

Paper 146 – Full Paper

Using synchronous web conferencing to enhance situated distance learner experience in a built environment context

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Abstract

The distance learning mode is a challenging way of studying, and yet is one increasingly adopted by situated, part time learners. An appropriate pedagogical context for considering online synchronous distance learning education is established from the literature, focussing on constructivist theories to enhance situated distance learner experience using synchronous web conferencing. Whether current practice accords with the literature based model is then explored using a survey of 12 post graduate distance learning courses in the built environment, University of Salford. The focus of the survey is on student experiences of studying with the support of online web conferencing software, ElluminateLive! Findings indicate that distance learning study is overwhelmingly enhanced by the use of synchronous conferencing. Equally, however, students derive significant benefit from being able to access recordings of synchronous sessions. Further research is recommended both into additional qualitative data acquired from this study and into problematic aspects of pedagogical approach hinted at by the current data.

1. Introduction

Successful learning builds from what is already known (Jonassen *et al.*, 1999). Mayes and de Freitas (2007: 17) establish that activities for constructing understanding have two key characteristics: they promote learner interaction with domain centred concepts, and they offer the opportunity for learners to exchange with other learners their ongoing experience of their developing understanding. Such learning is commonly referred to as being "situated". On one level this relates to learner centred learning which is heavily focussed on the learner's professional context, and may involve problem-centred learning. An alternative view is to focus on the learner's relationship with a group of people, albeit a group who are all involved in the same wider practice (Barab and Duffy, 2000). Entry into a professional domain requires more than simply acquiring the knowledge objects of that profession, it is also necessary to adopt its culture and way of working (Lave and Wenger, 1991; Wenger, 1998). Ellaway (2007: 154) argues that virtual environments may be exploited to afford professionals opportunities to practise professional skills in a supportive environment which reflects the real world, but which is less risk-laden (Schön, 1987, in Ellaway, 2007).

Such theories arguably underpin the pedagogical design of most masters level courses targeted at students who seek to deepen and broaden their professional expertise. Increasingly, however, such courses are being delivered on a distance learning ("DL") basis (Allen and Seaman, 2010). Indeed Shachar and Neumann (2010) argue that the trend is for the DL mode to outstrip the "traditional mode" not merely in numbers but in student performance levels, despite which DL still treated as anomalous in many organisations. In order to seek to implement learning strategies in DL courses, many institutions rely on a range of technological innovations. The focus of this paper is on one such; the use of synchronous web conferencing.

2. Literature Review

2.1 Synchronous conferencing in online education

There are a number of different terminologies in the literature, which relate to the same, or similar, technologies. Mirza and Lamy (2010) talk about synchronous audio-graphic systems; Schullo *et al.* refer to a 'synchronous web-based course system' (2005); many refer to CMC, which may be Computer Mediated Conferencing/Communication, and which covers a broad spectrum of e-based practices, both synchronous and asynchronous (Collis, 1996: 227). As Kenning points out (2010: 4, 9) it is crucial to the robustness of any research paper that the specifics of the system under investigation are made clear. In this case, the focus is on the use of ElluminateLive!, a piece of web conferencing software which permits multi participant text, audio and video synchronous communication, the use of application sharing, and the presentation of images and text by a presenter. Such interactions occur synchronously, for which Kenning's definition is adopted: 'the necessary availability of the participants for the whole of a communicative event' (2010:7).

Collis (1996) claims synchronous instruction systems have four principal advantages. They assist with the provision of motivation; real time-interaction assists with the development of group cohesion; instantaneous feedback can be provided; and the regularity of the synchronous sessions encourages learning discipline (Collis, 1996, in Schullo, 2006). The review of Schullo *et al.* (2005) confirms that there is considerable evidence in the literature that interaction is important for effective distance learning teaching and that interaction, whether tutor to peer, or peer to peer, improves student attitude, depth of learning and student retention (Schullo *et al.* 2005:3).

