The Use of Educational Technology in an Engineering School: Then, Now, and the Future

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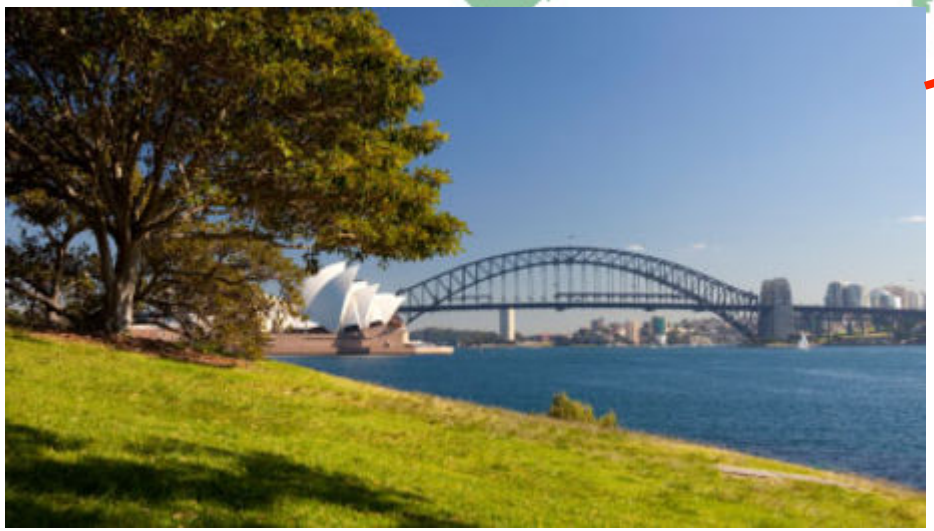
1. INTRODUCTION TO UNSW



1. INTRODUCTION TO UNSW

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1. INTRODUCTION TO UNSW

Fast Facts

- ✓ Number of students - > 52,582 (14,607 international)
- ✓ Number of staff – 7,737
- ✓ 8 Faculties, 1 College, 65 Schools, 97 affiliated institutes and centres
- ✓ Engineering – 9 Schools
- ✓ Electrical Engineering & Telecommunications
  - ✓ Students – approx. 1,000 (700 UG, 200 PG Coursework, 100 PhD)

2. Why Educational Technology

- ✓ Common challenges in teaching/learning
  - ✓ Maintaining students' attention
  - ✓ Communicating difficult mathematical concepts
  - ✓ Students learn at differing pace
  - ✓ Lack of fluency in written/spoken English
  - ✓ Students are busier! - 45% in part-time work 2003-2006
  - ✓ 36% of students study less than 5 hrs/wk outside schedule classes.

➔Smaller percentage of students are/were grasping key concepts in live lectures

➔Students left to develop the critical understanding in their own time … can lead to a vicious cycle!

➔An alternative delivery mode which would encourage and support self-directed study.

