Comparison of Technology Enabled Learning Practices (TELP) in Engineering: a Student's Perspective

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BACKGROUND

Recent years have seen a steady growth in the use of technology in learning and teaching. Deakin's School of Engineering uses its own set of Technology Enabled Learning Practices (TELP). Student surveys are taken after the completion of every unit, but although valuable, they give only a generic student view. What is required is a holistic approach from the student's perspective.

PURPOSE

What type of TELP best helps the student to learn engineering?

DESIGN/METHOD

A survey dedicated to TELPs from the students' point of view has been designed and will be given to students at various year levels in engineering at Deakin. The survey is designed to obtain quantitative as well as qualitative results. An analysis of this survey will give a view of the students' perspective of TELPs as they progress through their engineering degree.

RESULTS

The survey indicated that the students find that the full professional recording and screen capture TELPs as the most helpful as an aid to learning. It is also indicates that of all the TELPs the screen capture is greatly sought after by the students.

CONCLUSIONS

These results give the School of Engineering the information needed to tailor the TELPs used in unit delivery to further enrich the learning experience.

KEYWORDS

Technology Enabled Learn Practices, Study Presentation, Quality Assurance.

INTRODUCTION

With the internet available, the birth of tablet computers and other technology innovations has come various new teaching practices that use the new technology. Unit delivery styles have included the use of internet streaming, iPad applications and content distribution through to Virtual Reality devices.(Ai-guo, Ping, & He, 2011; Ikuo, Nagashima, Yoshinaga, & Ogawa, 2012; Qing, Fang, & Yongqiang, 2012; Raja & JosephRaj, 2012; Terry, Benzley, Hawks, & Judd, 1996; Yu-bao, Qian-li, & Shao-tang, 2009; Zywno & Kennedy, 2000) .

The School of Engineering at Deakin University has used its share of these technologies. Various lecturers have used different technologies at their own discretion and have promoted their use of technology to other lecturers. The School of Engineering has noticed that this has created gaps in the students expectations of what units of study will entail. The School has created its own set of Technology Enabled Learning Practices (TELP) to try and close these perceived gaps. However to get a clearer picture of just which TELPs are effective required the students perspective on which TELPs aid their learning process and student experience.

PURPOSE

Using new technology to deliver a unit may be seen by various lecturers as the best way to deliver a unit. Web based lecture technologies have become popular in universities and are being used as a tool to deliver the lectures to students. The use of hardware and software to capture the audio, video, and slides has been used to provide content to the students (Winer,Cooperstock,2001). The content has been delivered to students through the use of learning management systems using multiple delivery systems (Singh, 2003). Lecture capture technologies have been used in Australian universities and one of the prominent ones has been iLecture also known as Lectopia and Echo 360(Woo, 2008). The school is aware however that just because a technology is new, this does not necessarily equate to a better experience for the student. Whilst it is evidence that today's teenager is more ready and willing to use new technology (Danesh, 2010) that does not necessarily mean that its use for teaching is an improvement over older unit delivery styles.

To gauge the effectiveness of a particular TELP, the students' perspective on its effectiveness is sort.

The different TELPs used include, Screen and audio capture, tablet PCs, video cameras and notes.

Notes

This covers any written notes or documents that a lecture provides and includes full study guides. This was how all lecture delivery was done a decade ago. Notes were either mailed to the student or, in more recent times, emailed or placed on a web page.

Audio and Notes

This is an audio recording of a lecture plus the notes for that lecture and any other documents such as a study guide.

Screen and audio capture

This involves using a PC with a data projector and recording both the events that occur on the screen along with audio as a video which can be distributed to the students. Notes could also be distributed. At the School of Engineering this is done in one of two ways; iLecture™ and Camtasia™.

iLecture™

This system is built into many of the larger lecture rooms and is booked by the lecturer. It starts recording on the hour and stops 55 minutes later. It is completely automatic as far as the lecturer is concerned and records anything that appears on the projected image in the room plus the lecturer though a lapel microphone. It has several disadvantages. It is not editable so if the lecturer says something wrong, it is there for all posterity! If the lecture starts late or finishes early, anything that happens before or after is still recorded. It only recorded at 1 frame per second and at low resolution.

Camtasia™

This package can be loaded onto a laptop or tablet PC and used in any lecture room which is equipped with a data projector. It records only what the lecturer wishes to be recorded, it is editable and captures at 25 frames per second at high resolution. The lecturer has full control. This however is also a disadvantage as the lecturer much edit, render and distribute the recording himself.