2.2 The problem of disaffection and models for resolution

The DL mode can be peculiarly vulnerable to student disaffection, isolation and lack of motivation, all of which can translate into high drop out rates (Rovai, 2002, and Schullo *et al.* 2005). Hutchins (2003) posits that there may be mileage in the enhancement of distance learning experience by focussing on techniques which enhance 'instructional immediacy', primarily at a verbal level. Examples of behaviours tending to lead to this include using humour, using students' names, responding to student-initiated comments and encouraging discussion (Hutchins, 2003). Such approaches are evidently not the exclusive domain of online synchronous conferencing, and instead derive from the wider examination of what is

'good' teaching practice (Worley, 2000: 101). Hutchins seeks to correlate concepts of 'instructional immediacy' with the Seven Principles of Good Practice developed by Chickering and Gamson (1987, in Hutchins, 2003) which may be summarised as:

1. Encouraging contact between students and tutors;
2. Developing reciprocity and cooperation between students;
3. Encouraging active learning;
4. Giving prompt feedback;
5. Emphasizing time on task;
6. Communicating high expectations;
7. Respecting diverse talents and ways of learning.

Shea *et al.* (2003) also focus on the potential relevance of the Chickering and Gamson principles to online learning, albeit in an a-synchronous context and this time drawing correlations between the 7 principles of engagement and the model for effective learning environments developed by Bransford *et al.* (2000, in Shea *et al.* 2003:63ff). This model posits that good learning environments are centred, interdependently, upon knowledge, upon learners, upon the specific and wider community, and also upon the assessment chosen.

Garrison *et al.* (2000) developed a Community of Inquiry model for the enhancement of computer mediated communication and conferencing, based around the inter-relationship of three "presences" – social, cognitive and teaching. Teaching presence is defined as the design of the educational experience coupled with its facilitation. Since its original publication this model has been implemented in many different contexts (Garrison *et al.* 2010, and including Shea, 2003, *supra*).

The shortfall with some of these theoretical bases for current purposes is that they were developed in the context of wider DL programmes, which were more reliant on a-synchronous approaches and were not specific to domain centred teaching and learning.

2.3 A framework for evaluating internet conferencing in distance learning

Hacker and Niederhauser (2000) focus on five key principles to promote deep and durable learning in the online classroom; students to become active participants, effective use of examples, collaborative problem solving, feedback that is commensurate with performance, effective instruction has embedded motivational components within it. They further point out that to achieve deep and durable learning it is vital to adopt reflective instructional practice. Reflective instructional practices depend on how knowledge is constructed in domains (Chi & Ceci, 1987). The built environment discipline has almost acquired the status of a well established, recognised multi-disciplinary field of study with high vocational orientation (Chynoweth, 2009). Although there are no clearly established boundaries for the built environment domain (Chynoweth, 2009), Griffiths (2004; 711) has described it as “*a range of practice-oriented subjects concerned with the design, development and management of buildings, spaces and places*”.

Distance learning courses in built environment education in the last decade have evolved to utilise real-time, online delivery mechanisms to deliver effective teaching and learning. The UK Government's 'Skills for Sustainable Growth' report outlines the skills policies' twin objectives as being wider and more flexible access to skills training at every level. This is to be achieved by providing new opportunities to study part-time and by drawing an even tighter focus on the skills required for the modern world of work (DBIS, 2010). As the built environment is closely aligned with the skills agenda, this subject domain, and therefore the education provision within it, presents its own unique challenge. It is characterised by multi and interdisciplinary team work practice, projects that are often simulated or closely mirror the 'real world' and drawing on the design, construction and property industries. As Hacker and Niederhauser (2000) point out these characteristics are the essential ingredients of web based courses that are capable of promoting deep and durable learning.

A similar constructivist notion also promotes the idea that the learner has to drive the process of learning (Svinicki 1999) and that learners actively construct their own meaning and knowledge from their experiences (Bangert, 2004). Partlow and Gibbs (2003) found from a Delphi study that online courses designed from constructivist principles should provide project-based learning, cooperative group work, tasks that require higher order thinking and interactivity, while providing learners with some choice or control over their learning. Knowledge construction takes place via the opportunity to interact with other learners in sharing, discussing, constructing, and negotiating meaning (Redmond, 2006). Course design specified by Partlow and Gibbs (2003) would encourage this interactivity.

