



Threshold-Concept Inspired eTutorials in Electronics

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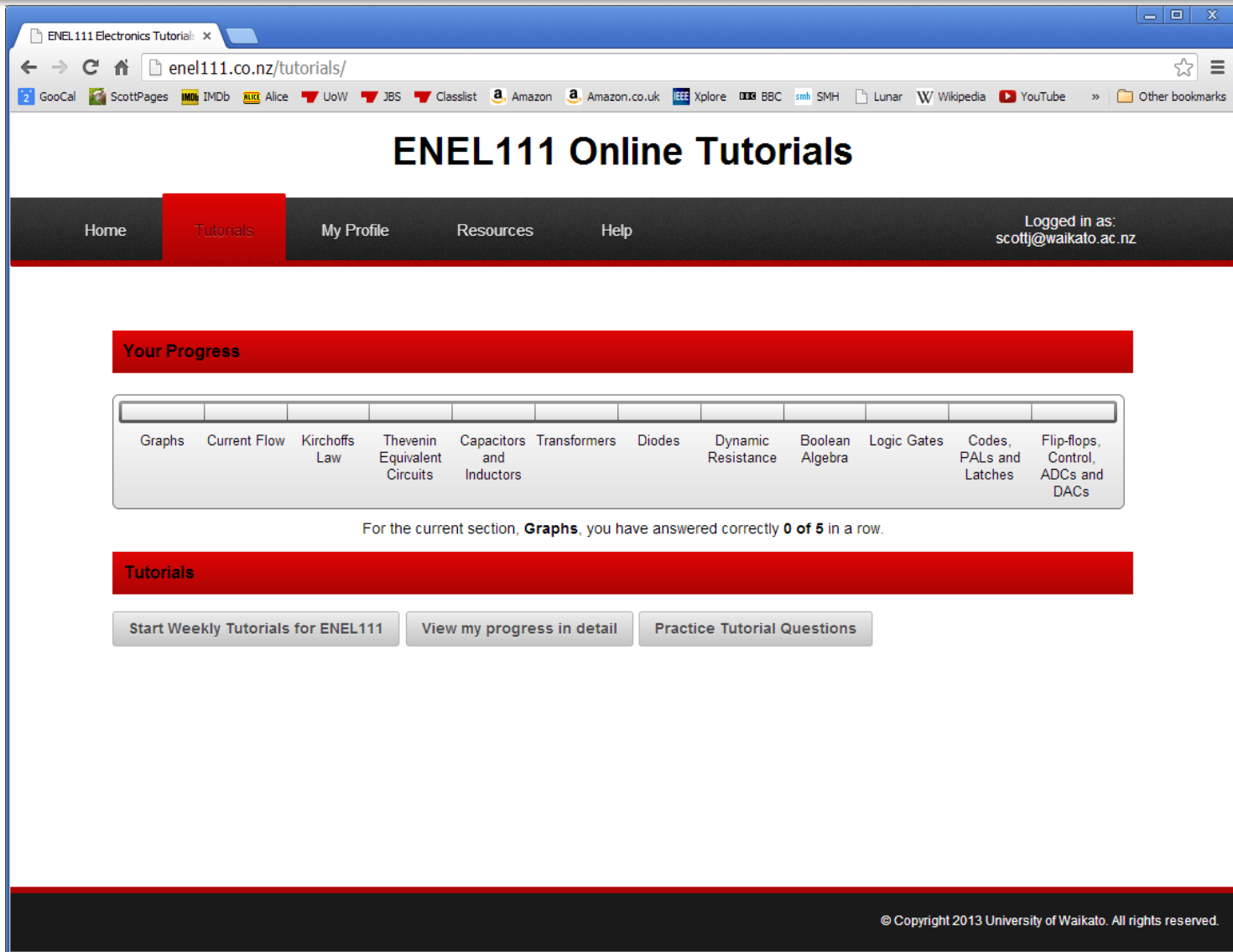


- Low engagement
 - Some bored (through the portal)
 - Some lost (in liminal space)
 - Not self-paced (minute/month)

 - 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



The screenshot shows a web browser window with the address bar at `enel111.co.nz/tutorials/`. The page title is "ENEL111 Online Tutorials". A navigation bar includes links for Home, Tutorials (highlighted in red), My Profile, Resources, and Help. The user is logged in as `scottj@waikato.ac.nz`. A "Your Progress" section features a progress bar and a list of topics: Graphs, Current Flow, Kirchoffs Law, Thevenin Equivalent Circuits, Capacitors and Inductors, Transformers, Diodes, Dynamic Resistance, Boolean Algebra, Logic Gates, Codes, PALs and Latches, and Flip-flops, Control, ADCs and DACs. Below this, a message states: "For the current section, **Graphs**, you have answered correctly **0 of 5** in a row." A "Tutorials" section contains three buttons: "Start Weekly Tutorials for ENEL111", "View my progress in detail", and "Practice Tutorial Questions". The footer contains the copyright notice: "© Copyright 2013 University of Waikato. All rights reserved."