Video recording

This involves setting up a video camera in the lecture room and recording the lecture. The advantage of this method is that it allows the lecturer who wishes to use a whiteboard to continue this delivery style and still get it recorded. This method can be used in conjunction with the screen capture (using Camtasia™) to providing video of the lecturer and cutting to the screen capture as required.

Table 1 provide a comparison the five technologies on the effort, cost, advantages and disadvantages of the each individual technology.

	Effort	Cost	Advantages	Disadvantages
Notes	Written notes and lectures prepared by the lecturer for the unit.	No extra cost involved.	Traditional method of delivering content and can be easily uploaded to the learning content management systems in various file formats	Students cannot catch up on a missed lecture. Content covered outside of the notes and lecture slides are completely missed out.
Audio and Notes	Written notes coupled with audio recording of the lecture recorded by the lecturer	Cost of a voice recorder which can produce quality audio output.	Provides the students with a limited experience of the content covered in the lecture. The students can gather the lecturer's thoughts on the notes and lectures slides.	It is a limited experience, especially for content which involves solving of problems in class. Correlating the audio and notes can prove difficult.
iLecture	Requires the lecturer to book their lectures to be recorded. Records the voice and the screen.	Costs involve the setup of equipment to record the lecture and personnel to edit and render the lecture.	The screen and the audio are recorded together and are synchronised thereby giving the students better correlation.	Requires a big setup. The lecturer has no control over the editing of the lecture. The recording is at a lower resolution and does not record the white boards.
Camtasia	Screen capture tool loaded on the laptop or pc in the lecture theatre. Records the screen of the laptop or PC along with audio and is controlled by the lecturer.	Cost of the software and the license for multiple locations.	The screen is recorded at a higher resolution. The tools allow for the lecturer to not only capture the screen but also the movements of the cursor. The lecturer has full control over the content and can edit the video at their discretion.	The onus of the recording and editing lies with the lecturer. It is still screen capture and does not record the whiteboard.

Video Lecture	Recording of the actual lecture in the lecture theatre with the use of video cameras.	the cost of the camera and personnel to record and edit the lectures	The video camera can record the screen and the whiteboard. The students can get a feel of actually being in the lecture theatre. The video recordings can be used along with the screen capture tool for a wholesome experience.	Requires personnel to record the lecture and edit the lecture. Care has to be taken to make sure students are not recorded in the frame.

Table 1: Comparison of the various technologies

METHODOLOGY

The methodology for this project comprised of a survey dedicated to Technology Enabled Learning Practices (TELP) from the student's point of view and literature review analysis of worldwide documentation on TELP.

As mentioned earlier Deakin University's School of Engineering has been using its own set of TELP and collected student views from surveys at the end of each unit but the views have been generic, hence the approach in this project has been to gather student perspectives with a holistic approach. The broad areas for exploration in the survey centred on:

- The technology enabled learning practices encountered and their impact on learning.
- The advantages and disadvantages of TELP's.
- What role TELP's should play?

The survey was chosen as the preferred mode for this research as the research is being conducted over a period of three years and the use of the repeat survey would give the researchers a good overview on the student perspectives and the change in them over the years. The survey also presents a relatively short time commitment from the students and allowed us to acquire information from a wide audience (Fricker, 2002).

The survey was aimed to identify the roles TELP's play in the student's learning and their advantages and disadvantages. The identification of these issues will allow the School of Engineering to design TELP's which will best suit the students of the School.

A questionnaire containing quantitative and qualitative questions was distributed to the students from the School of Engineering. The participants for the survey were recruited by distributing it to them after their class and were mailed to the off campus students. The questions were designed to discover student's view on TELP's and what role they play in their learning. The research conducted via the survey aims to find how to improve the TELP's. The students were encouraged to complete the survey and it was voluntary.

The research questions used in the study were:

Q1. Which of the 5 TELP's have you encountered at Deakin?

A. Notes only

B. Audio recording and notes

C. iLecture™

D. Camtasia™ plus (C and D are screen capture TELPs)

E. Professional recording- seminars and facilitation sessions.

Q2. For each TELP you have encountered at Deakin, please rate how well each TELP has enabled your learning.

- 1 – does not help
- 2 – no effect
- 3 – possibly helps
- 4 - does help
- 5 - is necessary

Q3. Which TELP would you recommend for future engineering students?

Q4. Why did you recommend the TELP in the previous question?

