

Improving First Year First Semester Lecture Engagement

Author

Venema, Sven, Lodge, Jason

Published

2012

Conference Title

15th First Year in Higher Education (FYHE) Conference

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Improving First Year, First Semester Lecture Engagement

Sven Venema

School of Information and Communication Technology, Griffith University, Brisbane,
Australia

Jason M. Lodge

Griffith Institute for Higher Education, Griffith University, Brisbane, Australia

Despite its falling popularity, the traditional lecture has remained a key feature in the first year of many undergraduate programs. Advances in slideware technology and lecture capture have had a positive impact on student engagement. However, with current approaches, material written on the whiteboard can be difficult and expensive to capture. This practice report describes an innovative approach for enhancing the effectiveness of the traditional first year lecture through the use of 'digital ink' technology. By incorporating a USB touch tablet into the lecture presentation, hand-written material is captured live and made available for capture by the standard university lecture capture system. Feedback from students has been overwhelmingly positive, suggesting that this is an effective approach to improving engagement and enhancing the presentation of material in first year lectures.

With the introduction of new techniques and technologies into higher education, the lecture as a delivery method has gradually fallen out of favour. Despite this, the lecture has remained a key feature in the first year of many undergraduate programs due to physical, financial and academic resourcing restrictions. It is therefore likely that despite the decreasing popularity of the lecture, it will remain in higher education and in first year courses for some time to come.

Over time, the delivery methods used in lectures have moved from a traditional 'chalk and talk' approach to a more developed multimedia approach using 'slideware' such as Microsoft Powerpoint and Apple Keynote. The introduction of this technology has led to an increase in student interest through greater clarity (Apperson, Laws & Scepanisky, 2002), suggesting that this innovation has had a positive impact for students. While a wide range of technological enhancements have been made in terms of the experience of on-campus students (c.f. Ellis, Ginns & Piggott, 2010), beyond the use of presentation tools such as slideware, little enhancement has been made to the delivery of lectures (Deslauriers, Schelew & Wieman, 2011) and this lack of innovation is limiting the effectiveness of this teaching mode.

Despite the increased use of multimedia in first year lectures, the lecture remains a less than ideal method of learning in higher education. There are distinct problems with the increased use of slideware that are detrimental to student learning. For example, large volumes of text and pictures that do not directly relate to the content being presented cause interference with the learning process (Bartsch & Cobern, 2003; Tangen et al., 2011). Furthermore, the capacity for working through problems that was available through the use of blackboards and whiteboards is curtailed when using slideware (Scott, 2011). Thus some of the benefits of using slideware come at the cost of the benefits of the traditional 'chalk and talk' approach and partly explain why the increased use of slideware does not appear to have led to enhanced learning outcomes for students (Apperson et al., 2004).

The increased use of slideware has additional implications for some disciplines over others. In a number of disciplines, it is important to work through problems and develop diagrams and other content during the lecture. For example, the first year economics lecture is greatly enhanced through the use of diagrams and the working through of equations in the lecture session (Scott, 2011). It is very difficult to include such handwritten content using slideware. The inclusion of handwritten content is of importance to other disciplines such as mathematics, engineering, information technology and the sciences.

Handwritten content presented dynamically during lectures although useful, does have some drawbacks. In order to use a whiteboard or blackboard, a lecturer must spend a substantial amount of time with their back to the class. Without maintaining eye contact with the students, this can lead to a drop in student engagement with the lecture and is thus less than ideal (c.f. Race, 2007). In addition to the problems caused as a result of having his or her back to the class, writing on a whiteboard is also problematic because often the writing is illegible and/or difficult to see from the back of a lecture theatre. Writing on a whiteboard or blackboard is therefore not ideal for presenting handwritten material (Exley & Dennick, 2009) and is no doubt part of the reason why lectures are no longer seen as an effective learning mechanism.

In addition to causing problems during the lecture session itself, material written on whiteboards and blackboards is very difficult to capture in a lecture recording. Aligned with an increased emphasis on flexible delivery of course material, it has become more common for lectures to be recorded and made available to students at their leisure (Woo et al., 2008). Although it is relatively straightforward to capture slideware presentations, it is far more difficult and expensive to capture handwritten material.

One possible solution to these issues is the implementation of tablet computers (e.g. iPad) into first year lectures for the purpose of capturing dynamic content as well as that produced in advance (e.g. Mock, 2004; Scott, 2011). Despite this, these computers are not ideal for combining the complete audio and visual information available in a lecture setting. For example, although tablet computers are adept at handling drawing or other dynamic content and can be set up to display slideware, they are not as efficient at combining and recording these inputs in the same session. This is a criticism that can also be equally applied to other mechanisms used to capture dynamic presentation such as recordable whiteboards and projectors. In each case, the disparate information is difficult to integrate into a single lecture recording.