Even though synchronous online learning "involves people in different locations using internet tools and resources to work together" (Harris, 1999; Redmond, 2006), synchronous online learning for situated learners aligns with constructivist principles that advocate the learner as central to the learning process, who shares and negotiates understanding. In this context, research considers pedagogical practices to enhance learner experience via synchronous web conferencing. Table 1 presents a comparison between widely accepted constructivist theories to enhance learner experience via synchronous web conferencing. Most of these theories are underpinned by the Seven Principles of Good Practice referred to above (Chickering and Gamson, 1987). However, research realigns these practices towards synchronous web conferencing and collaborative learning. In addition, research includes 'organisation and management' and 'infrastructure' sections from the frameworks presented by Pahl (2003) and HEFCE (2011).

Table 1: Comparison of pedagogical practices to enhance learner experience

	<i>Chickering and Gamson (1987)</i>	<i>Pahl (2003)</i>	<i>Johnson and Aragon (2003)</i>	<i>Redmond and Lock (2006)</i>	<i>National Student Survey (HEFCE, 2011)</i>
1. Teaching and Academic support	Encourages contact between students and faculty	Knowledge modelling: Acquisition, modelling of and access to educational knowledge.	Motivate the student; Address individual differences	Developing and maintaining teaching presence	Teaching; Academic support
2. Reciprocity and Cooperation	Develops reciprocity and cooperation among students	Collaborative learning: Supporting student communication & collaboration via systems and shared workspaces.	Encourage social interaction	Creating and sustaining a learning community	
3. Active learning	Encourages active learning	Active learning: Engaging the student through interactive systems.	Create a real life context; Provide hands on activities	Fostering social presence; Participating in critical discourse; Knowledge in action	
4. Feedback	Gives prompt feedback; Emphasises time on task	Evolving instructional design: Planned evolution integrated in design through course evaluation.	Encourage student reflection and reflective learning	Exploring cognitive presence	Assessment and Feedback
5. Personal development	Communicates high expectations; Respects diverse talents and ways of learning	Autonomous learning: Personalisation and independent learning through adaptive systems	Avoid information overload	Scaffolding learning	Personal development
6. Organisation and management					Organisation and management
7. Infrastructure		Infrastructure: Changes due to developments in technology or learning devices			Learning resources

3. Research Method

Guided by the principles of the interpretive research paradigm, the operational aspects of this research are based on a survey research method. Questionnaire surveys provide an efficient way of collecting data from a large sample as the respondents are asked to answer the same set of questions (Saunders et al, 2007). Dillman (2000) suggests that three types of data variables can be gathered from questionnaires; opinions, behaviour and attributes. An opinion variable discloses what the respondents believe or their feelings about a subject; a behaviour variable records the experience of the respondents regarding a subject; and the attribute variable reveals the characteristics of the respondents. This survey utilises all three types of variables to collect information regarding student opinion, experience and characteristics, but focuses on the collection of student opinion and experience regarding the usage of online conferencing for distance learning. The survey questionnaire was constructed based on the following key pedagogical practice areas to draw out situated distance learner opinion and experience in using synchronous web conferencing.

1. Teaching and Academic support
2. Reciprocity and Cooperation
3. Active learning
4. Feedback
5. Personal development
6. Organisation and management
7. Infrastructure

For this purpose, an online survey was conducted across 12 built environment programmes at the University of Salford targeting 262 postgraduates. 92 valid responses were received providing a response rate of 35%. Whilst additional data relating to year of study and programme were obtained, such granularity has been ignored in this initial analysis of the data.

A list of the questions posed is contained in the Appendix. The questionnaire was delivered through survey monkey with an appropriate introduction to address purpose and ethical issues. A response was required to every question except for the final one.

4. Data Analysis

The questionnaire data has been analysed and assessed in the context of the criteria set out in Table 1. The Likert scale has been used in many questions where the mid point is seen as the neutral position. Accordingly, in the following analysis where conclusions are expressed indicating positive or negative tendencies such conclusions exclude mid point data.

Though the views of students from a range of programmes were canvassed, all students were drawn from one school in a single institution. Accordingly, there may be features of commonality in delivery approach which limit the generalisability of conclusions.

5. Findings

5.1 Teaching and academic support

The vast majority of respondents attend 'many or nearly all' sessions (87%, or a mean value of 4.52) with those attending 'none' being just 2%. It is clear that the hyperlinked online archived sessions are seen as valuable with 97% having reviewed at least one session and significant proportions reviewing many more. There were no respondents who neither attended any live sessions nor viewed any archives. The statistics demonstrate that many students must review the archives of live sessions they have already attended.

