AN EXPLORATION INTO THE REACTIONS OF UNDERGRADUATE STUDENTS TO VIRTUAL LECTURES

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Abstract
Using a literature survey this paper explores the different interpretations of the term virtual and its potential impact on undergraduate students. The literature reveals that many researchers have concerns on the possible negative effects should virtual education reduce the interaction between the educator and the student. Some studies have researched the reactions of students to using virtual lectures and whether it facilitates rather than hinders their individual learning outcomes.

An information technology subject at Swinburne University of Technology has adopted a multi-modal approach to subject delivery comprising face-to-face tutorials and replacing face-to-face lectures with virtual lectures. These lectures are delivered online via the World Wide Web. Concurring with other researchers my findings suggest that although students enjoy the convenience of online virtual lectures, many are reluctant to relinquish the face-to-face mode of lecture delivery. Furthermore the majority of students appear to demonstrate a lack of motivation to view these lectures on a regular basis, preferring to view them when the need is greatest i.e. for assessments.

Keywords
Face-to-face lectures, multi-modal delivery, virtual education, virtual lectures

Introduction

This paper reports findings from my particular research interest of electronic delivery of learning materials, focusing on virtual lectures that are delivered online on the World Wide Web and their impact on undergraduate students. Using networked or Internet technology for the development and delivery of learning materials has become increasingly prevalent in higher education. Extending this to include degrees of virtuality may be attributed, in part, to the increasing globalised use of the Internet.

As a university lecturer my concern is whether the use of virtuality in education enhances the students' learning experience or hinders their progress. Before conducting research into this problem it was necessary to survey the pertinent literature to discover what is known or not known about this issue. Immediately my search revealed that the term virtual has been interpreted in different ways within the context of higher education. This paper presents some of these interpretations whilst narrowing the focus to virtual lectures, which incorporate the use of text, image, hyperlinks and audio for delivery online via the World Wide Web.

The ITSM discipline at Swinburne University of Technology, Lilydale (SUTL) has adopted a blended pedagogical approach of Instructivism and Constructivism using multi-modal facilitation. Students are encouraged to be constructive in their approach to learning by being self-directed and seeking deeper understanding. Some subjects in the ITSM discipline endeavour to facilitate this

process by using a multi-modal approach to subject delivery comprising virtual lectures available online and face-to-face tutorials. However the virtual lectures and face-to-face tutorials maintain an instructivist framework where the student is expected to acquire the knowledge imparted by the instructor. The students' learning outcomes are then measured by their performance in required assessments.

My research explores the reactions of students in an information technology subject at SUTL, LAI210 Database Modelling and Concepts, which in 2001 adopted the multi-modal approach to subject delivery. Virtual lectures have replaced traditional face-to-face lectures, which were delivered in a lecture theatre whilst students listened and took notes. This, together with understanding the student's individual learning styles, directly addresses the purpose of this paper: to clarify and define the role of virtual lectures within education so that their impact on undergraduate students may be better understood.

Different Views of Virtual Education

My search revealed one consistent theme throughout the literature surveyed: virtuality in higher education uses an Internet based learning experience. Some researchers viewed virtual education as a means of alleviating geographical limitations for students studying at different campuses. Knox (1996) addressed this limitation by embracing the virtual aspect of education in the form of interactive video conferencing. This allowed students to study a course whilst being physically located in different geographical campuses. Stemer (1995) wrote of the virtual classroom where students would undertake subjects held at various campuses and then 'travel from campus to campus without ever leaving town' (p. 39) by taking video courses.

There were researchers whose interpretation of virtual education refered to distance education. Mason's (1996) viewpoint was all encompassing i.e. a Virtual University, which relies on technology for the delivery of all learning materials such as lectures and tutorials as well as for all communication between students and teaching staff e.g. using e-mail. Collings & Walker (1996) took a more conservative approach by using computer technology for the purpose of communication only. They created electronic workspaces for all discussions between students and staff, using it to schedule occasional face-to-face meetings for group assessments.

A viewpoint that explored the use of virtual within the context of learning is Barajas & Sancho (2000) who posed the question 'What are Virtual Learning Environments (VLEs)?' (p. 22). Their answer to this question emphasised the importance of *learning* being the aspect that 'drives the activity' whereas virtuality 'refers to the *technology* that is brought in to support learning' (p. 22). They defined VLEs as 'any combination of distance and face-to-face interaction, where some kind of time and space virtuality is present' (p. 24).