2. Why Educational Technology in this School

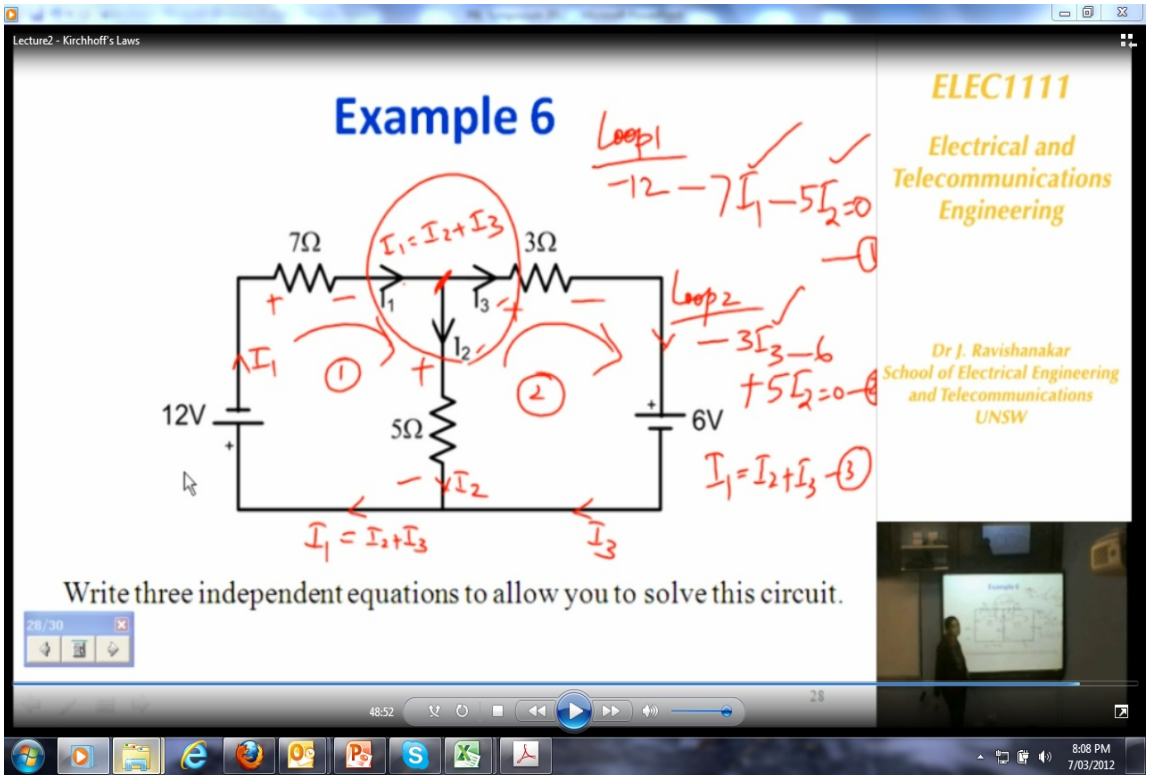
- ✓ Statistics from 2003-2008:
  - ✓ 75% of students study less than 10 hrs/wk outside schedule classes.
  - ✓ 36% of students study less than 5 hrs/wk outside schedule classes.
- ✓ Traditional lecture deliver modes (including PowerPoint presentations) were not as effective as required.

  ➔An alternative delivery mode which would encourage and support self-directed study.

3. The Virtual Classroom

- ✓ The School of EE&T developed a virtual classroom and DVD-based lecture facility in 2005.
- ✓ Virtual Classroom Facility – allows for capture of lecture/ tutorial material

- ✓ Synchronised electronic whiteboard content
- ✓ + lecturers handwriting annotations
- ✓ + audio and video of lecturer



3. The Virtual Classroom

- ✓ Flexibility
  - ✓ Students can of course watch at a time of their choosing.
    - ✓ Although they are not meant as a replacement to face-to-face lectures, but an additional support resource.
  - ✓ Recording with students (live) or without.
  - ✓ Lecturer can record smaller 10-15 electronic whiteboard-based clips, giving more detailed explanations for difficult concepts, otherwise not practical in a traditional face-to-face lecture.
  - ✓ Annotated solutions to selected difficult (and simple) tutorial questions.

3. The Virtual Classroom

- ✓ Increased application
  - ✓ Many lectures have been recorded in this way and distributed to students.
  - ✓ Now used in Summer semester courses (November-February)
    - ✓ Run in blended and block-mode format
    - ✓ Without face-to-face lectures but with experienced mentor support and interaction.

4. Distributed Teaching Laboratory

- ✓ Electrical Engineering degree program is traditionally laboratory-intensive – even more so since program review/revision of 2005/6.
  - ✓ Weekly or fortnightly labs of 2/3 hours duration.
  - ✓ Resource implications?

- ✓ Distributed Laboratory Facility – developed in 2010, enabling laboratory classrooms to be “connected”.
  - ✓ Similar technology to that implemented in the virtual classroom (electronic whiteboard, cameras and video recording facilities).

4. Distributed Teaching Laboratory

- ✓ Demonstration in one room streamed into another (recordable)
- ✓ Two-way interactive via electronic whiteboard.
- ✓ Zooming in on hardware to show practical concepts.
- ✓ Significant efficiency/consistency in teaching.
- ✓ Used increasingly, particularly in final year design course.

5. What does the future hold?

- ✓ Sustained utilisation/application of the existing technology
  - ✓ Virtual classroom and distributed teaching lab
  - ✓ Summer semester courses

- ✓ iPad/Tablet PC use (in use currently)
  - ✓ Content delivery
  - ✓ Discipline specific
  - ✓ Support

- ✓ Cross-institutional collaboration + MOOCs (work in progress)