In relation to teaching and learning methods the survey indicates a very positive response with very little variance. The vast majority of respondents agree that the learning and teaching methods used are appropriate (92%) and slightly more (93%) confirm that the sessions provide an opportunity for clear staff explanations. 90% of respondents were comfortable that they were able to ask questions via their preferred modes (chat, audio etc). Overall the majority were satisfied with the quality of the synchronous sessions (88%).

5.2 Reciprocity & Co-operation

75% are satisfied that discussions in the synchronous sessions made the subject interesting. The majority felt that their suggestions and ideas are valued in synchronous sessions (74%). Statistics demonstrate that the vast majority of respondents felt satisfied in being fully engaged in sharing their tacit knowledge and learning from others within the group.

5.3 Active Learning

The synchronous sessions provided an appropriate environment in which to learn for most respondents (93%). Most respondents indicated that the web conferencing software enhanced the feeling of a 'community of practice' where they felt part of a group that were committed to learning. However, 9% of respondents were less satisfied, and these students may have felt somewhat isolated. 68% of respondents indicated that their ability to learn online informally and socially had improved following participation in synchronous sessions.

5.4 Feedback

The students' responses were more varied on formative feedback on their learning during the course. 82% agreed that discussions during synchronous sessions linked well with the assessment brief. The majority recognised that synchronous sessions had been used to provide support and feedback on their work. However, there were a significant number who disagreed with this (16%).

5.5 Personal Development

Only 33% of respondents were satisfied that their communication skills had improved as a result of participation in synchronous sessions, and 21% indicated that their skills had not improved. This may suggest that they started at a high level or viewed this as one of a range of vehicles that enhance their communication skills, or again it could reflect that only a limited type of interaction was expected of them. The question could arguably have been more specific and asked about 'virtual communication' skills. 35% are satisfied that their IT skills have improved owing to participation in Elluminate sessions. However, 22% disagreed suggesting that their IT skills were already proficient. There is a 0.66 correlation between communication skills and IT skills. 68% are strongly motivated by Elluminate in that it has stimulated their enthusiasm for further online distance learning

5.6 Organisation & Management

The vast majority (81%) were satisfied that the timetable for the synchronous sessions works efficiently. This is an encouraging figure since it is only to be expected that timetabling cannot suit all individuals. Also, just 2% of respondents declared that changes in teaching schedule had not been communicated effectively.

5.7 Infrastructure and response to technical issues

In this section we sought to establish which features of the web conferencing software adopted were perceived as being most beneficial by the students. The Whiteboard – somewhat equivalent to a PowerPoint display, albeit with the added option of annotating the space - was positively viewed with the majority of students being satisfied (65% to a great extent). Likewise, the utility of audio conferencing was considered at least satisfactory by most with 54% to a great extent. Given that audio conferencing is the prime means for many tutors to communicate with students, the negative views of this feature warrant further investigation. Video conferencing was viewed less favourably. Only 61% of students were even satisfied with video conferencing and only 25% were satisfied to a great extent, whereas 39% rated this feature as of little or no use. We cannot establish from this survey from what the relative dissatisfaction with video interaction is derived. Possible causes include the technical problems that video's greater hunger for bandwidth may prompt or social issues such as students being more comfortable in a less exposed position. Certainly text chatting, which in ElluminateLive! operates on a "publish when ready" basis (see Kenning, 2010: 7), is widely regarded as useful with 88% of students being at least satisfied (and 62% to a great extent).

Turning to the more technologically advanced features of ElluminateLive!, 80% of respondents liked the idea of polling & quizzes; but 20% saw these features as of little or no use. Anecdotal evidence from some of the tutors involved in the surveyed courses suggests that these features are not frequently utilised by academic staff, though the generally positive attitude to them suggests that wider adoption might be a 'value add' for students in future sessions. As for application sharing, where one participant shares the whole or part of their

virtual desktop with the rest of the participants in a synchronous session, 84% were satisfied or better (40% saw this feature as useful to a great extent). Once again, anecdotal indications suggest that application sharing is not widely used by academic staff but these results point to its potential benefit for use in future sessions. Break out rooms, which permit the virtual cohort of participants to be split off into smaller "rooms" in order to carry out tasks or discussions, were perhaps less favourably viewed. Only 59% of respondents were positively inclined to any degree with only 21% greatly in favour. On the other hand, 41% were negatively disposed. Possible reasons include a lack of comfort towards working in a virtual environment with peers they hardly know, as well as a potential lack of meaningful tasks designed by the academic. Perhaps some ice-breakers early on in the use of the technology could help build confidence in this feature.

