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VIRTUAL LECTURES VERSUS FACE-TO-FACE LECTURES: A FOUR-YEAR STUDY EXPLORING THE IMPACT ON STUDENTS' RESULTS

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Abstract

Many of the subjects in the ITSM discipline at Swinburne University, Lilydale have replaced the traditional mode of delivering lectures face-to-face with virtual lectures available on the Internet. This paper explores the impact this has had on final exam raw scores for students in one of these subjects by comparing two years of face-to-face lectures with two years of virtual lectures. Interestingly the statistics over the four-year period demonstrate no significant effect on the students' exam raw scores. It would appear that the transition to virtual lectures has had little impact on the academic results of students. This paper will address these findings in more detail whilst considering some of the variables that may have influenced the results.

Keywords

Virtual lectures, face-to-face lectures, multi-modal approach, online learning, learning outcomes

Introduction and Background

Prior to 1998, the undergraduate subjects in the ITSM discipline at Swinburne University, Lilydale (SUTL) used a traditional mode of delivery for all its subject materials. This traditional mode of delivery comprised face-to-face lectures and tutorials, delivered in a classroom with students responsible for their own notes and for the printing of computer based learning materials.

Due to research by the ITSM Discipline Leader, Calway (2000) the mode of delivering subject material for the ITSM discipline was changed to a multi-modal approach where lectures were delivered on the Internet and tutorials maintained a face-to-face mode of delivery. Traditional face-to-face lecturers within the ITSM discipline felt a certain degree of scepticism about the benefits of using computer technology to replace the face-to-face mode of delivering subject material in higher education.

There were two primary issues of concern. The first was whether this multi-modal approach would affect the students' final results and consequently hinder rather than benefit their learning outcomes. The second was how the students would react to the change in delivery modes. Calway (2000) explored the latter issue finding 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). Although this is an important issue that requires additional research, it is not further studied in this paper.

This paper uses a situated study of one of the ITSM subjects that converted to virtual lectures in 2001; LAI210 Database Concepts and Modelling. Statistics were taken of the students' final exam raw scores spanning over four years from 1999 until 2002. In 1999 and 2000, the lectures were delivered face-to-face in a lecture theatre whilst in 2001 and 2002, the lectures were delivered as virtual lectures i.e. PowerPoint presentations with text, image and audio capabilities accessible on the Internet. These virtual lectures

provided flexibility for the student to listen to the lectures at home, at work or at SUTL and at a time of convenience. 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.

The following researchers analysed students' results, comparing face-to-face delivery of subject material with virtual delivery finding there was no significant impact on final learning outcomes. Smeaton & Keogh (1998) introduced virtual lectures and then compared student usage with exam performance. They maintained a mixed mode of delivery by having fortnightly face-to-face tutorials to supplement the virtual lectures. Peat & Franklin (2003) investigated student usage of offline (paper based) and online assessment material giving students the opportunity to use both forms of delivery. Although the previous researchers used a multi-modal approach to the delivery of subject material, the same findings were mirrored by Carey (2000) who analysed the difference between pretest and posttest knowledge in two identical courses. Each course was delivered in a single mode, either online or face-to-face.

Pahl (2002) discovered an improvement in students' results when using forms of virtual delivery. He replaced face-to-face tutorials with virtual tutorials and felt this to be true as long as 'sufficient guidance and integration is offered by the system' (Discussion and Conclusions, para. 2).

Research Design

The research design best suited to this study is a quantitative style using quasi-experimental methodology. A group, being the subject LAI210 Database Concepts and Modelling, did not have students randomly assigned to it as would happen in experimental methodology (Christensen, 1991; McGuigan, 1997). Instead quasi-experimental research 'studies the effect of a treatment on intact groups' (Mertens, 1998 p.77). The LAI210 subject forms an intact group created by the students' enrolments.

The quasi-experimental design applicable is the Posttest-Only Non Equivalent Control Group design. As explained by Gravetter & Forzano (2003) one group of participants (the LAI210 students in 2001 and 2002) is given a treatment (the virtual lectures) after which they are measured by a posttest (the LAI210 end of semester exam). The treated group is then compared with a non-equivalent group that has not received the treatment, known as the control group. The control group for this study was the LAI210 students in 1999 and 2000 who received a face-to-face mode of lecture delivery. This may be represented in a notation system developed by Campbell and Stanley (1963) as follows:

X	O	The treatment group
X	O	The non-equivalent control group

O indicates the measurement i.e. the posttest which is the end of semester exam, X signifies the treatment being virtual lectures. The dash line states that there was no random assignment

Extraneous Variables to be Considered

There are several extraneous variables that threaten the validity of studies of this nature. They were identified and where possible, minimised. One variable is whether the subject content changed from 1999 to 2002. LAI210 is a subject that teaches historical database concepts as well as traditional database modelling tools. Therefore the content has remained relatively static and the exam has not changed significantly during the years of this research.