What is required then is a mechanism whereby all visual and auditory components of a lecture session can be efficiently and cost-effectively captured. One possibility for achieving this is through the use of 'digital ink'. Including hand-drawn diagrams on presentation slides has the potential to improve learning (Iribe, Nagaoka, Kouichi & Nitta, 2010) and can be implemented via the use of a USB writing tablet and software that enables the presentation and capture of slideware, audio, and handwritten content using the standard equipment in a modern lecture theatre.

As this process of presenting material in a more integrated way has the potential to enhance the lecture experience, the current project aimed to implement a writing tablet and digital ink into a first year computer architecture and networking course.

Lecture enhancement using a touch tablet

The trial of digital ink as a way of presenting material in a first year lecture was undertaken at an outer metropolitan university in Australia. A USB writing tablet was used in order to provide dynamic presentation of handwritten material that was also captured using a lecture capture system and posted onto the university's learning management system as a resource for students.

During initial testing of the USB tablet and digital ink, it became apparent that writing onto existing slideware presentations was not ideal as there was limited space for writing directly onto each slide. An alternate approach was developed which involved converting the presentation to a Portable Document File (PDF) format with sufficient space inserted into the document to allow for the handwritten elements to be added during the session. Figure 1 illustrates the pre-prepared presentation.

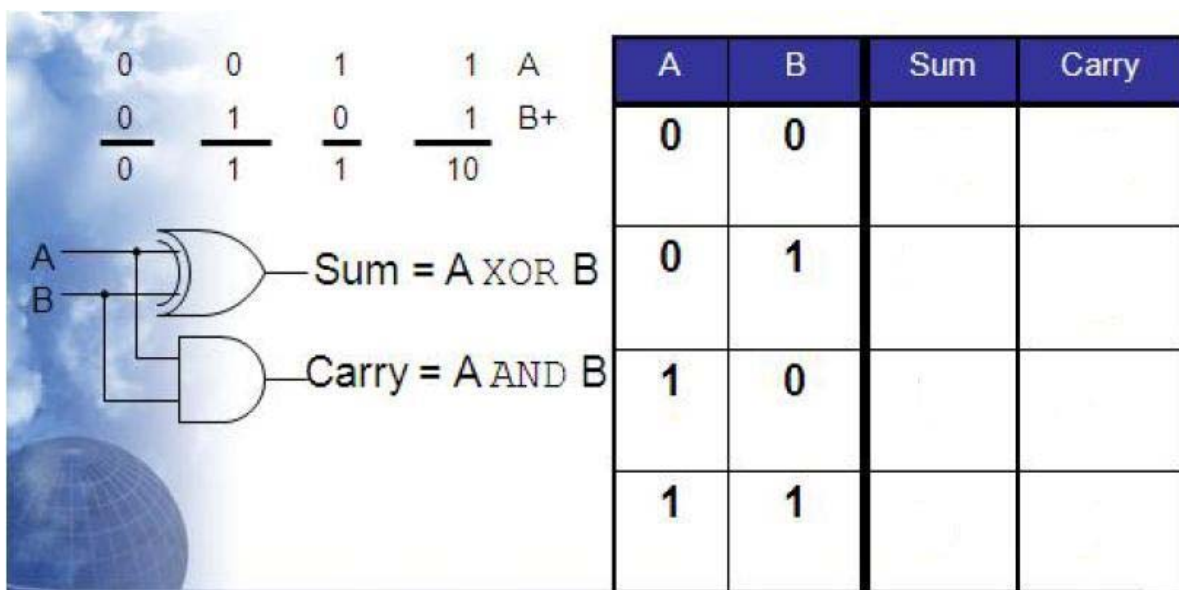


Figure 1. Projected example prior to annotating

Figure 2 shows the presentation slide after it had been annotated in the lecture session.