Though all students had immediate hyperlink access to the archived recording of any earlier synchronous session, few students had ever been supplied with downloadable audio or video files of these archives by academics. All students had access to software, ElluminatePublish, whereby they could create their own downloadable files. There was, however, an overwhelming lack of interest in taking advantage of that feature; 56% felt that there was little usefulness at all to creating audio with an even more significant figure 90% not seeing the relevance of creating video podcasts. That is not, however, to say that students were uninterested in having their own portable archives. Far from it, 77% of respondents showed a strong interest in being provided with audio (MP3) archives and 53% with video archives. The relative lesser popularity for video archives may be explained by the fact that the normal session archives are provided in "video" format, and whilst these require live internet access, at the same time, watching video is less flexible than listening to audio (e.g. you can drive and listen to an MP3 file).

Informal discussions with students who had had access to 'unplugged files' supported the view that these added value as no internet access was required for archive access. Few participating members of academic staff publish downloadable archives of sessions. Such an operation may be perceived as being an advanced feature, though in any event publication requires additional time and resource to achieve. There is therefore a tension between the desires of students and the current provision practices which remains unresolved.

Finally the respondents gave some feedback regarding technical aspects of the interface. 7% of respondents experienced detrimental problems with sound transfer often or always and a further 36% sometimes had problems. Though this means that over 50% of respondents had a relatively trouble free interface, the adverse view is significant. Sound is a key element of the learning environment, and if it degrades the learner benefit is inevitably adversely affected. It can be postulated that the impact of poor sound may be even more keenly felt in a DL mode, since if sound is poor in a face to face environment the student may have the option of moving nearer the speaker, whereas in DL, their options may be limited to flagging the problem with a text chat message, but with no guarantee that the speaker has power to improve the situation.

As for difficulties logging on, a significant minority, some 21%, experienced difficulties at least sometimes. This is a real problem – given that one purpose of using synchronous sessions is to assist with motivation and esprit de corps, there can be little more likely to demotivate than

an inability even to step foot in the room. It is encouraging that 29% never encountered a difficulty, and that 50% rarely did. A positive aspect of the findings, and one that underlines the necessity for providing timely and appropriate technical support, is that 41% often asked for support, or were provided with it immediately when they asked. There remains no room for complacency on this front, however, since 24% of respondents were only given timely support sometimes or rarely.

6. Conclusion

This paper reports only a partial analysis of the research findings, since a rich qualitative data-set has been gathered from the "any other comments" field, and this provides a much more nuanced and reflective account of the student experience than does the quantitative outlined above. Even so, some valuable findings emerge.

Though the intended target of this research exercise was the ability of synchronous web conferencing to support the learning of part-time DL students, data was also gathered regarding the associated feature of the software; its ability to archive synchronous sessions. The activity of students reviewing what was discussed in class is a feature of the system which supports active and reflective learning. The positive response of students to the various synchronous modes of communication also indicates the important role synchronous sessions may have in encouraging contact between students and tutors, and between students. A striking finding was how averse students appeared to be to the technology of breakout rooms. According to the model outlined above pedagogies which encourage reciprocity and cooperation between students should enhance student experience and learning. Break out rooms seem tailor-made for doing this, and for replicating at DL the use of break out groups in class rooms. However, experience from our data is that currently these are not being leveraged as well as they might in order to embed this benefit.

Likewise, a significant minority did not consider that feedback was provided via the synchronous sessions, or that they felt part of a community of practice. These findings may highlight a mismatch between the pedagogies adopted in the synchronous sessions, as compared with what the technology permits. Overall, our analysis shows that learner experience can be dramatically enhanced using web conferencing. However, if the learning design could focus on incorporating project-based learning, cooperative group work, tasks that require higher order thinking and interactivity (Partlow and Gibbs, 2003) it may be that better knowledge construction can be achieved. Further research is recommended both into additional qualitative data acquired from this study and the above mentioned problematic aspects of pedagogical approach hinted at by the current data.