Example

ENEL111 Electronics Tutorial: x

enel111.co.nz/tutorials/weekly_tute.php

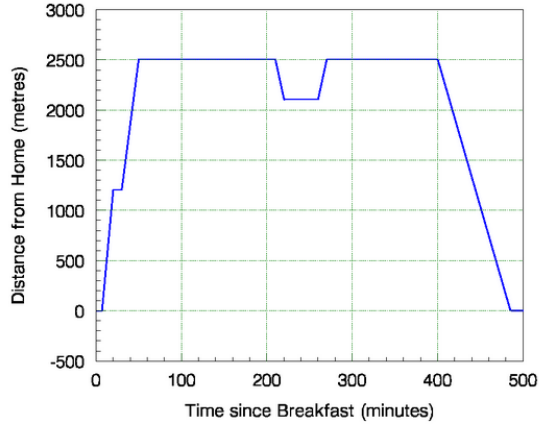
Googal ScottPages IMDb Alice UoW JBS Classlist Amazon Amazon.co.uk Xplore BBC SMH Lunar Wikipedia YouTube Other bookmarks

ENEL111 Online Tutorials

Home **Tutorials** My Profile Resources Help

Logged in as: scottj@waikato.ac.nz

12. Distance from Home 1



Distance from Home (metres)

Time since Breakfast (minutes)

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

490

1200

2500

5000

Reason for your Answer

Please give a reason for your answer...

Submit

Resource Links

Need some help? Try these links...

Section Links

[Graphing - KhanAcademy](#) [Reading Graphs](#)

General Links

[Hyperphysics](#) [Electronic-Tutorials.ws](#) [All About Circuits](#) [Electronics Club](#) [MIT Electronics Videos](#)

Results: 2012 vs. 2013

- Benchmarked cohorts (+2%, not significant)
- Surveyed & interviewed both to death

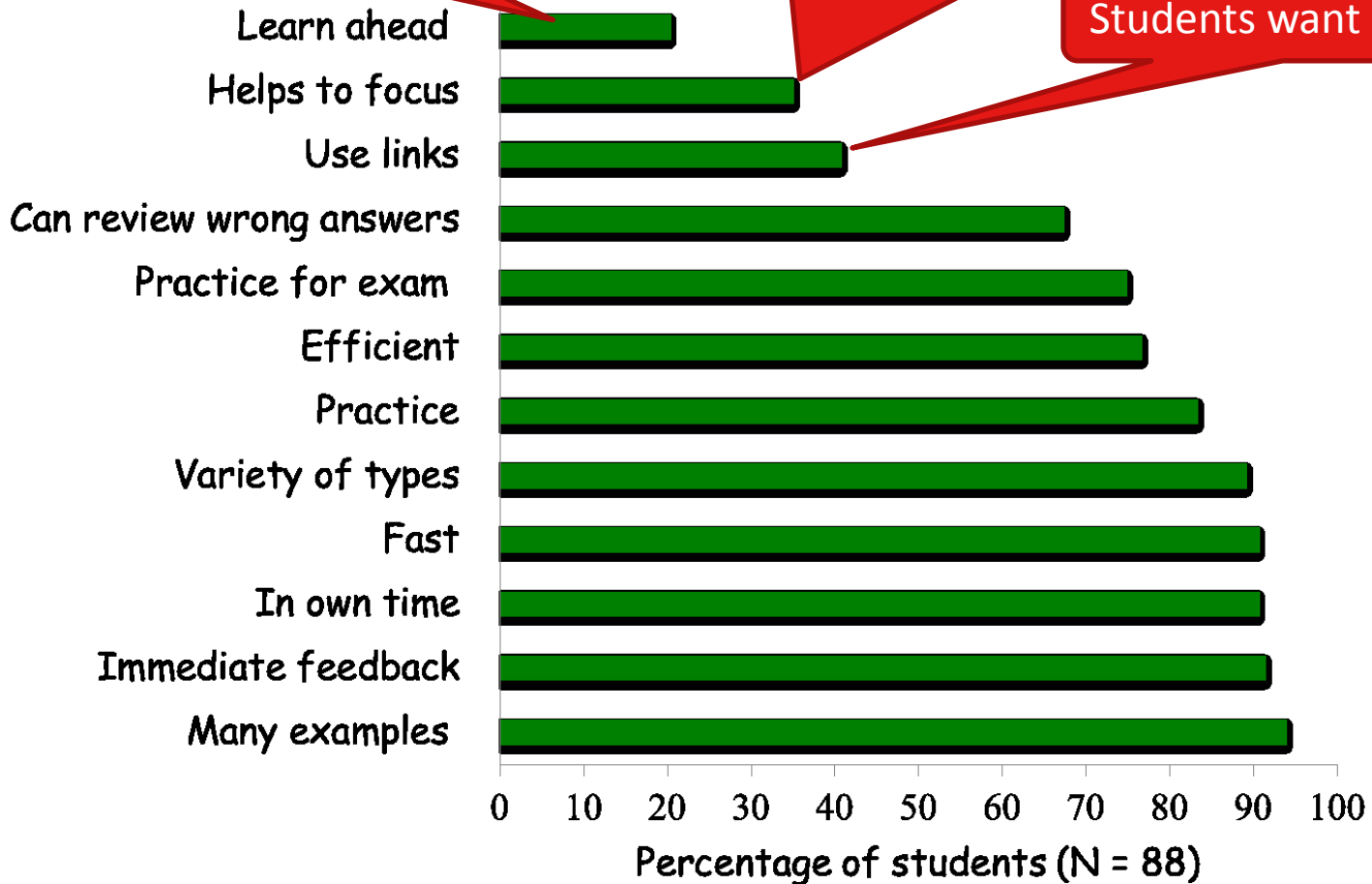
- More engaged
- Less dissatisfied
- 5x questions still perceived as “too few”
- Minimal risk of Hawthorne effect