Q5. List up to 3 advantages and disadvantages of each TELP.

RESULTS

It is recognised that students learn in many different ways and forms. Deakin Engineering has been very active in assisting students to achieve their highest potential through a variety of learning styles including face to face learning, online learning, blended learning, and more recently cloud learning and located learning. When students asked about the different styles, 100% of the responses indicated that they have encountered some type of technology enabled learning practice. When asked about which technology they feel is most helpful, 55% indicated that audio recordings and notes together are important, 50% mentioned that the Deakin iLecture™ tool is helpful, as well as using the Camtasia™ recording software. These statistics are illustrated in Figure 1.

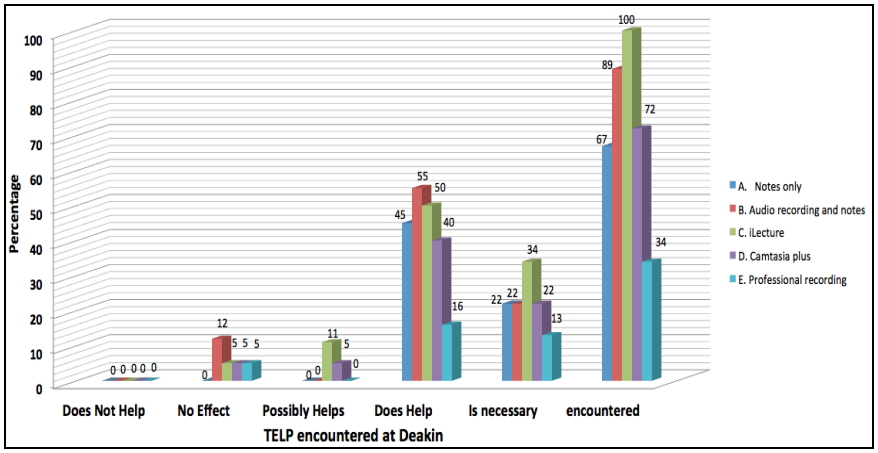

Figure 1 Technology Enabled Learning Practices encountered at Deakin Engineering

When students were asked about which technology enabled learning practice they would recommend for future engineering education, 40% indicated that Camtasia™ plus (which is a combination of the Camtasia™ software along with video recordings of the academic staff) is one which they would recommend, as shown in Figure 2. Interestingly, about 22% of the students are satisfied with notes only received by the academic staff. It should be noted that nearly 100% of the participants in this survey were on campus students. It should also be observed that questions 3 and 4 were set in a way for students to think about the different TELPs' and also consider about any recommendations they made. Initial research indicates that the most popular and useful technology enabled learning practices with off-campus students are the video recordings and the Camtasia™ recordings.

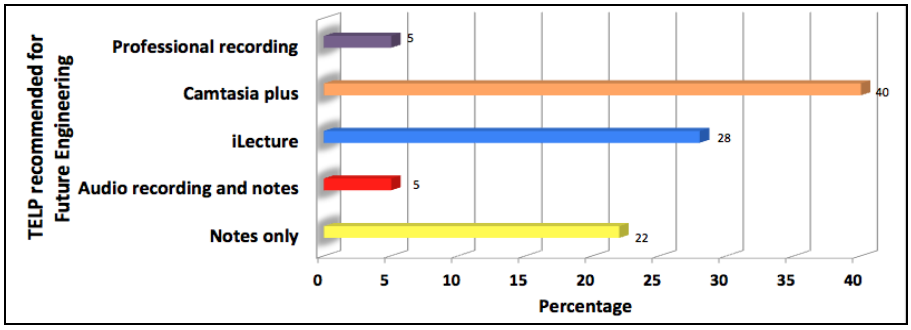

Figure 2 TELPs recommended for future Engineering

When students were asked about why they recommended these TELPs, 28% of students stated that if they were to miss a lecture they could catch up by watching the recordings, as shown in Figure 3. The download statistics for the video recording support this view; the video downloads range from 25% to 60 %.

