzel, 2004). The programme with an initial curriculum started in the academic year 2004/2005 under the initiative of two of the partner universities. The

course later evolved to a more flexible form of 'Course Pool' offering core and elective modules covering various aspects of IT in construction, managed by nine universities. The course pool consisted of a suite of modules developed by different institutions within Europe. The students who were spread within the European partner institutions had the flexibility of choosing elective modules from the course pool so that they benefited from the expertise of many institutions during their course. The model adopted by the ITCE is depicted in Figure 1.

Figure 1 ITCE distance learning module

As shown in Figure 1, the large circles indicate the European institutions contributing to the course pool. The learners (indicated by the smaller circles) benefit from the course pool delivered by the distance-learning programme (indicated by the dotted lines). The thick straight lines indicate that in addition to the course pool, each individual student is registered with one of the universities delivering the course pool. Further, as indicated in Figure 1, the universities that are responsible for the development of the courses do not necessarily have students registered with them. The learners attend the courses in web based virtual classrooms, where they meet with their tutors from the partner institutes. The programme has been developed with the intention of providing the best learning experience for the learners as they get the opportunity of interacting with learners and tutors of the partner universities. The learners also get exposure to the experience of other lecturers, fellow learners and the cultures of partner institutions.

The transformation of a multiple input-multiple class into a single virtual class is one of the phenomena of the multi-university multipoint distant learning provided by this distance learning concept (Rebolj and Menzel, 2004). To overcome formal obstacles in accreditation of a uniform curriculum and to open the ITCE postgraduate programme to the global community the course adopts an open pool of modules.

Background of distance-learning environments

The distance learning context of the two case studies are displayed in Table 1. The use of ICT based mechanisms and their relative degree of sophistication varies from one context to another. Case Study 1 - MSc1 uses Wimba for online lectures and Case Study 2 utilises a similar product referred to as ʼclick to meetʼ as a synchronous medium.

Table 1: Background of distance-learning environments

	Case Study 1 MSc1	Case study 1 MSc2	Case study 2
Interactions with learners	All interactions on a remote basis	Main interactions on a remote basis except for induction	All interactions on a remote basis
Induction	Online synchronous and asynchronous	Face-to-face and summer school	Online synchronous and asynchronous
Lectures and tutorials online (synchronous)	Wimba tool for online lectures (archived)	Email based discussion forum (similar to yahoo groups style)	'Click to meet' for online lectures Skype, MSN messenger
Asynchronous mechanisms	Blackboard (for document access, announcements, assessment submission and discussion forum) Email Telephone	Blackboard (for document access, announcements) Email based discussion forum (similar to yahoo groups style)	ITCE portal (MOODLE based) for document access, announcements and assessment Email
Dispatch of documents and lecture materials	Basic instructions sent in the post and via emai	Lecture notes are dispatched in a CD	All electronic communication

The tutor can manipulate the functionalities given in the screen to achieve the desired outcomes of the online tutorial (MSc1).

Case Study Analysis

The discussion of the findings of the two case studies follows the initial research questions raised in the paper.

Case Study 1

First, the synchronous medium used in MSc1 is considered. According to the MSc1 tutor, social interactions as defined earlier in the paper are considered a major priority within the programme. Accordingly, online synchronous lectures are conducted via the Internet utilising the Wimba virtual classroom facility. The types of social interactions emerging during the online tutorials as a result of tutor and learner interventions are shown in Table 2.

Table 2: Social interactions of a virtual classroom in Case Study 1 – MSc1

'Social interaction' methods	Facilities offered within Wimba virtual classroom	Special Interventions
Face-to-face contact between tutors and learners	Voice only, no video transfer	Not available
Opportunities for learners to question the tutor	Electronic chatting, raising hand and voice transferring	Electronic chatting, voice facility
Student feedback during a lecture	Voting, raising hand, electronic chatting, voice transferring	Electronic chatting, voice facility
Assess student engagement in the lecture	Number of times raising hand by clicking icon, voting by pressing icon, electronic chatting using text, voice transferring using microphone and headset.	Room pulse identification
Opportunities for tutor to question learners	Voice transfer, electronic chatting	Electronic chatting, voice facility
Class control and measures to ensure equal opportunities	Initiate via electronic chatting (send personal messages to control specific students), voice transfer, disable student connection	Monitoring of discussion by tutor
Tutor presentation	PowerPoint slideshows, use of white board, archive sessions	Ability to talk through slides and archive
Share applications	Use of whiteboard, transfer of access rights to students, application sharing, desktop sharing	Access rights to students, electronic whiteboard
Guidance and support	Coursework support during tutorials	Write a chat line, use voice facility
Support if a student is absent for a tutorial	Archived sessions	Weblink to archive by tutor