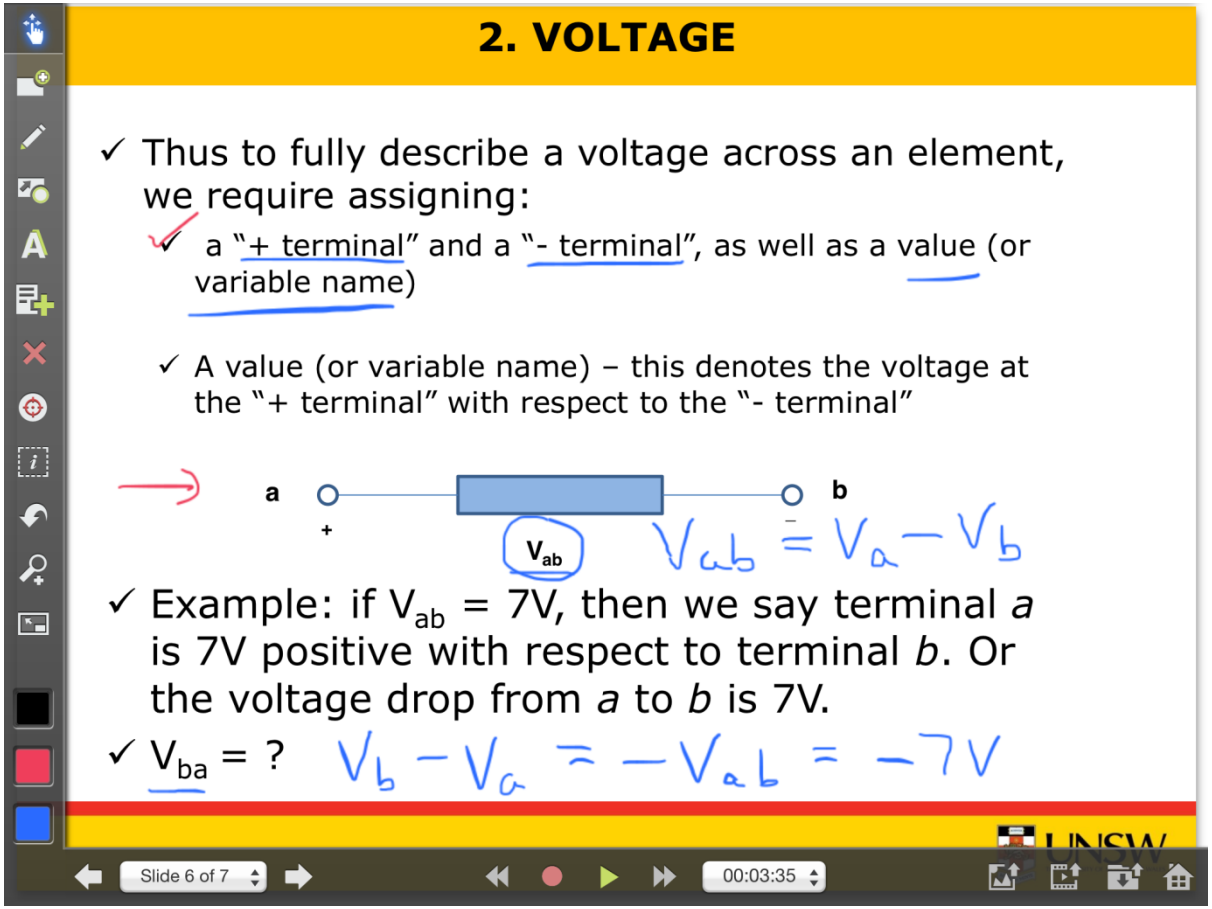
5. iPads/Tablet PCs

Explain Everything (iPad)

✓ Feature rich presentation app

✓ Dynamic annotation, page insertion, audio and slide recording

➔ The “mobile virtual classroom” facility!