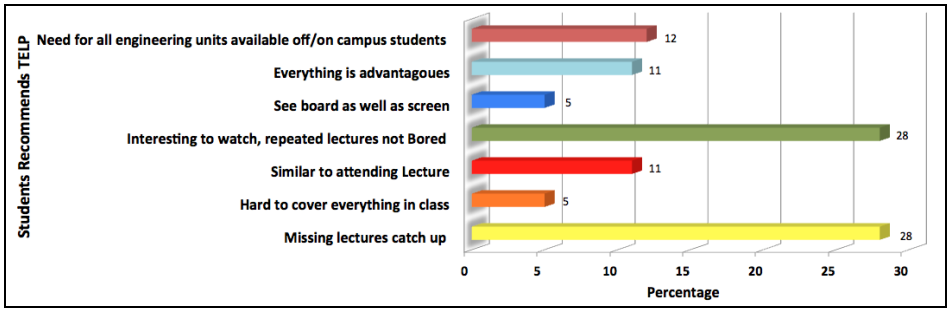

Figure 3 Reasons for recommending these TELPs

Interestingly, when students were asked about the advantages of TELPs, 33% indicated that there is more interaction through a technology enabled learning practice rather than the physical on site lecture, as illustrated in Figure 4. This clearly shows that if technology was used to its fullest potential, interaction is certainly achievable. Another 40% indicated that the advantage of TELPs is that the lecture or learning activity can be viewed more than once and can be successfully used as a catch up exercise.

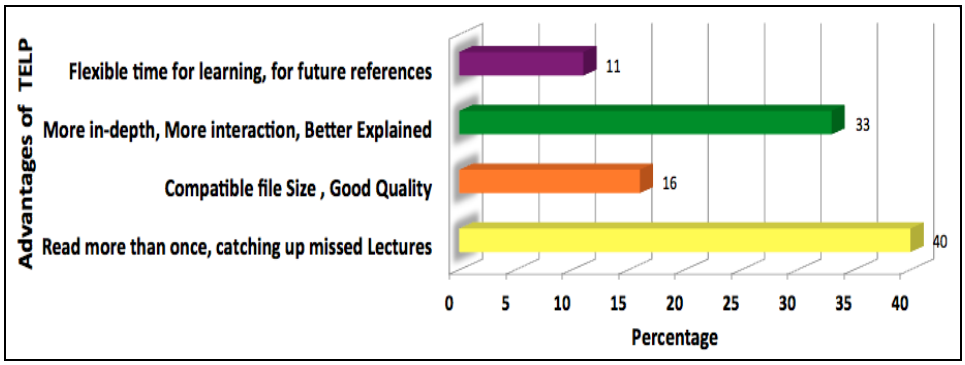

Figure 4 Advantages of Technology Enabled Learning Practices

On the other hand when students were asked to comment on the disadvantages of the technology enabled learning practices, 30% indicated that the learning activities which take place using technology are not the same as a real life lecture due to the lack of motivation, as shown in Figure 5. This indicates that more research and work needs to be done on ways and techniques to motivate students who chose to study using technology enabled learning practices.

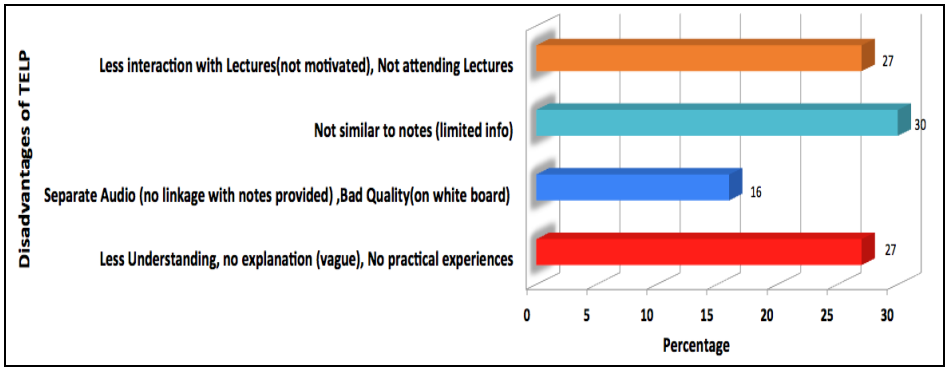

Figure 5 Disadvantages of Technology Enabled Learning Practices

CONCLUSION

The use of technology in learning and teaching has been steadily increasing; lecture capture technologies are one of the dimensions of this steady increase. The School of Engineering at Deakin University has also been using its own set of technology enabled learning practices; this research project investigates the student perspectives on the TELPs' used in the school. The results from the survey shows the students prefer the use of screen capture coupled with video recording as a method to deliver content and also recommend it for future use. These results give the School of Engineering the information needed to tailor the TELPs used in unit delivery to further enrich the learning experience.

ACKNOWLEDGEMENT

The authors would like to thank all the students at Deakin Engineering who took park in this research study.

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