In addition to the synchronous virtual classroom covered in Table 2, MSc1 conducts an electronic discussion forum within Blackboard, which facilitates student discussions on various threads relating to the modules. According to the MSc1 tutor, the learners have time to reflect before posting responses in the discussion forum and the asynchronous transmission provides them with flexibility in participation. In addition, tutors use conventional email and telephone conversations to complement the process of tutor – learner interaction. To increase flexibility, the tutors conduct the weekly one hour tutorials twice during the week, so that learners can join either of the two sessions based on their convenience of access to the Internet.

MSc2 on the other hand carries out synchronous live email discussions utilising a yahoo groups based discussion forum over a four hour time slot every week. This discussion forum is linked with the personal emails of all the learners so that they are fully engaged in the modules. The module tutors first start a discussion by introducing a relevant area which is then developed by the learners, who participate in populating ideas, first on the initial topic and then deviating to various relevant areas. The emails, once generated, reach all the learners registered in the course. Sometimes within the weekly time slot various tasks and activities are handed over to the learners and their feedback is obtained. The outcomes are then shared within the discussion forum. Table 3 shows how social interactions emerge and

tutor interventions that facilitate some of these interactions within the online synchronous discussion forum.

Table 3: Social interactions of a synchronous electronic discussion forum in Case study 1 – MSc2

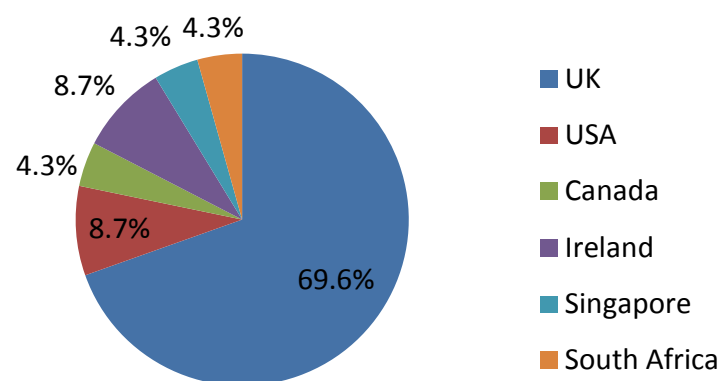| 'Social interaction' Methods	Facilities offered within the synchronous discussion forum	Special Interventions
Face-to-face contact between tutors and learners	Not available	Not available
Opportunities for learners to question the tutor	Via email to the forum	Write email
Student feedback during a lecture	Via email to the forum, via email and telephone outside the forum	Write email Use phone
Assess student engagement in the lecture	Discussion forum participation, emails that stimulate debate	Participate in forum, email, phone
Opportunities for tutor to question learners	Via email to the forum	Via email
Class control and measures to ensure equal opportunities	Focused discussion forum, tutors can remove students from the forum	Administration of discussion forum
Tutor presentation	Students given advance notice via recommended reading list for each of the modules	No
Share applications	This is done via emails using the discussion forum	Write email
Guidance and support	Via email to the discussion forum.	Write email
Support if a student is absent for a tutorial	Discussion forum leaves an email track for revisiting	Available via email

The tutor perceptions of how social interactions are addressed within MSc1 and MSc2 were compared with the student survey data. Out of the twenty learners registered in the first year programme of MSc1, ten learners responded (50% response rate). The majority of the learners were located in the UK (7). The others were from Lebanon (1), Ireland (1) and Slovenia (1).