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Appendix – Questionnaire

The topic headings equate to the pages on the online survey.

<i>Demographics & System Usage</i>		
1.	Please select the course you are studying:	<i>12 programmes listed, "other" option permitted</i>
2.	Please select when you first enrolled on the course:	<i>Range of enrolment dates offered</i>
3.	In relation to the live sessions, I attend:	<i>All/nearly all Many Some A few None</i>
4.	In relation to the archived sessions, I review:	<i>[ditto]</i>

Academic Support & Active Learning

Please indicate your attitude to the following statements by selecting the appropriate response from the drop-down menus:

5.	"The learning and teaching methods used in Elluminate are appropriate"	<i>Definitely agree</i> <i>Mostly Agree</i> <i>Neither agree no disagree</i> <i>Mostly disagree</i> <i>Definitely disagree</i> <i>N/A</i>
6.	"Elluminate provides a good platform for staff members to explain things"	<i>[ditto]</i>
7.	"I was able to ask questions via preferred modes (chat, audio etc) in Elluminate"	<i>[ditto]</i>
8.	"Overall I am satisfied with the quality of the Elluminate sessions"	<i>[ditto]</i>
9.	"The Elluminate sessions provide an appropriate environment in which to learn"	<i>[ditto]</i>
10.	"Elluminate enhances my feeling that I'm part of a group of students committed to learning"	<i>[ditto]</i>
11.	"My ability to learn online informally and socially has improved owing to my participation in Elluminate sessions"	<i>[ditto]</i>

Reciprocity – Feedback – Personal Development

12.	"Discussions in Elluminate have made the subject interesting"	<i>[ditto]</i>
13.	"I feel my suggestions and ideas are valued in Elluminate discussions"	<i>[ditto]</i>
14.	"Discussions in Elluminate linked well with the assessment brief"	<i>[ditto]</i>
15.	"Elluminate sessions have been used to provide support and feedback on my work"	<i>[ditto]</i>
16.	"My communication skills have improved due to participation in Elluminate sessions"	<i>[ditto]</i>

17.	"My IT skills have improved due to participation in Elluminate sessions"	<i>[ditto]</i>					
18.	"Elluminate has stimulated my enthusiasm for further online distance learning"	<i>[ditto]</i>					
<i>Organisation & Management – Elluminate Features</i>							
19.	"The Elluminate timetable works efficiently as far as my activities are concerned"	<i>[ditto]</i>					
20.	"Any changes in the teaching schedule have been communicated effectively"	<i>[ditto]</i>					
21.	Rate the usefulness of the following Elluminate features:						
		<i>Very</i>	<i>Somewhat</i>	<i>Little</i>	<i>Very little</i>	<i>Not at all</i>	<i>Not experienced</i>
	Whiteboard						
	Audio conferencing						
	Video conferencing						
	Text chatting						
	Polling and quizzes						
	Application sharing						
	Breakout sessions						
22.	I use Elluminate Publish (or other software) to create my own:						
		<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>	<i>Not heard of Publish</i>
	Audio downloads of sessions						
	Video downloads of sessions						
23.	I would value being provided with downloadable...						
		<i>Definitely agree</i>	<i>Mostly agree</i>	<i>Neither agree & c</i>	<i>Mostly disagree</i>	<i>Definitely disagree</i>	<i>N/A</i>
	Audio Mp3s of elluminate sessions						
	Video files of elluminate sessions						
<i>Technical Issues</i>							
<i>Rate the common issues with Elluminate sessions:</i>							
24.	"My learning experience has been degraded by poor sound quality/low sound volume"	<i>Always</i> <i>Often</i> <i>Sometimes</i>					

		<i>Rarely</i> <i>Never</i> <i>N/A</i>
25.	"My learning experience has been degraded by difficulties logging into the live sessions"	<i>[ditto]</i>
26.	"Technical issues with Elluminate were resolved quickly"	<i>[ditto]</i>
27.	If you have any other comments about your experience of Elluminate sessions please set them out here:	