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Podcasting by synchronising PowerPoint and voice: What are the pedagogical benefits?

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ABSTRACT

The purpose of this study was to investigate the efficacy of audio–visual synchrony in podcasting and its possible pedagogical benefits. 'Synchrony' in this study refers to the simultaneous playback of audio and video data streams, so that the transitions between presentation slides occur at "lecturer chosen" points in the audio commentary. Manufacturers of lecture recording software (e.g. ProfCast) would have us believe that the synchrony of image and audio should improve the learning experience. We have yet to see in the literature any empirical evidence to support this hypothesis. In our study, 90 participants in two groups undertook two electronic lectures (e-lectures) on two separate topics, the subject matter of neither was familiar to them beforehand. Each group experienced one "synchronous" presentation (e-lecture) of one of the topics, and one "separate" presentation (i.e. PowerPoint and audio files separately presented) of the other topic. Each group therefore experienced both "synchronous" and "separate" delivery and they were then given an MCQ test that assessed five levels of Bloom's taxonomy. Results show no differences in innate ability between the two groups but the evidence supported our primary hypothesis in that statistically significantly higher test scores were seen when participants viewed a synchronous e-lecture; these scores were accounted for by subjects' performance at three of the five levels of Bloom's taxonomy. Qualitative 'attitude' survey results also displayed participant preference towards the synchronous over the asynchronous mode of delivery, and in spite of general acceptance of the proposed benefits of electronic proceedings, a majority preference towards traditional rather than electronic lectures. Despite this conservatism, this paper explores in more detail the potential benefits of podcasting via synchronous PowerPoint and voice.

1. Introduction

Electronic delivery of lecture material (e-lectures), both as an adjunct to traditional teaching and a means of distance learning, presents enormous opportunities for higher education (McKinney, Dyck, & Luber, 2009). De la Sola Pool (1984) argued that computer-based communication is the most fundamental change in communication technology for over a hundred years. The published research upon the topic of e-learning however offers little in the way of empirical evidence to support its efficacy; without this, it could be argued that an in-depth understanding of e-learning in higher education would surely be incomplete (Garrison & Anderson, 2003).

PowerPoint presentations are by far the most common means of delivering lectures (Fisher, 2003) and many lecturers have taken the option of podcasting audio recordings of their lectures, either recorded 'live,' or in the comfort of their offices, in addition to supplying the PowerPoint file online to their students (McGreal, Cheung, Tin, & Schafer, 2005). More recently, specialised lecture recording software has offered lecturers greater opportunities to synchronise their audio recordings to the accompanying PowerPoint slides to create fully navigable 'e-lectures', thus making available an entire lecture experience online. This has led to an increasing number of universities turning to e-lecture recording technologies to tailor their own e-learning solutions (Rui, Gupta, Grudin, & He, 2004).

A variety of studies have endeavoured to make a comparison between e-lectures and traditional methods of learning. Within this field, qualitative studies are most common, and perhaps as a consequence, there is a paucity of empirical evidence of the efficacy of e-lectures (Wofford, Spickard, & Wofford, 2001). Dewhurst and Williams (1998) concluded that the e-learning system they had implemented was as efficient as traditional means at imparting information, although a survey distributed to students found that they preferred traditional approaches to the electronic alternatives. In contrast, Holt et al., (2001) found that students rated e-learning systems as more effective and

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efficient in comparison to traditional means. A further study (Brotherton & Abowd, 2004) found that students used their "eClass" system to take useful lecture notes. When the effectiveness of eClass was evaluated by survey the majority said that they did not think that the program could be a complete replacement for the traditional approach but conceded that it was a very useful supplement, especially for revision purposes, or when a lecture was missed. This accords with the authors' own anecdotal experience of using synchronous lecture recording technology in the classroom (Brotherton & Abowd, 2004) (see Fig. 1).

In addition to studies comparing e-learning techniques to traditional lectures, the work of our own research group (Griffin and colleagues) has specialised in comparing different e-learning techniques against one another. In one quantitative study, we (Evans, Gibbons, Shah, & Griffin, 2004), demonstrated that an e-lecture with enhanced interaction and navigation properties yielded higher test scores on a comprehension test when compared with the same content being delivered as static imagery and text. We suggested that the structure and usability of an e-lecture's interface, along with its navigational properties, are paramount in determining the effectiveness of an e-lecture. In a later study we compared "real" lectures with two different types of e-lecture (one of which involved synchronised PowerPoint and voice) concluding that different types of lecture delivery can differentially promote different types of student learning as measured using the principles of Bloom's taxonomy (Stephenson, Brown, & Griffin, 2008).