The learners' main driver for course selection (90% response rate) was the degree of flexibility provided by the ICT based distance learning setting. Online tutorials were the main mechanism by which the co-learners interacted. Although the majority of the learners expressed satisfaction with the online tutorials, the duration was rated as highly inadequate (70%). A few respondents stated that they needed extra time to enhance co-learner interactions as in face-to-face classroom settings. To compensate for this perceived gap in their learning experience, 60% of the respondents mentioned that they contacted the tutors via email and telephone on matters such as concepts introduced, lecture content and the assessment material. One of the learners highlighted the opportunity to ask the tutor questions as a special feature of the online voice transfer facility. Some of the specific guidance that the learners get is mostly outside the online tutorial session (via email, telephone conversations) and a few learners mentioned that this is consistent with face-to-

face classroom sessions where learners get an opportunity to contact the tutor outside the lecture hours.

The learners identified flexibility as the main reason for course selection (80% response rate). The term 'flexibility' had multiple meanings in its definition. Learners valued the archive functionality of online tutorials, so that they could follow the course amidst the various day-to-day work commitments. In addition, they stated that the online tutorials and the discussion forums enabled them to utilise more of their experiential knowledge and provided a more desirable virtual setting for learning purposes than a face-to-face classroom.

Learners within MSc2 were dispersed widely in countries as shown in Figure 2.

Figure 2 Geographic distribution of learners (MSc2)

The response rate from MSc2 learners was 38%. According to the survey results, 92% of the learners rated the email based discussion forum (synchronous discussion forum) as effective. The comments from learners identified that there was very good interaction between the learners through the forum. In addition, the learners valued the face-to-face experience during the summer school and induction sessions as providing extended social interaction between the learners. Due to the discontinuity of the face-to-face sessions, and the need to enhance their learning experience, the learners frequently communicated with their tutors utilising emails and telephone. A few learners also made arrangements to have face-to-face meetings with the tutors (only a few who were located within a reasonable travel distance to the university). Tutors intervened in the discussion forum by stimulating debate and maintaining the focus of the discussion. One of the survey participants stated that on certain occasions he faced difficulties in catching up if any of the tutorials were missed, due to the large volume of emails generated in the discussion forum. However, this view was contested by some of the survey respondents who indicated that to follow a course of study of this nature requires strong self motivation, unlike following a course by attendance, hence identifying the important role performed by the learners themselves. Further, some of the respondents indicated that they tolerated the numerous emails that did not relate to them and developed the capability to glean the relevant material out of the discussion forum. To improve the current systems, some learners suggested the use of MSN messenger and

Skype to supplement the discussion forum so that they provide more opportunities outside the formal discussion forum for learners to collaborate and improve social interactions.

The distance learning Masters programmes delivered by the School were positively aligned with the employers and workforce constraints of the learners. The distance learning philosophy therefore, of studying at the learners own pace and time is the basis on which they have been attracted to the courses. Therefore, the tutors perceived that too many interventions via online synchronous content to improve social interactions would affect the rationale for distance learning course design. For example, one tutor stated:

> I am yet to see a distance-learning course being delivered totally utilising the synchronous tools. What we have here is a distance-learning course that has a synchronous element in it to conduct live tutorials.

MSc1 addressed this problem by minimising synchronous tutorials to one hour per week with repeat sessions and MSc2 by limiting the synchronous element to a four hour ICT based discussion forum. The student responses in MSc1 reveal that the module assessments sometimes generate the need to have more group discussions between the learners. Therefore they prefer utilising the online synchronous tool more as an informal tool than a formal one. This functionality is not currently available within the programme. The main constraint within MSc2 is that it is not based on a discussion thread. For instance one of the learners stated that:

> Sometimes when a discussion is taking place and a large number of emails are sent it is difficult to keep a track of who said what. It is easy to lose the thread of the conversation.

To control this situation the tutors joined in the discussion from time to time to maintain the focus of the discussion and to motivate the learners to elaborate on certain topical areas in line with the aims and objectives of the tutorial. In addition to tutor intervention, the learners recognised that to follow a distance learning programme requires a certain amount of discipline on their part to structure the information. As a result, a few learners pointed out that some of the information they receive was not aligned with their tasks and identified specific skills that are necessary to prioritise the information according to their specific interests. However, learners in the MSc2 perceived that in addition to the individual skills, there should be more opportunities to 'bounce ideas off' colleagues in the course, using other mechanisms.