Cooper's (2001) involvement with online courses offered the students a choice between completing subjects with traditional face-to-face classes or with online instruction only. Examinations were conducted on-campus for all students. During 1999-2000 Cooper conducted a comparative survey between these two choices by distributing surveys in-class and online via e-mail to the relevant students. In the surveys the students were asked to evaluate their class experience. Cooper found that although students did not 'view online instruction as a replacement for traditional classroom instruction', their overall response indicated that 'with the right instructor, and for the right student, Internet or online classes can provide an effective educational environment' which could 'offer a viable alternative to traditional classroom instruction' (p. 55).

Providing all or part of the learning material for university subjects online via the World Wide Web could encompass lectures, tutorials and exercises. Students may read/listen to this material at their own pace, in their choice of environment and during a convenient time. Self-Paced Web Courses are providing this same convenience. As Robinson (1999) explained 'students… take the time necessary to master new technologies and features' (p. 32). Not only can the students learn at their own pace, they can concentrate on the areas of need, skimming over or skipping the areas in which they already possess the skills. Consequently, although the student may be selective on their

areas of study, they would need to be disciplined and self-motivated in order to cover all the required material.

The possible excessive use of the Internet caused Aase (2000) to pose the phrase 'just as we wouldn't want to lead virtual lives, certainly we wouldn't want a virtual education' (p. 19). Yet, according to Aase, that is exactly what some people do want, with students who undertake online courses being happy to 'give up the classroom with all that it entails—long commutes, impossible parking, and monotonous lectures' (p. 19). According to Aase these students interacted more with their professor and peers in an online course finding their course work to be 'more rigorous, relevant, and satisfying' (p. 19). Roberson & Klotz (2002) maintained a high level of personal contact with their online students using chat sessions, creating interaction amongst the students as well as their instructors.

Considerations in a Virtual Learning Environment

There were studies that highlighted the benefits as well as disadvantages in using virtual learning environments to provide online delivery of subject material. Aase (2000) suggested that using technology for online learning offers many benefits, from convenience for the student to prestige due to online delivery carrying 'a cutting-edge cachet' (p. 19). Aase believed that there is greater teacher-student contact and peer-to-peer contact. However, it was not explained how this would be achieved. Aase highlighted some disadvantages with online learning such as 'facelessness: lack of verbal and facial cues, body language' (p. 23), as well as the possibility of technological breakdowns hence requiring twenty-four hour, seven days a week technical support. Other disadvantages included the increased workload to educators in developing the online courses and the cost involved in producing these online courses with 'audio, video and interactivity' (p. 23). Mason (1996) also saw the financial issues pertaining to the implementation of virtual education as a disadvantage. Although this issue is significant, it has wider implications not within the scope of this paper.

Finding research that specifically addressed students' attitudes towards virtual education led me to a study published by Barajas & Sancho (2000). From cases observed and studied, they determined the predominant underlying hesitancy by students to using virtual learning was technological. However the reasons for students in favour of using virtual learning were varied. These included the opportunity for expanding their knowledge in areas of technology, accessibility to different courses as well as a greater scope for communication amongst peers.

In accord with Barajas & Sancho (2000); Rivera, McAlister & Rice (2002) believed that technological mastery has an affect on students' level of satisfaction with the online course. Another influence on student satisfaction was their ability to be self-motivated. Despite this and concurring with other studies (Yatrakis and Simon, 2002; Cooper, 2001; Tucker, 2001) Rivera, McAlister & Rice found that the overall performance of students was not affected.

Yatrakis & Simon (2002) stated that despite the growth in demand for courses provided over the Internet, some universities still offer the same courses using traditional face-to-face delivery, hence giving students the flexibility to choose between the two modes of delivery. They felt that students with a self-directed learning style might choose the online format whilst students who desire direction and guidance as well as the 'supportive environment of a traditional classroom' may prefer the traditional format. Their overall conclusion was that *choice* to do online courses was the primary factor that determined a high degree of satisfaction, as the student was more likely to possess the learning styles best suited to this form of learning. However despite this they found that choice made no significant difference to the final results.

Regardless of the individual computer skills, human aspects must be understood in order to make computers an attractive learning tool. As Preece (1994) stated in relation to HCI (Human-Computer Interaction), 'by considering the way people act and react in their environment, systems can be designed to support their needs as well as to provide powerful functionality' (p. 56). According to Preece, the design of computer systems could be improved by understanding certain

human behaviour aspects, one of which is cognition. She defined cognition as 'the processes by which we become acquainted with things or, in other words, how we gain knowledge' (p. 62). Therefore, understanding cognition can lead to improved computer systems by addressing the user perspective i.e. user requirements, problems they encounter, and building user-friendly interfaces.

