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Facilitating Enhanced Learning in Tutorials through Tablet Computing Enabled Sharing and Annotation Technologies

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ABSTRACT

The purpose of this study is report on a trial of tablet computing enabled sharing and annotation technologies in an Introductory Accounting subject. These technologies allow student homework to be photographed using a tablet computer (iPad in our study), shown to the class instantaneously through a data projector and annotated live by the tutor, along with student participation, using the tablet computer. These technologies are intended to address calls for more student–centred approaches to learning, moving away from the didactic approach that dominates much of accounting education. Two focus group sessions were conducted to explore the effectiveness of the technologies, with the first group from a class where the tutor used the iPad and the second from a class where there was no iPad use. The findings from the focus groups suggest that in the class where the iPad was used, there was a far greater ability to focus on the questions and problems students were facing, a lot more material could be covered, student felt more comfortable participating because they could see their fellow students faced similar challenges and they were far more likely to complete homework prior to class. Overall this indicates there were significant benefits for students.

KEYWORDS

Accounting education, sharing and annotation technologies, student–centred learning, tablet computing

INTRODUCTION

Emphasis on active, student–centred learning has been found to enhance student engagement, motivating students to adopt deeper approaches to learning (Prosser & Trigwell 1999, pp. 90-92). Despite this there is still a largely didactic approach to tertiary education, at both the lecture and tutorial level, particularly in the area of accounting education (Stevenson et al., 2014). Addressing this issue is important in accounting education, as accounting students are typically not highly intrinsically motivated (Ottewill & Macfarlane 2003) to complete required homework, which is critical for mastery of the subject matter. There have been a range of calls to address this issue in accounting from practice and literature, particularly given the links between enhanced student engagement, positive attitudes to learning, development of better communication skills, higher order thinking and enhanced student performance (Ballantyne & Larres 2009; Ravenscroft et al., 1999).

To address the calls for greater levels of engagement, the use of tablet computing and annotation technologies was trialed in selected tutorials of a large Introductory Accounting subject. This is studied by approximately 1,500 students in the first semester and 700 students in the second semester of the year. These technologies enable tutors to take photos of student homework in class using a

tablet computer (iPad in our case), show these images to the class instantaneously using a data projector, and annotate these images through the tutor's use of the iPad (along with student input), with these annotations being projected live to the class (Figure 1).

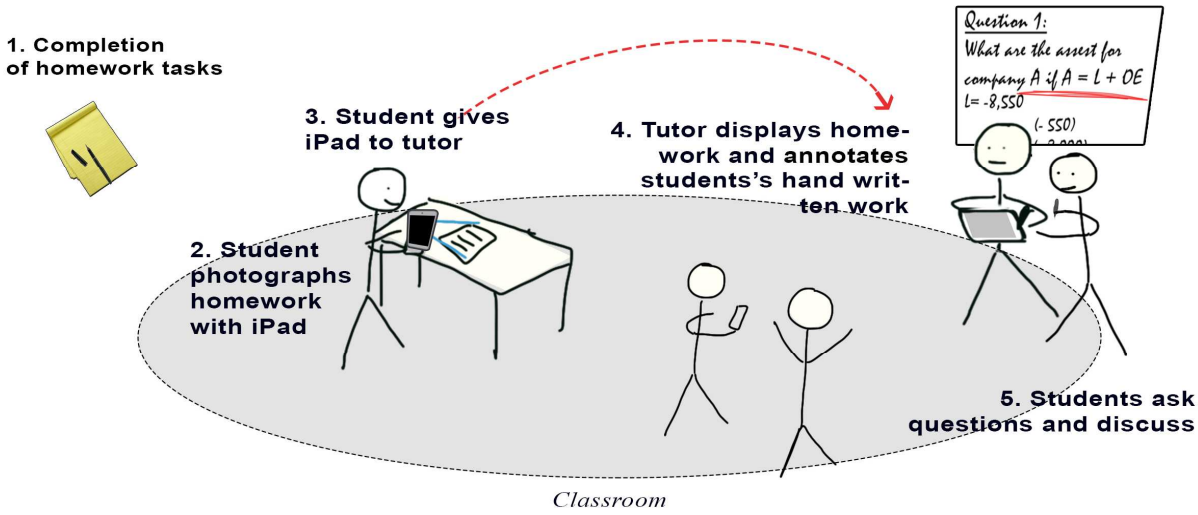

Figure 1. Image Sharing and Annotation Process in Class

RESEARCH METHODS

The image sharing and annotation was evaluated using several methods that were conducted sequentially. These methods are described here:

1. *Pre-implementation in-class observations:* Prior to the use of the sharing and annotation technologies, one of the researchers not associated with the subject sat in on one of the tutorials and took notes of her observations. Observations focused on student participation.
2. *Comparative Focus Groups:* Following the trial of the iPad innovation two focus groups were conducted. One comprised students who were enrolled in tutorials where the iPad innovation had been implemented, another was comprised of students attending a traditional tutorial. Students were given the incentive of lunch or afternoon tea if they attended. The focus groups were led by one of the research team while notes were entered on a laptop simultaneously by another using as much of the students' own language as possible. Neither of these researchers was known to the students, nor are they involved in teaching accounting. The notes were anonymised before sharing with the Business School researchers who teach the subject.
3. *Surveys:* Surveys were distributed to students to gather further evidence and corroborate the findings from the iPad tutorial focus group. These surveys were distributed to students attending tutorials in which the sharing and annotation software were introduced. Students answered nine questions with a 1-to-5 Likert-scale (Strongly Disagree to Strongly Agree).