Case Study 1 presented two different distance learning scenarios within a centralised delivery process that uses IT based tools at different degrees of sophistication. Case Study 2 provides an IT based distributed distance-learning setting to deliver a course by integrating the expertise of nine universities in Europe.

Case Study 2

Within ITCE, the interviews with the tutors revealed that they consider the online synchronous sessions as forming the mainstream course delivery mechanism. Unlike the previous case study, the students had to undertake a group project requiring frequent

collaboration among the students as well as tutors and students. Accordingly, the tutors utilised the online tool 'click to meet' that has the capability of video streaming via web cams to deliver online lectures via the Internet. In addition to the formal online mechanism, Skype and MSN messenger were used for collaboration purposes outside the formal tutorial times on a regular basis. The tutors identified important protocols that are followed to improve the effectiveness of social interactions. When an online tutorial is in progress, the learners switch off their microphones to avoid any audio conflicts and allow the tutor to deliver the lecture. Switching on a microphone triggers the web cam window to maximise and occupy the centre of the screen. It gives the indication to the tutor that the student needs to contribute to the discussion. The learners adhere to the protocol of giving notice to the tutor of a possible question via the chat facility of 'click to meet' and then switching on the microphone to actually ask the question, if permission is granted. The tutors on certain occasions hand over the controls of the presentation to learners so that they can use some of the functionalities of the presentation function. This demonstrates the build up of trust between tutors and learners and enhanced social interactions. It was observed that 'click to meet' offered the same functionalities as Wimba with the added facility of web cam support. The students and the tutors were therefore able to see each other during the synchronous tutorial. This added functionality had a positive effect on improving social interactions.

To investigate the effectiveness of the virtual classroom utilised in Case Study 2, a survey was conducted with three distance learning students in the first year of their study. Two of the learners were based in Slovenia, while the other was based in Germany.

The flexibility of the course and the delivery methods were the main drivers for the students to enrol on the programme. The course pool concept presented earlier (see Figure 1) significantly influenced the student motivation in the programme. The learners supported the use of IT based distance learning tools (both synchronous and asynchronous) and the survey results show that the learners conduct important activities to bridge any gaps in the delivery system. Most of these gaps perceived by the learners are pertaining to enhancing social interactions. The students did not face any physical barriers such as time zone management problems due to the basis on which they were located. Therefore, in addition to the formal mechanism, the learners met online using Skype and MSN messenger to brainstorm ideas for their group project. They perceived 'click to meet' as a formal tool and preferred the effectiveness of Skype and MSN messenger for informal chatting.

Despite the provision of interventions during the online tutorials via 'click to meet', the tutors identified the absence of a proper way to gauge student engagement in the lecture as a drawback. The tutors would like to see new developments taking place in this area so that they can monitor the degree of student interest and engagement in the particular tutorial.

Analysis of student survey results revealed that they prefer to utilise a single composite tool that encompasses the functionalities of 'click to meet', Skype and MSN messenger, rather than using different tools. The tutors in their interviews also identified the importance of such a composite and flexible tool that can be customised to the particular distance learning setting therefore supporting the tutor interventions. Both tutors and learners believed that in the future, online tools will incorporate very good voice quality and video quality as well as
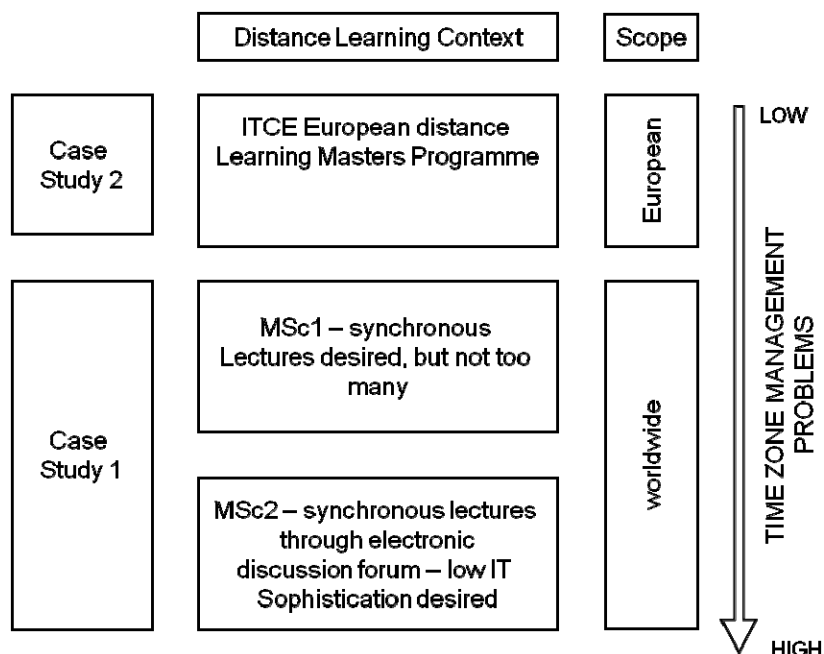
enhanced connectivity between the learners. In summary, the learners expressed their satisfaction with the distance learning programme as they were able to interact with learners in nine universities contributing to a 'feel of achievement' as being educated concurrently in nine universities.