In the current study we extend our investigations using previously tried and tested approaches (Evans et al., 2004; Stephenson et al., 2008) to test the hypothesis that synchrony of PowerPoint and voice in podcasts has pedagogical benefits over presentation of the two media as separate files (one podcast and one PowerPoint file). Indeed it has been previously suggested that audio–visual synchronised presentations are of more worth than stand-alone PowerPoint presentations or audio files (Latchman, Salzmann, Gillet, & Kim, 2001) however we have yet to encounter an empirical study that asks the question of whether synchrony *per-se* lends itself to promoting the learning process (despite its obvious popularity). Indeed, an alternative hypothesis might be that keeping the audio and PowerPoint separate forces the learner to remain involved with the information and thus to promote more effective learning.

2. Research design

2.1. The nature of the e-lectures and podcasts used in this study

Two different types of presentation formats were designed for each topic that was presented to the participants: a "synchronised" e-lecture format and a "separate" PowerPoint file with accompanying mp3 audio podcast.

In the first (synchronous) style of presentation, the students were able to view a fully synchronised audio–visual podcast. In practice this meant that the slide transitions throughout the presentation were automatically timed to coincide with the appropriate point in the audio commentary. These e-lectures had full navigability through the use of slide-select drop down menus and a timeline tool bar when viewed in a compatible viewer. Presentations were devised using Microsoft PowerPoint, and audio commentary was studio recorded over the presentation slides using the software ProfCast. The ProfCast program was developed by Humble Daisy Inc. (http://www.humbledaisy.com/). It was designed for use with Macintosh computers only (although, at time of writing, there is a Windows based version under Beta test) and was utilised in the creation of the electronic video lectures and presentations used in this study. ProfCast records lectures by synchronising visual stills and audio commentary, and subsequently outputting the synchronised data into a selected video (.mov) or enhanced audio (.m4a, .m4b) file format. These files can then be played back on any computer with a standard media player, for example, Apple QuickTime

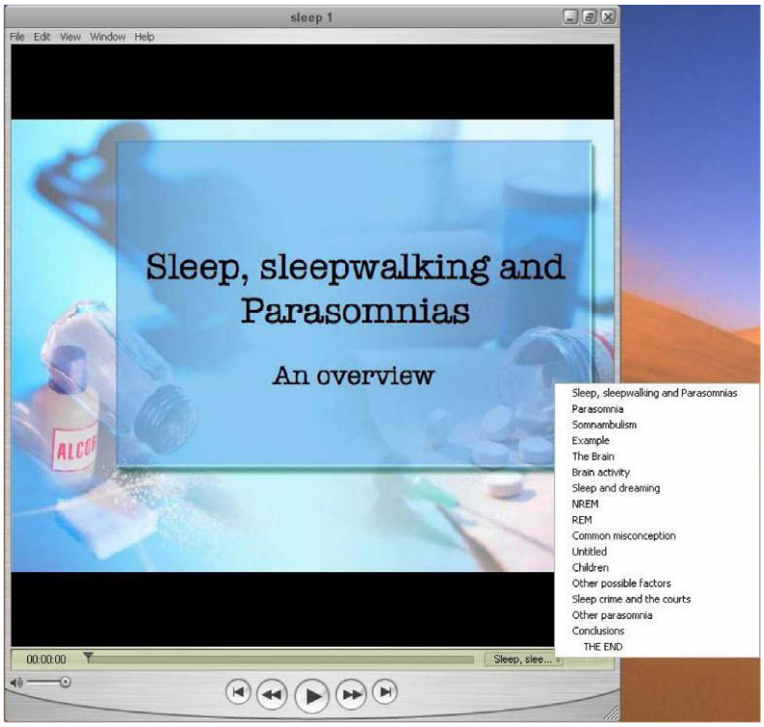

Fig. 1. An example of one of the "synchronised" e-lectures with slide-select menu.

or VLC media player. The data recorded can also be exported to post-production software such as Apple's GarageBand system, and ProfCast can distribute recorded lectures to RSS feeds to provide 'podcasting' facilities.