FINDINGS

Pre-implementation In-class Observations

Within the standard tutorial the researcher observed that the tutorial was very teacher-centred, with most of the 'talk time' coming from the tutor, who provided and explained solutions to the homework questions. Very little time was spent on student discussions, despite the tutor encouraging students to ask questions and sometimes challenging them to contribute a comment or answer to the class. The students' questions and answers were normally very brief (only 1 or 2 were sustained) and in total took up less than 10 – 15% of the tutorial time. Only a minority of students participated in this way: only 9 students, mostly males, spoke out of the 28 students present in the class. Of the 18 total student contributions to class, 13 consisted of questions to the tutor and 5 comprised students answering a question posed by the tutor. However, all students with one exception were intensely

focused on the class, closely following the tutor's working through of solutions and his explanations of what he was doing, and a few took photographs of the solutions with their smartphones or iPads.

Comparative Focus Groups

Focus groups with both those in the traditional tutorial and those with the iPad innovation were conducted. We present findings for these focus groups separately, but discuss comparisons in the discussions of this paper.

Traditional Tutorial

Both focus group participants who came from the traditional tutorial confirmed that most tutorial time is spent going over the homework. The procedure is as follows: 'She presents a problem and we all brainstorm it', individually. If a student knows the answer, they volunteer their solution. If no-one knows, the tutor explains it: as she works through the solution, she will ask, 'Who knows what to do now?' Someone might volunteer, or if no-one can do it, the tutor steps in and continues through the exercise. Most students do not volunteer since, as the exchange student said, 'What's the point of me? The answer might be wrong.' However, unlike the other student, this student sometimes volunteers: 'It takes you out of your comfort zone.' The tutor usually suggests the questions to go over since she knows which ones students normally get stuck on. Then sometimes she will ask students what questions they want to work on. The focus group participants noted that there is interaction between the tutor and the students but 'Between students, not much.' If a topic is tough, students are more likely to ask questions of the tutor. The majority of time is taken up by some of the questions that are very long, with others being skipped.

When asked what they would like to happen in tutorials, both students came out strongly for groupwork: 'Groupwork would make the class more engaging. This is a bit lacking.' For example, the brainstorming could be done in groups: 'I think most of them would know each other. Getting in groups would break the ice'. They could work in a group and then present to the class. An added benefit would be that students would get to know other students and could study for exams together. They were adamant that students needed to do more of the work in the tutorial since they have to become independent learners: 'It has to be … they have to study by themselves'. One student, who attended extra tutorials aimed at students who had failed or needed extra help, was enthusiastic about a group activity in which students re-assembled a financial statement, which the tutor had cut up, and then did the calculations to complete it.

Other suggestions by the students were to include discussion of news articles to engage students, incorporate examples of real-world practice so that theory is related to practice, and either make the tutorials half an hour longer or structure the tutorials in such a way that all the material is covered.

The focus group participants were asked what they thought of introducing iPads into the class for photographing students' homework for display and discussion: 'Depends on the person … I think they would be a bit nervous showing it to the entire class.' They thought it would be good to compare one's own work to the student whose work was up there, but that it would not be such a great experience for the student whose work was on the screen. However, it would be a good method of identifying problems 'on the spot.' If you could share homework anonymously, then they thought it might work but were still hesitant about the idea: 'I think so. I think that's a good idea. It depends how you do it.'

iPad Tutorial Focus Group

The three focus group participants who were enrolled in a tutorial in which the new procedure was being trialed expressed a high level of enthusiasm with regards to the tutor's use of the iPad, as comments quoted below show. Moreover, there was consensus between them and a fourth student who spoke to the researchers' informally after the focus group had concluded.

According to the participants, the tutorials are conducted in the following manner: First, the tutor asks the class which questions they want to discuss, and which questions they have problems with.

Going over homework questions and discussing them takes up 'pretty well the whole tute'. When someone volunteers their solution to a question, the tutor uses his iPad to photograph the student's work and share it with the class. One student said that some people always volunteer their work, depending on where they sit in class and how easy it is for the tutor to reach that student with the iPad. The participants also agree that the tutorials are very interactive – in fact, they state that as the semester progresses, students become more enthusiastic and more frequently volunteer to have their homework displayed on the screen.