Cross Case Study Comparisons

Both Case Studies 1 and 2 utilised ICT based distance learning tools with varying degrees of sophistication and the managers of the MSc programmes considered social interactions between learners as a priority. The different ways by which the distance learning programmes were structured indicated the importance of social interactions. Case Study 1, which offered a centralised delivery process targeting learners from a wider geographic spread, mainly used asynchronous mechanisms with a low degree of synchronous methods to run online tutorials. Case Study 2 departing from this model, offered more synchronous methods as the student dispersion was restricted to the EU region. The course designers were justified in increasing the emphasis on synchronous methods based on their ability to facilitate social interactions. One of the features in Case Study 2 was its adoption of video streaming via web cams to achieve a near face-to-face interaction between tutors and learners during online tutorials.

The relationship between the case study context and the time zone management problems can be represented as given below in Figure 3.

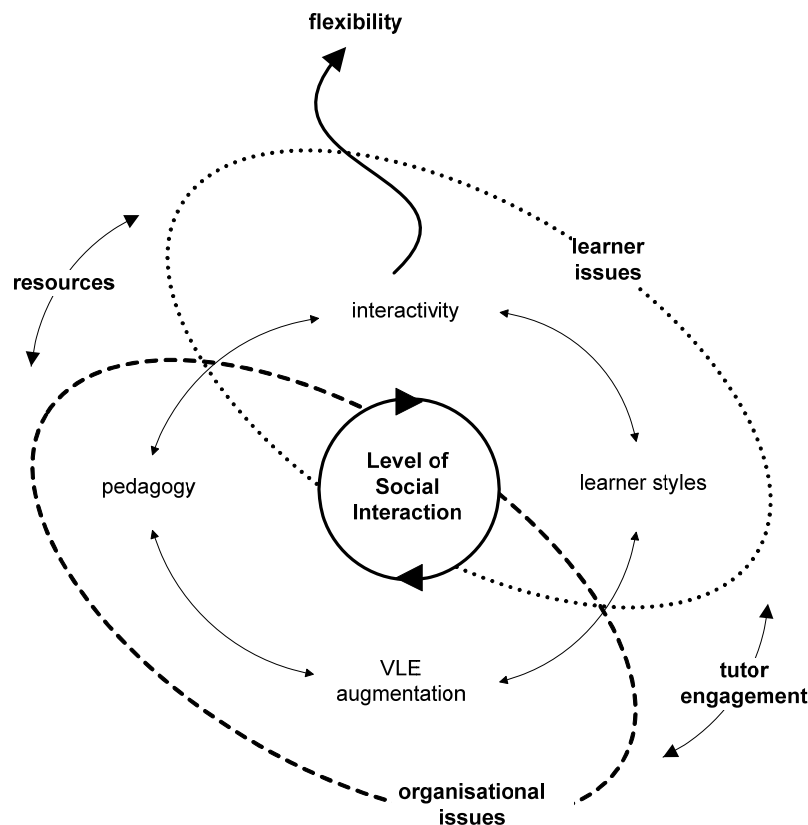**Figure 3 Cross case study representation**

Figure 3 presents how the distance learning course designers have rationalised the IT sophistication of their programme given the physical barriers of time zone management. For instance, situated in the extreme was MSc2, with synchronous discussion forum sessions,

which are extended as asynchronous discussions. Case Study 2 on the other hand, adopts both formal and informal synchronous tools to improve social interactions. This is justified by the low level management problems and physical barriers associated with time zones. The survey of learners in each of the case studies indicates their preferences not to be isolated and to be engaged with co-learners and tutors. This was mainly evident in Case Study 2 where the students had to work on a group project as one of their assessments in the programme. They understood the important role that ICT based delivery mechanisms played, but at the same time appreciated the flexibility aspect of distance learning courses as the majority of the learners were employed full-time in the construction industry.