The second presentation given to the students was delivered in a "separate" format. This consisted of two independent files (one PowerPoint file and one audio mp3 podcast) so that the slide transition points were not synchronised to the audio commentary. Students were thus required to navigate the content of the presentation manually and so initiate a slide transition from within the PowerPoint presentation when he/she deduced that the audio commentary had moved onto the next slide.

Participants accessed the podcasts and PowerPoint files via WebCT. The academic content of presentations themselves were developed to cover two different topics, deliberately chosen to be unrelated to any topic on their current course of study and so that the participants would have limited or no knowledge of both of the topics. These were 'Sleepwalking and other parasomnias' (Topic 1) and 'Hot air balloons and how they work' (Topic 2).

The experiment took place at the University of Kent at Canterbury during the spring term of the 2007–2008 academic year. The overall experimental design outlined below was nearly identical to that of our previous published work (Evans et al., 2004) and very similar to that of a more recent study by our group (Stephenson et al., 2008). A total of 90 participants were full-time students studying for a variety of different degrees at the university in the science and social science faculties and were divided into two equally sized groups. We thought it inappropriate to match students by academic ability since this would not necessarily distinguish innate ability to perform this task and because the nature of the controlled experimental design (Evans et al., 2004; Stephenson et al., 2008) was such that any influence effected by group ability of ease of topic was compensated for. Nevertheless, participants were divided in such a way that individual degree courses were roughly equally represented in each group. Table 1 summarises the experimental design and shows the division of topic and presentation format in relation to the two student groups.

When participants signed into WebCT they were presented with individual specific combinations of synchronous and separate presentation formats. For example, Group A could only view Topic 1 in a synchronous format and Topic 2 in a separate format, while Group B could only view Topic 2 in a synchronous format and Topic 1 in a separate format. Access to the content was thus limited in order to minimise the risk of participant confusion and other confounding possibilities. Once a student had accessed the experimental materials online he or she had one hour to view both topics and complete an MCQ assessment (see next section).

The experiment was completely independent of the participants' studies and so the marks they received had no influence on their marks or degrees. The experiment was conducted under the University's procedures for the approval of research involving human participants.

2.2. MCQ design

The principles of Bloom's taxonomy influenced the creation of the MCQ test and is consistent with the experimental design previously employed by our group (Evans et al., 2004; Stephenson et al., 2008). Using WebCT tools an online multiple choice question (MCQ) test was devised to give a quantitative assessment of the efficacy of the synchronous presentation format in comparison with the asynchronous format. The participants were all given the same online test comprising of a 10 question MCQ test with five responses per question. Questions 1–5 assessed Topic 1, while questions 6–10 assessed Topic 2. Within the five question block for each topic each question assessed an increasingly deeper level of learning (i.e. recall, comprehension, analysis, application and evaluation). In other words, questions 1 and 6, the starting questions for the respective topics, tested the lowest cognitive skill that Bloom's taxonomy describes, 'knowledge' which tests basic recall. Questions 2 and 7 assessed 'comprehension' in the form of assertion-reason questions. Questions 3 and 8 assessed participants' 'analysis' skills requiring the interpretation of new data related to, but not presented directly in the presentation. Questions 4 and 9 assessed the students' 'application' skills by getting participants to apply knowledge learnt from the presentation to an unknown situation. Finally, questions 5 and 10 assessed participants' 'evaluation' abilities by asking the participants to evaluate the validity of a statement related to the topic content.

2.3. Attitudinal survey design

An online survey was made available to participants after viewing both of the presentations and completing the MCQ test. The purpose of this attitudinal survey was to assess the preferences of the participants between synchronous versus separate presentations, as well as their views on e-learning as compared to traditional learning methods.