Gordon (1996) viewed information technology as a tool for 'empowering students to engage in a cognitive struggle with new learning situations' (p. 46) resulting in the student taking responsibility for their own learning with reflection on their thinking and their choices. All of which, according to Gordon are factors in developing metacognition. Metacognition has been defined as 'having knowledge (cognition) and having understanding, control over, and appropriate use of that knowledge' (Tei & Stewart, 1985 pp. 46-55). The acquiring of knowledge, for the learner, is required at a level that leads to an understanding of the subject material being covered. The aim is for the learner to practically and theoretically apply this knowledge to different scenarios and experiences in both the university environment (as a student) and the workplace (as an employee).

Virtual Lectures Related Studies

Maltby & Whittle (2000) compared traditional face-to-face delivery of lectures with online lecture delivery for an information technology subject. They examined student perceptions and performance by producing a questionnaire and monitoring assignment and exam results. Maltby & Whittle found that 58% of the students' preferred face-to-face lectures considering them to have 'better educational value'. Many saw online lectures as providing the benefit of setting their own pace. However, students found communication limiting, in particular when asking questions of the lecturer (35%). Added to this were problems with the network connection as well as user problems (29%). Interestingly Maltby & Whittle found that high achievers performed equally well in both modes of delivery. Ryan's (2000) study on virtual delivery of lectures also found limitations in the area of communication. Many students expressed a desire for specific times to be designated for interacting with the instructor via e-mail, telephone or online chat.

In 1996 Smeaton & Crimmins (1997) conducted research into the effects of implementing virtual lectures into an undergraduate, information technology subject. These lectures incorporated text, image and audio capabilities and were delivered online via the World Wide Web. They replaced what they saw as the 'passive transfer of information in conventional lectures' enabling students to 'take control of their own learning and do so at their own rate, albeit moderated by the lecturer' (p. 993). The emphasis on creating an environment that incorporated student-control was reinforced by Smeaton & Keogh (1998). They believed that replacing traditional lectures with virtual lectures supported 'the ideals of having student-directed and student-controlled learning' where students could reference the material at their own convenience and as often as they wished.

Late in 1998 the discipline leader of the ITSM discipline at SUTL, Dr. Bruce Calway began providing subject learning guides online via the World Wide Web as 'a means of optimising available resources' (Calway, 2001b). The main purpose was to create a virtual learning environment for undergraduate subjects by developing the learning materials using computer-assisted delivery.

As with Smeaton (1998), Calway (2000) focused on providing students with virtual lectures and learning materials online for specific undergraduate information technology subjects. To ensure some degree of teacher-student contact Calway (2001a) and Smeaton & Crimmins (1997) maintained classroom based face-to-face tutorials, which became the main point of contact between peers and lecturers. Calway (2001a) encouraged the availability of face-to-face tutoring 'thus maintaining multi-modal subject delivery'. Smeaton & Keogh (1998) explained that the tutorials were used to clarify subject material, answer students' questions and work through examples. All other communications with students, regarding assessment schedules, new material and past exam papers were conducted via the World Wide Web. It was not Smeaton's (1998) intention to claim that 'virtual lectures deliver a totally learner-centered environment but only that it is a step in that direction'.

ITSM Situated Analysis

Since 2001 one of the subjects at SUTL, LAI210 Database Modelling and Concepts has incorporated virtual lectures developed using computer technology that integrates images, text and audio and are accessible via the World Wide Web. These virtual lectures have replaced the traditional face-to-face lectures providing flexibility for the student to view the lectures at home, at work or at SUTL and at a time of convenience. As with Smeaton & Crimmins (1997) and Smeaton & Keogh (1998); emphasis was placed on students attending tutorials, which maintained the face-to-face mode of delivery. Virtual lectures became a tool for the communication of knowledge whilst the tutorials were the communication of understanding.

Within the ITSM discipline it was expected that the students' final exam raw scores would decline when using virtual lectures due to the change in face-to-face contact impacting their learning outcomes. As part of my ongoing research, a study (Signor, 2003) was undertaken over a period of four years from 1999 until 2002 on the LAI210 subject. In 1999 and 2000 the lecture delivery was face-to-face whereas in 2001 and 2002 the lecture delivery was virtual i.e. PowerPoint presentations available on the Internet. Each year the final exam raw scores of LAI210 students were entered into a spreadsheet that calculated the grade point for each student.