The results show that amidst physical barriers such as difficulties of time zone management, the managers of distance learning programmes still put in place mechanisms to facilitate social interactions as they considered them as priorities. The managers also want to ensure that they do not compromise the distance learning philosophy of learners studying in their own time and at their own pace by introducing too many synchronous delivery mechanisms. Therefore, the results of the study contextualise how ICT based distance learning mechanisms are used in practice within distinctly different distance learning scenarios. In terms of the main research question set out in the paper it tends to show that although social interactions are considered to be a priority, the degree to which the measures are put in place are subjected to commercial realities and are strongly desired by the learners. Therefore, developers of ICT based mechanisms for distance learning should note the importance of contextualising their teaching and learning material.

Discussion

The case study findings in conjunction with extant literature, helped inform the main conceptual model emerging out of this research – see Figure 4. In this respect, Figure 4 highlights a central core 'Level of Social Interaction' through which two polarised tensions exist: learner issues, and organisational issues. The learner issues embody the type (e.g. full-time/part-time/distance-learning) and level (e.g. undergraduate/postgraduate etc) of the learners involved; the level of interaction required (e.g. full/partial); and the corresponding learner styles of the learner group. These issues also incorporate such concepts raised by Kolb (1984), Honey and Mumford (2006), and Felder and Silverman (1988). However, the organisational issues incorporate pedagogical concepts (Gagne *et al.,* 1988); Reigeluth, 1999; Merrill *et al.,* 1996), along with the VLE infrastructure augmentation and drivers (see Alshawi *et al.,* 2006; Vercoustre and McLean, 2005). These two polarised ellipses are intertwined by the dynamics of resources (infrastructure, time, cost), and tutor engagement (learner/tutor ratio).

Figure 4 Social interaction conceptual model

From Figure 4, it can be seen that the main considerations in the choice of ICT based synchronous and asynchronous delivery tools are predominantly driven by two interrelated activities, representing the institutional and learner settings respectively. This balance, by default embraces a trade-off between flexibility of undertaking learning (from a learner's perspective), through to a capacity to fully furnish this need (from an institutional perspective). In addition, amidst the constraints placed on the managers of distance learning programmes, various measures are often put in place to enable social interactions of the learners thereby negating learner isolation in favour of enhancing engagement. This paradigm does, however, need to be tempered with the availability of resources to service this arrangement, along with an expectation that learners themselves have a direct responsibility to engage in the teaching-learning process, which directly impinges on the overall effectiveness of the online distance learning experience (see Gal-Ezer and Lupo, 2002; Hodson *et al.*, 2001).

Conclusion

Specific advantages offered by ICT enabled tools have revolutionised the way distance learning education is structured, augmented and delivered. This not only presents learners with greater and emerging opportunities to learn online, but also allows learning providers to maximise resources. A review of the extant literature indicated that although advances in technologies have focused on some of the logistical barriers of addressing student concerns,

they still fall short of meeting the social requirements of actual classroom sessions. In this respect, learners often felt a sense of isolation and perceived a gap in their learning experience when compared to learners engaged in conventional face-to-face sessions.

This paper investigated the extent to which social interaction of learners was considered a priority within distance learning courses, and examined the views of both distance learning tutors and learners, so that the distance learning provision could be effectively contextualised. In this respect, two case studies of two different models of distance learning delivery were presented for discussion, namely: a centralised and a distributed distance learning delivery. The two case studies were chosen deliberately from the construction industry to address some of the unique characteristics of the industry as justified in the earlier section relating to distance learning provision in the literature review. Incorporating the above, this paper then presented a conceptual framework for interpreting the social interaction dynamics associated with distance learning environments. The study indicates that while the new ICT based tools need to satisfy some of the student concerns related to more interactive social interactions (that prevent isolation) they should also strongly support some of their aspirations of gaining higher degree qualifications without sacrificing workplace commitments. This is significant within the construction industry as the majority of the learners seeking postgraduate qualifications desire distance-learning education. Therefore, the managers of distance learning courses should satisfy their need for improved social interaction by providing a distance learning programme that has the flexiblity to be accessed amidst pressures of work commitments.