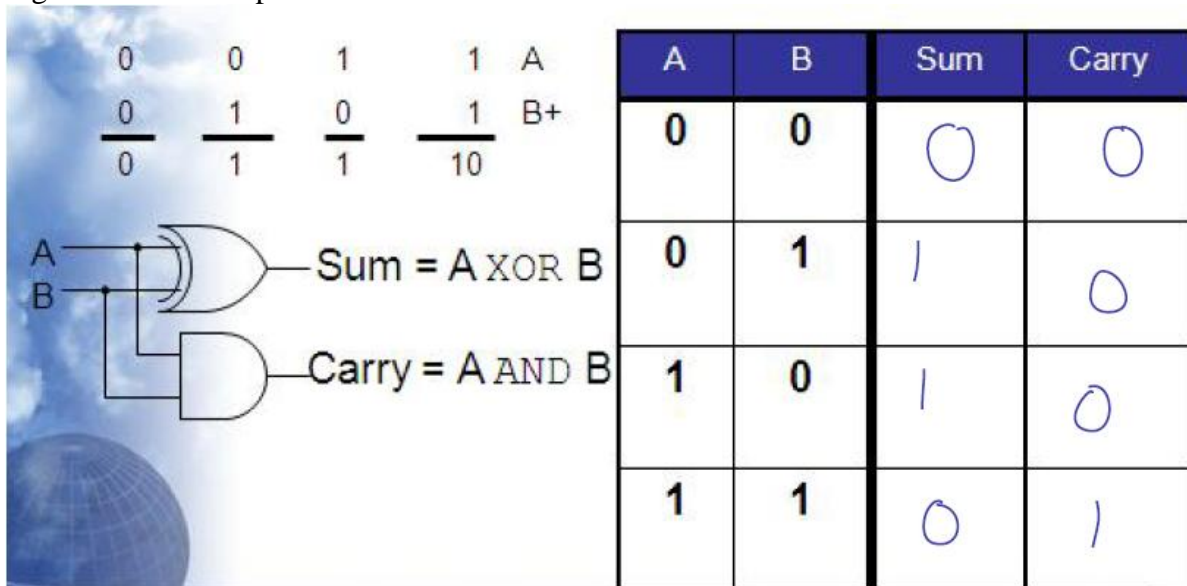


Figure 2. Projected example after annotating

Student Feedback

In order to determine whether the USB tablet and digital ink were beneficial from a student perspective, students were asked a series of survey questions on five-point Likert scales from ‘strongly disagree’ to ‘strongly agree’. Questions ranged from overall satisfaction with the lecture, whether the material was presented in an organised and effective way and some questions specifically about how effective the digital ink was. Several open-ended questions about the best and worst aspects of the lecture were also included.

In total, 64 students completed the survey questions representing 28% of the cohort. Students generally rated the lecture as interesting, organised and were positive about the implementation of the digital ink.

In terms of the features of the lecture mentioned by students in the open-ended questions, 53% of students specifically mentioned the digital ink and claimed that they thought it was a “great idea”. There were few comments about the aspects of the lecture that needed improvement with only one student commenting that the introduction of digital ink was perhaps premature and required a greater level of confidence before being completely effective.

The number of times the resulting lecture recordings were downloaded was tracked using the university’s learning management system. Table 1 gives the figures for the total number of times the videos were downloaded and the unique views of the videos.

Table 1. *Breakdown of accesses of lectures including ‘digital ink’*

	Video 1	Video 2	Revision link
Number of unique accesses	85	74	N/A
Total number of accesses	290	195	108

A follow-up survey was conducted to determine how useful the video of the lecture was for students. The response was again overwhelmingly positive with the majority of the 31 students who responded to the follow-up survey specifically mentioning the handwritten content captured using the USB tablet and digital ink as being the most useful part of the lecture recording. The only negative comment about the recording was that it required a VLC player in order for it to play.

Conclusions

Lectures are becoming less popular as a technique for engaging first year students. As discussed, the increased use of slideware has had some negative consequences despite ostensibly enhancing student interest. Ideally, large first year classes would be conducted in such a way as to allow for the design of individual learning experiences. While resources and technology is being developed to allow such experiences in the future, the lecture will remain a feature of the higher education landscape for at least the short to medium term. Although not ideal, the current project highlights one possible way in which technology can be used to

create a more dynamic lecture experience for students. The implementation of a USB tablet and digital ink meant that handwritten material could be incorporated seamlessly back into the session while the lecturer remained facing the class and was able to be captured for later review. The positive feedback from students suggests that this way of enhancing the presentation of material in a first year lecture is seen as effective by students

Key Questions

Is the lecture as a mechanism for engaging first year students untenable?

Are there other ways of using technology to enhance the first year lecture experience?

Session Plan

Background to the issue and potential solutions	5 min
Live demonstration of the initiative with question time	10 min
Discussion of student feedback and future implications	5 min
Group discussion exercise centred on key questions (above)	10min

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