5. iPads/Tablet PCs

AirServer

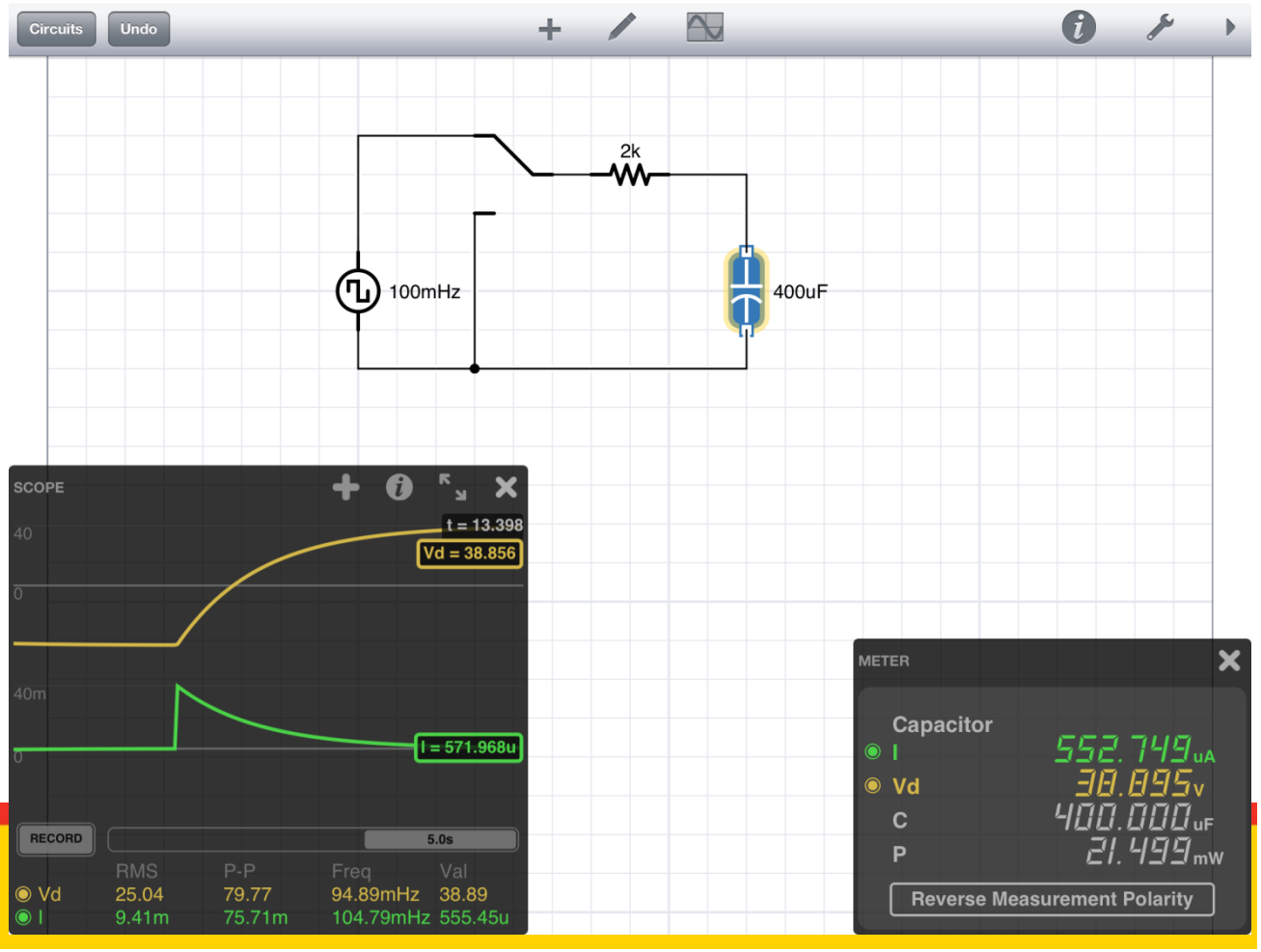
- ✓ Allows the iPad (multiple) to mirror its screen to a PC/Mac on the same wireless network. This facilitates:
  - ✓ mobile presentation - good also for small classes/group work where students can interact via their own device or the teacher's.
  - ✓ recording of iPad work sessions on a PC/Mac

5. iPads/Tablet PCs

iCircuit

- ✓ Powerful discipline specific app for circuit analysis
  - ✓ Can build and simulate circuits quickly

- ✓ Great for demonstration of theoretical concepts in lectures, checking solutions to solving tutorial problems.



5. Works in progress - Collaboration + MOOCs

- ✓ Cross-institutional collaboration
  - ✓ Delivery of engineering material between UNSW and Taylor's University College using educational technology.
- ✓ MOOCs
  - ✓ Currently developing a MOOC on electrical circuits, aimed at entry level engineering students + senior High School students.
  - ✓ Its purpose:
    - ✓ Remediation for existing students.
    - ✓ Marketing plus possible extra admissions criteria.
    - ✓ Exploration of how to improve delivery of online material with a hardware lab component and with the use of new/emerging technology such as iPads/Tablets.

6. Conclusion

- ✓ Educational technology within the School Electrical Engineering and Telecommunications at UNSW has slowly evolved over the past decade and has served as a valuable resource for supporting student learning.

- ✓ This finds us at an exciting time, where we can look to new and emerging technologies, and when the education landscape is shifting.