“10 years ahead” – what is possible in a classroom powered by tablet technology?

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Research Questions

• Can we make a mathematics class more interactive and engaging using the technologies available in a new teaching space?

• Will the technologies be too distracting?
Background to the study

• Experienced with one-tablet model
• 1\textsuperscript{st}/2\textsuperscript{nd} year mathematics teaching

Great results – but
> only one person writing
> what do students really know?
> can they solve the questions or are they just nodding to please the lecturer?

The Advanced Concepts Teaching Space

• 100 Wacom pen-enabled screens
• Powered by thin client technology
• $2.5m
• PowerPoint, SynchronEyes

• Motto: “10 years ahead”
The study

• Voluntary mid-semester exam revision
• Offered 2 sessions
• Data collected:
  > Screen capture of the first offer
  > Attendance record to match with exam performance
  > Student questionnaire
  > Unsolicited student emails
  > Lecturer/researcher interviews after both offers

What we did in the sessions

• Observation of what all students were doing
• Students working through questions similar to exam
• Students were given a question and (incorrect) solutions to mark
• Questions carefully selected, also to allow comparison with exam performance
Initial results - observations

• 50 and 60 students turned up. Some may have come a second time
• Students willing to participate
• Students not wanting to leave the room at the end
• Anonymity = non-scary participation

Initial results - data

Students appreciated that
• they felt encouraged to participate
• it was fun
• they could see what other students are doing
• it was an engaging, interactive experience

Although there were some technical issues -> outweighed by the engaging session (“no biggie”)

They requested similar sessions at the end of semester
Did the technology in the room distract you from the revision material?

• It was more engaging than the usual tutorials.
• I thought it was a great idea to make it interactive like it was. It encouraged everyone to participate because it was both fun and useful.
• Rather, having the technology there created a different context/environment/space for learning the revision material away from the lecture theatre. This was very good - it helped me to remember the material from the revision session very well. I think it also forced me to consciously explain my thinking while solving problems.

Did the technology in the room distract you from the revision material?

• I found it interesting and no distraction at all. I had a big day on that day and I was really tired at time of the session but then when i started the session i thought it finished pretty quick and I didn't realized how tired I was.
Lecturer feedback

• In today’s lecture […] directly after the session we had yesterday afternoon I felt that the students were more positive towards me

• And wow you should read them I don't think I have ever had anything like this.

I was surprised that many of them couldn’t take the partial derivative and I've been explaining this for at least the last two weeks […] they've all been nodding their head and telling me they knew how to do it but at yesterday’s session there was a lot of them that had it wrong, so today I took time to go back through it again and explain it to them and at the end of the lecture when I was talking to them, an increased number of them were saying, “Now I do get how to take a partial derivative […]” So that was a feedback loop that did actually work and it came out of yesterday.
Guiding a student to the right solution

Showing a correct solution
Overview of students’ work

Mark this question!

Consider the surface  \( z = f(x, y) = e^x y^2 \)

Find the tangent plane to \( f(x, y) \) at \((2,1)\)

\[ z = e^x \left( x + 2y - 4 \right) \]

\[ z = e^2 \left( x - 2 \right) + 2e \left( y - 1 \right) \]

\[ z = e^2 \left( -3 \right) \]

\[ z = e^2 \left( -3 \right) \]
A bit of fun …

Find the equation to the plane through the point (-1, 2, 3) and parallel to the plane x + y - 2z = 0.

- \( (x + 1) + 2(y - 2) + (z - 3) = 0 \)
- \( x + y - 2z = 0 \)

The normal to the plane is \( x + y - 2z = 0 \).