The survey was developed using the 'Bristol Online Survey tool' (BOS) (http://www.survey.bris.ac.uk) and took the form of multiple choice, drop-box and open-ended questions. The survey was divided into four different sections. Section A collected personal data such as gender, age, and degree programme. Section B asked the participants to evaluate their computer skills and past experiences with e-learning solutions. Section C asked a series of questions about preferences towards different lecture delivery formats, and which of these the student felt were most useful for learning and information retention. Section D asked students to evaluate their opinions towards a collection of statements relating to different aspects of e-learning; answers were expressed using a Likert scale where the possible responses were Strongly Agree, Agree, Neither Agree nor Disagree, Disagree and Strongly Disagree. At the end of the survey an 'additional comments' box was provided to enable participants to make personal comments about the experiment.

2.4. Statistical analysis

In order to compare differences in scores between groups, topic and delivery styles (and thereby test the hypothesis that a synchronous presentation would result in higher MCQ test scores) statistical analyses were performed using SPSS 16.0. Paired *t*-tests were used in order

Table 1
Structure of the experimental design.

	Topic 1: sleepwalking	Topic 2: hot air balloons
Group A	Synchronous	Separate
Group B	Separate	Synchronous

to determine the correlation between two variables. A chi-squared test was also used to ask whether the number of responses (broken down by Bloom's taxonomy) were significantly greater when synchronous and separate delivery were compared.

3. Multiple choice question test results

Group A scored 57.60% for Topic 1 but only 40.42% for Topic 2. Group B on the other hand scored 51.82% for Topic 1 compared to 48.40% for Topic 2. The mean MCQ test scores for the two groups, topics and delivery styles are shown in Table 2.

Table 2 shows that the mean scores between the two groups were not significantly different from one another and thus there was no evidence of a greater innate ability of one or other of the groups. That is Group B scored an overall mean percentage of 50.23% while Group A scored a mean percentage of 47.77% ($P > 0.05$). Somewhat surprisingly however, despite our efforts to make questions and presentations of similar difficulty Topic 1, sleepwalking, received higher test scores in comparison to Topic 2, hot air balloons ($P < 0.02$). With regard to our primary hypothesis however the mean scores for the two different delivery formats (synchronous and separate), reveals that synchronous presentation led to significantly higher scores ($P < 0.002$) than separate ones.

3.1. Analysis of MCQs classified according to Bloom's taxonomy

The number of correct responses (out of a possible 90) to the MCQ questions, in relation to the different presentation delivery formats, is represented in Table 3.

At the most basic level of learning, (knowledge) the highest number of correct responses over both the synchronous and the separate format was obtained. The synchronous format yielded significantly more correct answers (68) than the separate format (52) at a significance level of $P > 0.05$ by chi-squared test. Comprehension questions received the lowest number of correct answers with only 37 and 35 correct responses for the synchronous and separate formats, respectively, data that are not statistically significantly different from one another. In the "application" category, there was also no significant difference according to whether the students had been taught in a synchronous or an asynchronous fashion. However, for the "application" and "evaluation" questions values were higher in the synchronous category and, although individually these did not reach statistical significance, put together, the marks were significantly higher for students who had learned from a synchronous presentation ($P < 0.05$ by chi-squared test).

4. Qualitative attitude data survey analysis

A total of 90 surveys were submitted online, of these three were discarded due to their incomplete status. Responses in Section A showed that 69% of respondents were female and 31% were male. Section B found that 40.2% of the participants rated their computer literacy skills as 'good', while 10.3% stated they were 'excellent', 28.7% stated they were 'very good', 19.5% stated they were 'average' and only 1.1% confessed that their computer skills were 'poor'. A total of 59.8% of the participants had been exposed to e-learning practices before and 81.6% used their own computers to access the presentations and to perform the MCQ test.

Section C (Table 4) showed an overwhelming student preference for the synchronous presentation format. In the questions 'what was your preferred mode of delivery?', 'which do you feel promoted your learning best?' and 'which lecture was the easiest to learn from?', the synchronous presentation format was always preferred. Furthermore, 51.7% believed that presentations in the asynchronous format took significantly more time to complete.

Through analysis of Section D on the survey we observed that most students polled would prefer a traditional lecture approach, indeed no participant strongly disagreed with the statement 'I prefer to learn from a real lecture'. Also, the majority of students either disagreed or strongly disagreed with the statement 'Computer-based learning can be a complete replacement to lectures'. However, a total of 54% agreed, and 12.6% strongly agreed, that 'computer-based learning approaches are appealing because I could learn in my own time, location and pace'; 19.5% strongly agreed and 47.1% agreed that they would like to have e-lectures as a revision supplement to a traditional approach.