An independent t-test was used to determine if the type of lecture, face-to-face or virtual, made a difference to the final exam raw scores of the students in LAI210. The level of significance was set at $p < 0.05$. A p-value = 0.37 concluded that there was no level of significance. The mean for the exam raw scores of students using face-to-face lectures was 60.37 and the standard deviation was 12.05. The mean for the exam raw scores of students using virtual lectures was 59.32 and the standard deviation was 12.35. The longitudinal information derived from the study by Signor (2003) found the use of virtual lectures had no significant impact on final learning outcomes when measured by final exam raw scores.

In 2003 I conducted further research into the impact of virtual lectures on LAI210 students in order to understand the level of usage and their preferred method of delivery. The research methodology best suited to this study was survey methodology with statistical analysis. An anonymous questionnaire was distributed to students during their face-to-face tutorial in week eight of a twelve-week semester. One of the questions asked students when they thought they would be most likely to view the virtual lectures.

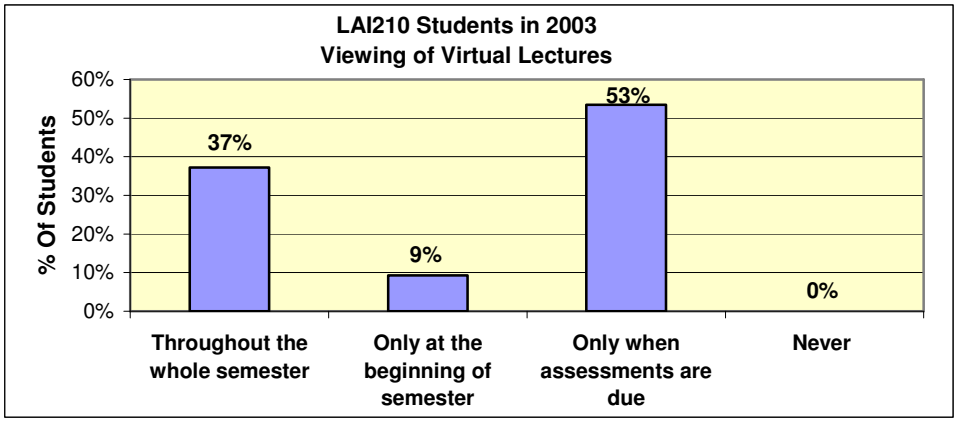

Figure 1: LAI210 Students viewing of virtual lectures in 2003

As illustrated in Figure 1, 37% of the students surveyed indicated their intention to view the virtual lectures throughout the whole semester however 53% anticipated they would only view the virtual lectures when the need was greatest i.e. when assessments were due. Since LAI210 requires the completion of four assessments this would result in over half the students taking a spasmodic approach to acquiring the necessary knowledge for adequately completing assessments.

My findings mirrored that of Smeaton & Keogh (1998) and Calway (2001b) who also conducted research into the impact virtual lectures had on undergraduate students as well as the level of usage. They distributed questionnaires and conducted focus group interviews. Both found the usage highest when the need was greatest. Although Smeaton & Keogh found that students accessed the virtual lecture in the first week, there were many students who used them as revision for the final exam. As Calway (2001b) explained, the students were more likely to be 'just-in-time learners, performance motivated, outcomes focused' (p. 5) rather than progressively viewing the virtual lectures throughout the semester.

Calway and Smeaton both encountered a desire from the students to use virtual lectures as a form of delivery. However, Calway (2000) found that students expressed a preference for 'face-to-face learning materials delivery on the one hand, with virtual lectures… as an alternative or adjunct approach' (p. 5). My research revealed similar findings as demonstrated in the questionnaire distributed to the LAI210 students in 2003. One of the questions asked students to select their preferred lecture mode of delivery. The results are illustrated in Figure 2.