The participants stated that the two most important aspects of the approach were seeing where their work stood with respect to others and getting the tutor's feedback. They said it was nice to see other students' work because it made them feel 'like you're not the only one who got it wrong or didn't understand'. Compared with when they are doing it home alone, in the tutorial it becomes clear: 'He goes through it step by step, so it really breaks it down. It's nice to know that other people are struggling with the same things that you are.' Another advantage is that the tutorial questions are answered quickly, which saves a lot of time: you 'get through a whole lot more content.'

When asked how they felt about having their work corrected by the tutor in front of the class, there was consensus that, 'There's no judgment if we don't get the question right.' One stated that, knowing that your homework might be shown on the screen 'makes you actually do it.' However, of the three participants, only one had ever volunteered her work: this student stated that 'even though I got a few wrong, at least I was able to correct it [from the tutor's annotations and discussion of her work in the class]. … It really does help.' Of the two students who had never volunteered their homework, one claimed it was because her handwriting was not good, while the other could give no reason.

When asked how they felt about having *another* student's work corrected by the tutor in front of the class, they all liked this. Typical comments included 'I kind of like the student work', and 'It made you feel OK if you didn't get it right.'

Regarding the use of the iPad, the students stated they were 'Definitely a good investment' and 'It's very helpful.' One student affirmed that 'These tutes have probably been the most helpful of all the subjects I've done so far', another that 'For this content, it's really well structured. … For Accounting it's really, really helpful.' One of the focus group students had attended another tutorial where the iPad was not being used by the tutor and the tutor told the students the answers: 'I hated it. It was horrible.' Moreover, the tutor must be able to use the iPad to its full capabilities: 'They really have to be comfortable with it.' In addition, they said the technique with the iPad would not work in all subjects since some do not have structured homework and tutorials consist of discussions of topics. By contrast, in accounting, 'There is a right and a wrong answer, and there is a process to go through.'

The only suggestion for improvement that the students had was to make the tutor's corrections to students' work available online in order to help them with exam revision. However, they realized that there would be issues with students' copying the solutions.

Surveys

From a sample of 65 students, the data suggests that the use of the iPad is well-received, with tutorials becoming more engaging and interactive. The sharing of answers via the iPad created a learning environment that was more conducive to student comfort and participation, relative to the traditional tutorial. Respondents felt that the use of the iPad enhanced their learning experience in the subject (4.40/5.00) and only a minority believed that using the iPad was time-consuming (2.08/5.00).

DISCUSSION AND LIMITATIONS

The findings drawn from the surveys and the focus groups are consistent with prior literature (Park & Choi 2014) and strongly suggest that the traditional classroom environment has crucial weaknesses – in this context, it is not very conducive to class participation, with little or no incentive for students

to offer their own solutions. On the other hand, the introduction of the iPad bundled with sharing and annotation software greatly increases student comfort in the classroom and their propensity to participate and engage in class discussions. The greatest benefits of this approach, as identified by the iPad tutorial focus group are: (1) the assurance that other students were facing similar struggles in completing the homework, and (2) receiving feedback from the tutor. This additional knowledge appears to be important in encouraging class participation, as evidenced by the growing eagerness of students to display their homework on the screen throughout the semester. Unfortunately, the number of students who volunteered to participate in the focus groups was low (three students in the first focus group, and two students in the second). In addition, the students from the traditional tutorial may not have been 'typical' students – one of the participants was an exchange student, enrolled at a university in the United Kingdom and undertaking a year of his degree in Australia, while the other had previously failed the subject. However, since failures are high in Introductory Accounting, in some ways he may be regarded as all too 'typical' (unfortunately so). Thus the students' comments in both focus groups need to be taken with caution but give an indication of student views and provide direction for further research.

CONCLUSION

Facilitating student-centred learning is critical to enhancing student learning outcomes. To address calls from practice and literature for more student-centred approaches to learning, we trialed tablet computing enabled sharing and annotation technologies in a large Introductory Accounting subject. Students who had experienced the tutorials where the iPad innovation was introduced were extremely enthusiastic about its use in the class, whether they were one of those who volunteered their homework for display and discussion or had never done so. They appreciated being able to get instant feedback and seeing where their work stood with respect to other students. The lack of anonymity in providing answers did not seem to worry them. Furthermore, they appreciated being able to cover such a large number of the homework exercises. The inability to cover all the required content in class was a major concern for the students from the traditional tutorial who had participated in the second focus group. These students confirmed much of both the lecturer's views and researcher's observations on how the tutorials are normally conducted and why they need improving, namely the adoption of a very teacher-centred approach, with many students never interacting with the tutor and little interaction between students. The findings of this exploratory study of introducing iPads into Introductory Accounting tutorials to shift the focus of learning from the tutor's explanations to the students' worked examples gives us encouragement to continue with this innovation on a larger scale next year. A full evaluation of the innovation will then be undertaken, including more rigorous comparison of the students' learning experience in tutorials with and without the iPads, and an evaluation of the impact on learning outcomes.

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