Lastly, an 'any additional comments' open-ended text box was included at the end of the survey for participants to give unrestricted feedback. Comments supporting e-learning solutions as a supplement to traditional approaches were frequent:

Table 2
Comparisons of mean scores per group, topic and delivery style and comments on significance when marks for tests and controls are compared.

	Mean test mark	Significant difference between t of two groups? (2-tailed *t*-test)
Group A	47.8%	
Group B	50.2%	Not significant ($P > 0.05$)
Topic 1 (sleepwalking)	54.7%	
Topic 2 (hot air balloons)	44.4%	Highly significant $P < 0.002$
Synchronous format	53.0%	
Separate format	46.1%	Highly significant $P < 0.002$

Table 3
Number of correct responses broken down by Bloom's taxonomy.

	Number of correct responses (out of 90)				
	Knowledge	Comprehension	Application	Analysis	Evaluation
Synchronous	68	37	43	44	47
Separate	52	35	45	35	40

Table 4
Responses to the qualitative survey total number of responses are given with percentages in brackets.

What was your preferred mode of presentation delivery?	
Synchronous presentation:	56 (64.4%)
Asynchronous presentation:	31 (35.6%)
Which do you feel promoted your learning best?	
Synchronous presentation:	51 (58.6%)
Asynchronous presentation:	36 (41.4%)
Which lecture was the easiest to learn from?	
Synchronous presentation:	51 (58.6%)
Asynchronous presentation:	36 (41.4%)
Which lecture style took the longest to get through?	
Synchronous presentation:	42 (48.3%)
Asynchronous presentation:	45 (51.7%)
Which presentation did you find hardest?	
Hot air balloons:	59 (67.8%)
Sleepwalking:	28 (32.2%)
Which part of the MCQ test did you find hardest?	
Sleepwalking (Questions 1–5):	25 (28.7%)
Hot air balloons (Questions 6–10:	62 (71.3%)

- "E-learning is good as enhancement."
- "I do strongly agree that having a full lecture like that would be a good way to revise."
- "I feel that while video lectures are good they should only be used as a way to access previous 'real' lectures so that you can 're-attend' lectures and pick up on the things you miss first time round."

Others thought that e-learning approaches had potential but were critical of certain elements:

- "e-learning approach is very interesting but interaction is lost."
- "There is something about the act of attending a lecture/seminar that isn't captured sitting behind a computer screen. It's handy technology to have if you want to refer back to something; that certainly seems an obviously advantageous facility which should be used. However, to replace the interaction and experience of a lecture or seminar entirely would miss an important element of learning."

A few participants had problems with the presentations and thought that it did not cater to the more computer inexperienced amongst them:

- "The experience was horrible. I felt out of my depth and my computer kept freezing."
- "My lack of computer experience was very detrimental in terms of my confidence and concentration levels too."

5. Discussion

5.1. General conclusions

The results from this experiment provide empirical evidence to support the hypothesis that synchronised audio and video media are more effective than the provision of separate media items containing the same information. That is, statistical analyses found that there was a significant difference in overall test scores depending on presentation format, synchronised being higher. There is further evidence from the attitudinal survey that the synchronised approach was the favoured one, and that students appreciate the benefits of e-learning, particularly when revising material (though overall preferring traditional approaches).

5.2. Synchronous vs. separate

The research of Dewhurst and Williams (1998) and Kulik, Kulik, and Cohen (1980) suggested that e-learning alternatives are a viable and advantageous lecture mechanism over more traditional proceedings. The research presented in this study adds to this finding by suggesting that synchronous presentations may have distinct advantages over more traditional methods such as putting slides or audio recordings on the web separately. One possible explanation for the increase in participants test scores for the synchronous format could be that the separate format caused cognitive overload in the participants thus hindering their learning experience (Kirsh, 2000). The experience of manually synchronising both the audio and image streams of a presentation may have led to participants focusing on the running of the presentation as much as the topic content itself and could have distracted the participants from learning. In any event the results here seems to refute the alternative hypothesis, i.e. that separated media would result in higher test scores due to a higher level of participant involvement and interaction.