The results of this research have implications on fields other than construction due to the widespread use of the model in many educational contexts, specifically those that use more online live lectures. Furthermore, learning providers should openly acknowledge that the viability of distance-learning courses should not only be assessed from a financial perspective, but should also directly embrace pedagogical effectiveness and level of social interaction as part of the holistic evaluation process. From a research methodology perspective, research limitations are acknowledged to embrace learner sets from two case studies only. Therefore, generalisation, repeatability, and inference taking needs to incorporate this caveat; and in this context, the conceptual model presented would benefit from further empirical data (especially temporal), to tease out the priorities, drivers, and barriers from the two polarised positions presented.

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Appendix

Survey Guideline

PLEASE CIRCLE THE BULLET/TICK THE BOX AND/OR TYPE/WRITE YOUR RESPONSE

- Your name (optional): ……………………………………………..

- Contact details (email - optional):
  …………………………………………………………………….

1. Give details of the distance learning course that you are following

   - Distance Learning course name:

     …………………………………………………………………

   - Where you are based (country / region):

     …………………………………………………………………

   - Online tool/tools used for delivery:

     …………………………………………………………………

2. What are the reasons for choosing a distance learning course as opposed to a classroom based course? (you may select more than one option here)

   - That is the only delivery mode available [ ]

   - This is the only course available [ ]

   - Ability to work full time while studying [ ]

   - Other Flexibility issues [ ] Please specify below

   - This course was recommended to me by:………………

   - Other (Please specify)
   …………………………………………………………………………………………
   …………………………………………………………………………………………

3. To what degree do you get the opportunity to interact with other learners

   - Always [ ]

   - Sometime [ ]

   - Never [ ]

   - Please specify the details below

   …………………………………………………………………………………………
   …………………………………………………………………………………………
   ………………………………

4. In addition to the formal tools used in the programme, do you use any other form of communication / tools with the tutors, other learners.

Please give details: …………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………
…………………………………………………

5. How is the distance learning course delivered to you?

• Context

…………………………………………………………………………………

• Delivery   methods

…………………………………………………………………………………

• Frequency of synchronous (at the same time) / asynchronous delivery

…………………………………………………………………………………

• Times

…………………………………………………………………………………

• Resources

…………………………………………………………………………………

• Other   details

………………………………………………………………………………………………………
………………………………………………………………………………………………………
……………………………………...

6. What are the likes, dislikes, advantages and disadvantages of the distance learning programme that you follow (you may perceive these differences when compared to a classroom based discussion)

• Likes

…………………………………………………………………………………

• Dislike

…………………………………………………………………………………

• Advantages

…………………………………………………………………………………

• Disadvantages

…………………………………………………………………………………

7. What problems connected to the delivery methods / tools have you faced

- Sudden disconnection problems [ ]

- Poor audio / data / video connection problems [ ]

- Computer resources problems (memory, speed, ect.) [ ]

- Other functionality problems (Please specify) [ ]

………
………
………………………………………

8. What are the specific tutor actions that motivate you to learn within the distance learning environment (e.g. personalisation, interaction, specific guidance, time for questions/ clarifications etc.)

- Personalisation [ ]

- Interaction [ ]

- Specific Guidance [ ]

- Question times [ ]

- Other (Please specify) [ ]

………
………
………………………………………

9. To what extent does the distance learning environment map with an actual classroom setting (personalisation, interaction etc.)

- The degree to which it is Personalised

  - Maximum [ ]

  - Minimum [ ]

  - Average [ ]

- Confidence in asking questions

  - Full confidence [ ]

  - No difference to a class room setting [ ]

  - Nervous [ ]

- Other (please specify).

………
………
…………………..

10. In your opinion what added functionalities/features would you like to see within your
distance learning environment to enhance your learning experience?

………………………………………………………………………………………………………

………………………………………………………………………………………………………

………………………………………………………………