Poster

Teaching with Tablets: Enabling Interactive Learning

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1   Introduction

In September, 2007 CPIT was awarded an HP Technology for Teaching Grant Initiative that enabled the purchase of 20 HP Tablet PCs. Washington State University was awarded a similar grant in 2004 and they have developed a software product called Classroom Presenter (Anderson *et al.,* 2007) that provides an interactive teaching environment using the tablet PCs. We are using Classroom Presenter to teach a first year, compulsory, discrete mathematics course. This course has previously been delivered using a 2 x 1 hour lecture plus 2 x 1 hour tutorial weekly format. Classroom Presenter allows PowerPoint slides presented on the instructor tablet PC to be sent via a wireless network to the student tablet PCs. The pen based technology means students can write, draw, or annotate the slide and then send their work back to the instructor. The instructor can discuss or comment on selected responses.

2   The Question Slides

A series of question slides were developed for each teaching session with best practices in mind (Anderson, Anderson & McDowell, 2005) and aiming for a 3 or 4 minute student response time. These were tested by the instructor completing them from a student perspective and modifications made as required. Further modifications have been made as a result of our week by week experience of this teaching method.

3   Technical issues

Power: The room we use has a number of power points on each side of the room. Each tablet PC is connected to a power point. This eliminates any problems with battery failure. System settings were changed to never go into standby or hibernate mode because when that happened the tablet would disconnect from the network.

Network: Initially we set up an ah-hoc (peer to peer) wireless network. Our testing was done with 4 tablet PCs but in a classroom situation with 16 tablet PCs the practical limit for the peer to peer network was 6 tablet PCs. An Access Point was used to solve this problem. Each tablet is connected, via a wireless network, to the Access Point which handles all communications. This works well with 16 tablets connected.

Security: Each tablet is numbered and stored on a numbered position on a three shelf trolley. The electronic pens are attached to the tablets using a cord. We use a set of sheets that record the tablet number and each one is signed out and signed in. The sheets include a pen check. We have had no problems with tablets or pens going missing.

4   A Typical Teaching Session

Each 1 hour lecture + 1 hour tutorial has been replaced by a 2 hour interactive learning session. The tablets are deliberately shared one between two students to encourage peer instruction (Crouch & Mazur, 2001). There is a range of different types of question.

The teaching is done in chunks:

- 5 or 10 min teaching slot using the white board or power point slides or using tablet slides plus annotations using the pen

- A question slide or slides to reinforce this teaching is sent to the student tablets

- Students work in pairs to answer the question and then send their response back to the instructor tablet

- The instructor selects "interesting" responses to display via the data show and discuss with the class.

5   Instructor Reflections

The change to an interactive learning mode means a change in teaching style. The instructor thinks in terms of chunks when developing the question slides and this is reflected in the delivery. Each topic is broken down into a set of learning objectives that build on each other. Each question reinforces each objective. The questions need to be self explanatory, at the right level to make the students think and take about 3 minutes to complete. A number of different question styles have been developed i.e. fill in the blanks, draw a diagram, colour in sets, complete a truth table, find the errors. Students are interested and keen to use the tablets. At the start of a class it takes a while for tablets to be issued, powered up and connected. We have introduced a revision question to start each class so that now as each group gets their tablet connected they then work on the revision question. When a question is sent out there are always some groups who complete it and send back their answer long before other groups. Waiting for all groups to finish a question meant that the early finishers were talking, playing, or getting bored. We now have 1 or 2 supplementary questions on an OHP for these groups to do while they are waiting. This works well. While students are working on a question the instructor can move around the room and observe their progress. Sometimes the instructor will provide help to a group, other times it is better to let them solve it together. This peer instruction aspect is something that the students have commented favourably on. The teaching session can be dynamically altered depending on the responses received. If student responses indicate that a topic has been mastered then we can move on, if not then a response can be reviewed and another similar question sent out. When reviewing the student submissions it is a good idea to select a correct one and indicate this with ticks. The student responses are saved and copied to a student network drive so that students can review all responses. A student evaluation after the first 4 weeks asked for advantages and disadvantages. Evaluations were overwhelmingly positive such as "fun", "enjoyable", "good to see others work", "made us work together". We have made changes to address the negative comments such as "the pace is too slow" and "I can't keep the slides for revision".

6   References

Anderson, R., Anderson, R., Davis, K. M., Linnell, N., Prince, C., & Razmov, V. (2007). Supporting Active Learning and Example Based Instruction with Classroom Technology. SIGCSE'07.

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Crouch, C. H., & Mazur, E. (2001). Peer Instruction: Ten Years of Experience and Results. American Journal of Physics, 69(9), 970-977.