5.3. Significance of the subject matter

The statistical findings also indicated that Topic 1 (sleepwalking) might be the easier of the two topics. This was mirrored in the analysis of the survey where 67.8% of survey respondents stated that they thought that the Topic 2 presentation was harder to understand, and 71.3% believed that the MCQ questions testing the Topic 2 content were more difficult. As we indicated above we found this surprising

since we went to considerable effort to make questions of equivalent difficulty. With the benefit of hindsight, given that more participants were from the Social Sciences and Humanities than the Science faculty (58-33-9 ratio), it is possible that the slightly more mathematical nature of the questions in Topic 2 may have least suited the participants. This is open to debate however since inter-lecture variation (in terms of test scores) is something we have reported before even with students all on the same course experiencing e-lectures and assessments related to their course (Stephenson et al., 2008). It would be interesting to observe in future studies whether Topic 2 would still be considered the more difficult topic if the study had a larger number of participants who belonged to the Science faculty. Nonetheless, we conclude that this difference in the perceived difficulty has no impact on the conclusion that synchronised presentations are more effective that "separate" presentations.

5.4. Presentation formats in relation to Bloom's taxonomy

The results showed a generally higher correct response rate for the synchronous format than the separate format however some levels of Bloom's taxonomy did not show a significant difference. This finding is mirrored, in some ways, by our previous work (Stephenson et al., 2008), which concluded that different levels of learning may benefit from different modes of delivery.

5.5. Pedagogical ramifications of this work

The traditional lecture has been the mainstay of teaching in universities since their inception, but since at least the 1930s (Holt, 1931) their efficacy has been questioned. The main pedagogical benefit of the traditional lecture is that it is efficient (one person can deliver a predetermined body of knowledge to a large number of students) and flexible (it is only minimally constrained by time and location). Traditional lectures are tutor-centred; the notion of the tutor as the "expert" delivering wisdom to the student body is attractive to the tutor as they maintain significant control over the student learning experience and can tailor their teaching strategies accordingly. With this in mind, the question must be raised as to whether there are any benefits to e-lectures at all. Two possible reasons include the fact that (a) adoption of computers and the world-wide-web is widespread and growing in all walks of life (Alessi & Trollip, 2001; Inglis, Ling, & Joosten, 2002); and (b) there is a an increased demand for higher education worldwide and thereby increased pressure on tutors to use technology to cope with it (e.g. Dearing Report 1997; http://www.leeds.ac.uk/educol/ncihe/).

However, neither of these addresses the fundamental question of whether e-lectures can provide significant learning advantages for the student. We and others have argued that e-lectures can indeed promote learning provided appropriate design is employed. For the purposes of this paper we summarise the possible pedagogical advantages of e-learning as "the four Ps," namely

- Place: students have the flexibility to learn in a location of their own choosing provided there is a computer available;
- Pace: students can learn at their own desired speed and do not have to keep up with the lecturer;
- Peace: students can choose the time in which they learn picking moments of peace and quiet most appropriate for learning, and
- "Process: students can choose the means by which they learn, selecting the learning process most suitable for themselves.

(This taxonomy is adapted from e.g. Dewhurst & Williams, 1998; Evans et al., 2004; Kulik et al., 1980; Stephenson et al., 2008). Left to their own devices however and not constrained by the strictures of a regular routine we would like to propose that there is a risk among students that the pedagogical advantages afforded by the e-lectures may be misused and thus the following "four Ps" may apply:

- Pub: students may choose an inappropriate place of learning such as a public house).
- Plod: in the absence of encouragement and peer pressure and where restrictions on time need to more self-imposed, the pace of learning may slow considerably;
- Procrastinate: the freedom to choose the time in which the students learn may encourage procrastination; and
- Play: given the freedom to choose their own learning process, students may choose one that is inappropriate, thus not concentrating on the job at hand.

There is therefore a continuing need to devise e-learning strategies that will provide the maximum pedagogical benefit, in the above example maximising the first "four Ps" and minimising the second.

In this paper we have provided empirical evidence that a pre-existing strategy (the synchronisation of voice and PowerPoint slide – McKinney et al., 2009; Stephenson et al., 2008) can indeed have pedagogical benefit over presentation and podcast provided separately. This is an intervention that, unlike many interventions based on novel learning environments, can be implemented at minimal cost. Moreover there are "non-functional" or "contextual" considerations in that the e-lectures can help the students recall the original presentation (tone of voice and informality are issues here) thereby aided recall and revision.