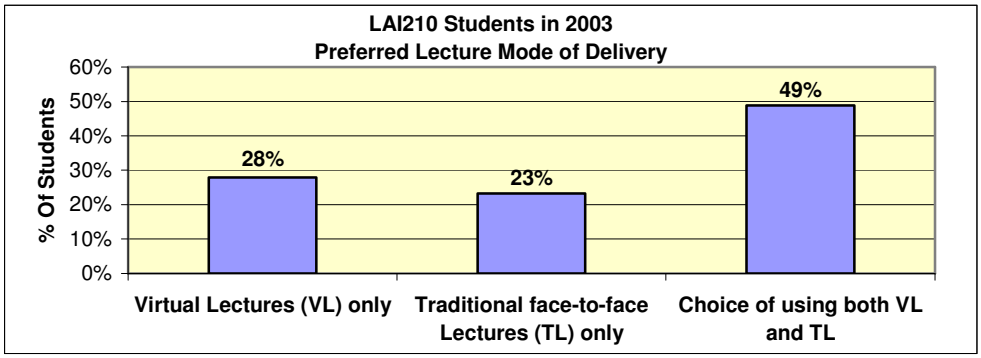

Figure 2: LAI210 students preferred lecture delivery mode in 2003

Concurring with Calway (2000) there was a significant percentage of students who indicated a preference for having the option to attend traditional face-to-face lectures whilst also having access to virtual lectures. The remaining students were almost equally divided between preferring only virtual lectures (28%) and preferring only traditional face-to-face lectures (23%). Smeaton (1998) found that although students regard virtual lectures as being slightly less stimulating than traditional lectures, students still preferred them.

Unlike Smeaton, Calway's (2001b) research led him to attempt to understand 'how individuals (educators or students) worldviews of learning effect their study environment' (p. 5). Previously Calway (2000) had highlighted the importance for educators to understand the students' different or individual learning styles. Calway (2001b) argues that 'neither the traditional instructional design or the virtual learning environment (VLE) instruction' (p. 3) meets the requirements for 'computer-assisted constructivist learning', which includes self-organisation and motivation to learn. Calway (2001a) posed the question 'can online computer-mediated learning be developed to a stage where students choose self-directed learning over conventional instruction?' His later research (2001b) implied negatively that 'students remain reluctant to become independent learners even when offered the freedom of the virtual learning environment' (p. 5). This was despite the use of Resource-Based Learning which, according to Calway (p. 20) 'seeks to empower students to pursue learning and construct knowledge by providing a great variety of resources from which they can obtain and synthesise knowledge'.

Summary and Conclusions

The literature revealed a common theme: that although virtuality in education meant different things to different people, it usually incorporates forms of online delivery on the Internet and the World Wide Web. This ranges from virtual universities that are all encompassing (Mason, 1996) to using online delivery for communication purposes only e.g. electronic workspaces (Collings & Walker, 1996).

A recurring concern was the reduction of student satisfaction with online delivery of courses (Barajas & Sancho, 2000; Rivera, McAlister & Rice, 2002; Yatrakis & Simon, 2002). Particularly in the area of communication and interaction with the instructor (Maltby & Whittle, 2000; Ryan, 2000). Despite this, the current literature implies that whilst the use of virtuality in education does not substantially enhance the students' learning experience, it does not hinder their performance either (Signor, 2003; Rivera, McAlister & Rice, 2002; Yatrakis & Simon, 2002; Cooper, 2001; Tucker, 2001). High achievers will perform well regardless of the mode of delivery (Maltby & Whittle, 2000).

Specific examples where virtual lectures were incorporated (Maltby & Whittle, 2000; Calway, 2000, 2001a, 2001b; Smeaton & Crimmins, 1997; Smeaton 1998; Smeaton & Keogh, 1998) illustrated reluctance by undergraduate students to relinquish the face-to-face mode of lecture delivery. This was mirrored in my research, which also conformed to findings by Smeaton and Calway that the majority of students view virtual lectures when the need is greatest i.e. when assessments are due.

The research suggests to me that the more virtuality adopted in education the more self-directed learning is required lending itself to a more constructivist approach. Yatrakis & Simon (2002) feel that students with a self-directed learning style are more likely to choose an online format for subject delivery whilst students who desire direction and guidance may prefer a traditional format.

It is not enough to have a pedagogical approach that offers a multi-modal delivery of subject material. Although this offers flexibility to the student it should also provide for the acquisition of knowledge through constructivism as well as instructivism. Encouraging the students to become constructive learners with a motivation to learn is a key issue – do virtual lectures aid or impair this process? As part of my continuing research into the impact of virtual lectures on undergraduate students at SUTL, a deeper exploration can be made into when students access the virtual lectures, and what motivates them to do so. The findings could assist educators in developing virtual lectures that are efficiently utilised by the students, enhancing their learning experience.

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