Another variable is the students' level of computer literacy for each year. LAI210 is a second year subject with prerequisites of two Information Technology subjects where the fundamentals of computer literacy are taught. Therefore students of LAI210 start out with a similar level of computer literacy.

A reduction to teacher-student contact when using virtual lectures may adversely affect the student’s exam performance. The subject, LAI210 maintained face-to-face classroom tutorials increasing the length of these tutorials to ensure students were able to maintain the same amount of contact hours with teaching staff.

The ratio of females to males each year is unlikely to have affected the exam raw scores. Regardless of the number of females to males, females performed consistently better in the final exam regardless of the mode of delivery; an interesting issue but not within the scope of this paper.

Student’s’ entry scores should also be considered. This is discussed in more detail in the Data Collection and Analysis section of this paper.

Data Collection and Analysis

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. This study was undertaken over a period of four years from 1999 until 2002. 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 is set at $p < 0.05$. A p -value = 0.37 concludes 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.

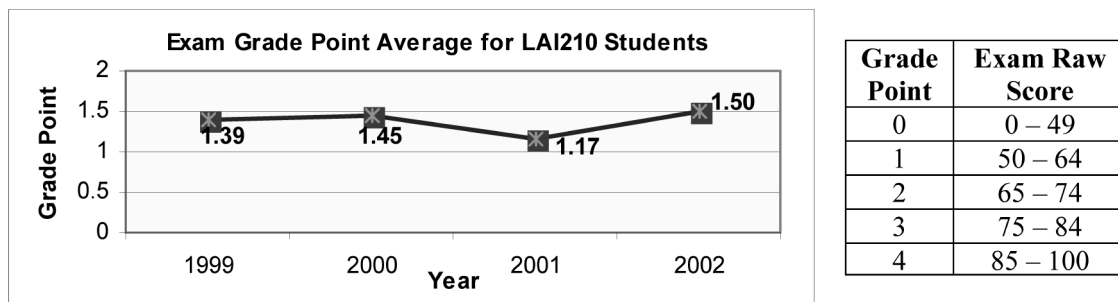


Figure 1: LAI210 Exam Grade Point Average from 1999 until 2002

Grade Point	Exam Raw Score
0	0 – 49
1	50 – 64
2	65 – 74
3	75 – 84
4	85 – 100

As evident in Figure 1, the grade point average of exam raw scores for 1999 and 2000 when face-to-face lectures were used shows a minimal variation. A decline occurred in 2001 when virtual lectures were first introduced possibly demonstrating a year of transition for the students. However, the grade point average immediately increased in 2002, which continued using virtual lectures. To determine whether this may be attributed to students in 2002 having higher entry scores further analysis is required correlating students entry scores with final exam raw scores.

An independent t-test was used to compare the difference between the mean of the entry scores of students using face-to-face lectures compared to students using virtual lectures relative to the spread of these scores to determine if they are statistically different. The level of significance is set at $p < 0.05$. A p -value=0.00 demonstrates a significant difference. The mean for the entry scores of students using face-to-face lectures was 57.56 and the standard deviation was 11.17. The mean for the entry scores of students using virtual lectures was 66.35 and the standard deviation was 9.19.

Summary and Conclusions

The longitudinal information derived from this study found there was no significant impact on final learning outcomes concurring with Smeaton & Keogh (1998), Peat & Franklin (2003) and Carey (2000).

As with the ITSM discipline at SUTL Smeaton & Keogh (1998) and Peat & Franklin (2003) used a multi-modal approach to the delivery of subject material, whereas Carey (2000) used a single mode of delivery i.e. either online or face-to-face.

As illustrated in Figure 1 of this study the LAI210 students' grade point average during traditional face-to-face lecture delivery remained relatively static. However in 2001 there was a decline when virtual lectures were first introduced, elevating sufficiently in 2002 to rebound it. This fall and rise of the students' grade point average when using virtual lecture delivery will require further research into the variables that may have influenced the results.

The extraneous variables identified by this study highlighted the difficulty in accurately comparing exam performance from one year to another. As a consequence there is insufficient evidence to support the research by Pahl (2002) who found students' results improved when using forms of virtual delivery.

As this study is a work in progress, these are preliminary results that may assist academic staff in measuring the potential impact on students' results when changing from a classroom, face-to-face mode of delivering lectures to online virtual lectures. The reactions of students to this change in delivery mode require further research. However the impact on final exam raw scores is potentially minimised when using a multi-modal approach.

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