5.6. Student opinions regarding e-learning and traditional approaches

The majority of participants enjoyed taking part in this study and were excited about the potential of e-learning, at least as a revision tool. This corroborated the work of Khadra, Guinea, and Hill (1995) who found that students were highly receptive to the electronic approach being used. Qualitative responses from participants in this study show a general acknowledgement of the opportunities and flexibility which e-lectures are able to provide over traditional methods. However, while participants appreciated the positive attributes of electronic learning tools, most preferred a traditional approach to learning. Other studies have also found that participants had a preference towards a traditional approach over electronic alternatives. The study conducted by Dewhurst and Williams (1998) found that although e-learning did not hamper the learning process, the majority preference was against it. Maki and Maki (2002) and Williams, Aubin, Harkin, and Cottrell (2001) echo these findings. Conversely, Tvedten, Walter, Stickle, Henkel, and Anderson (1993) and Holt et al. (2001) found that respondents preferred the electronic equivalents. Susskind (2004) found that participants enjoyed the e-learning approach and self-evaluated themselves as more capable after learning from an e-lecture format.

It would seem therefore that preference towards different teaching approaches, be they electronic or traditional, are dependent on the individual or group being surveyed and their personal experiences with each approach. If a particularly skilled presenter implements a flawless traditional lecture, the participants would be more likely to warm to this approach. In contrast, an e-lecture, which is boring and uninformative, has traditionally led to students' condemnation of the whole electronic approach as a 'bad' way of teaching. Another point for consideration is that different lecturers may be more suited to different teaching approaches. For example, some lecturers may feel awkward presenting their content in a room of 100+ students and would value the opportunity to formulate e-lectures in their own pace and time and be able to optimise presentation quality. Other lecturers, however, may excel at live delivery in front of large audiences and being restrained to the realm of the electronic may lessen the quality of their lectures.

Other factors may also contribute to an individual's preference towards traditional over e-learning approaches. For instance, an audience inexperienced in e-learning might have reservations and prefer traditional methods because they are familiar. The current study found that 40.2% of participants had no previous experience with e-learning technologies and there was a majority preference towards traditional teaching methods. It may be that preference for traditional approaches is merely a reluctance to stray from the familiar traditional proceedings that have helped them learn in the past. The loss of interaction that students experience when participating in an e-learning process can be combated, for example, through the inclusion of a tutor as a facilitator of knowledge, or via the use of online student interaction tools. This can be done through asynchronous posting forums, synchronous web chats and email support, amongst other mechanisms (Shepherd, 2005). Further work may benefit from an exploration of these techniques, to determine if they truly enhance learner participation and interaction, and decrease feelings of isolation.

5.7. Blended learning

It is also argued in the literature that e-learning should be supported by many other types of medium in order to truly enhance the learning process. This may be achieved not by comparing and contrasting different approaches to learning, but by combining and pooling the advantages from all different teaching methods. Qualitative answers from this research support the idea that e-learning solutions should be integrated and incorporated into existing teaching strategies, rather than replace them. The increasingly popular 'blended learning' approach (Yazon, Mayer-Smith, & Redfield, 2002) matches all these criteria.

By 'blended learning' we mean the thoughtful integration of classroom face-to-face learning practices with e-learning experiences. The most typical example of a blended learning approach is the 'computer workshop' where a tutor guides the students through e-learning technologies. It is believed that the implementation of such blended techniques will facilitate more discussion than through the application of a single approach alone (Garrison & Kanuka, 2004). In a study conducted by Riffell and Sibley (2005), the results showed that a blended learning approach was equal in standing, if not better, to a traditional approach. In this experiment, most participants were insistent that e-learning would need to be introduced as a blended learning approach or as a supplement to traditional lectures rather than a replacement for them. This finding corroborated with Steele, Johnson Palensky, Lynch, Lacy, and Duffy (2002), who presented evidence showing that although the majority of students acknowledged the e-learning approach to be useful and effective, only a minority thought the approach to be superior to a traditional lecture.

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