Threshold-Concept Inspired eTutorials in Electronics

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Traditional EE Tutorials

- Low engagement
- Some bored (through the portal)
- Some lost (in liminal space)
- Not self-paced (minute/month)

- Manpower expensive
- Timetable tiresome

Especially for large classes
• Attack above problems, but...
• Can be numerical, crammable, tiresome

• Our solution:
  – Web-based, self-paced
  – TC-centric (thinking not calculating)
  – No penalty for wrongs (learning not assessment)
Example

ENEL111 Online Tutorials

Your Progress

For the current section, Graphs, you have answered correctly 0 of 5 in a row.

Tutorials

Start Weekly Tutorials for ENEL111  View my progress in detail  Practice Tutorial Questions
12. Distance from Home 1

Simone has plotted her distance from home as a function of time on a typical working day. Simone is picked up from home by a friend and they stop to buy lunch on the way. Simone leaves work to eat lunch, and finally walks home in the afternoon.

How far, in metres, is Simone’s workplace from her home?

Select an Answer

- 400
- 1200
- 2500
- 5000

Reason for your Answer

Please give a reason for your answer...

Submit
Results: 2012 vs. 2013

• Benchmarked cohorts (+2%, not significant)
• Surveyed & interviewed both to death
Results: Qualitative

• More engaged
• Less dissatisfied
• 5x questions still perceived as “too few”
• Minimal risk of Hawthorne effect
Results: Quantitative

Not a preferred learning resource

Felt lack of teachers breathing down their necks?

Students want hyperlinks

- Learn ahead
- Helps to focus
- Use links
- Can review wrong answers
- Practice for exam
- Efficient
- Practice
- Variety of types
- Fast
- In own time
- Immediate feedback
- Many examples

Percentage of students (N = 88)
Results: Quantitative

• Seems to help learning
• Sed post hoc ergo propter hoc

![Bar chart showing Quiz 1 scores: 85% for Section4_Done (N = 31), 68% for Section4_Not Done (N = 63).]
Results: Quantitative

- 7% gain & we did NOTHING else different!
Results: Quantitative

Student e-activity during semester

- Bursty
- Continuous
- BREAK

- Quiz 1
- Quiz 2
- Exam
Results: Statistical

1 line/student/section

# attempts

~20 Questions/section

% attempts correct
Cost

• About 600 hours programming
• About 100 hours entering questions
• About $30k total build cost
• Commercial systems $37/student/semester
• Traditional about $25/student/semester (NZ)
• Payback in <1000 student-semesters (ignoring learning improvement)
• Faster if class size bigger

Break even $\alpha \frac{1}{n}$
Conclusion

• Better than traditional
• Classes <250 → unhappy accountants
• No comparison with non-TC eTutorials (OASIS)
• Learning tool, not an assessment tool
Thank you