Results: Quantitative

Not a preferred learning resource

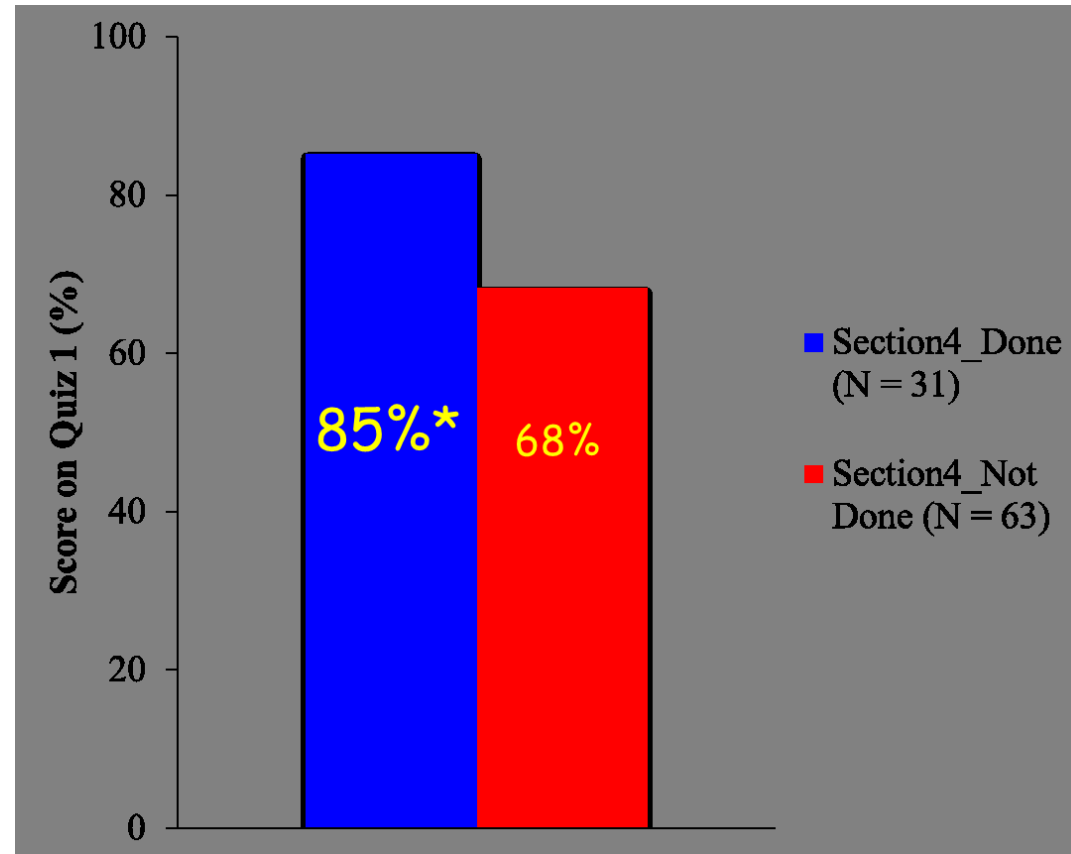
Felt lack of teachers breathing down their necks?

Students want hyperlinks



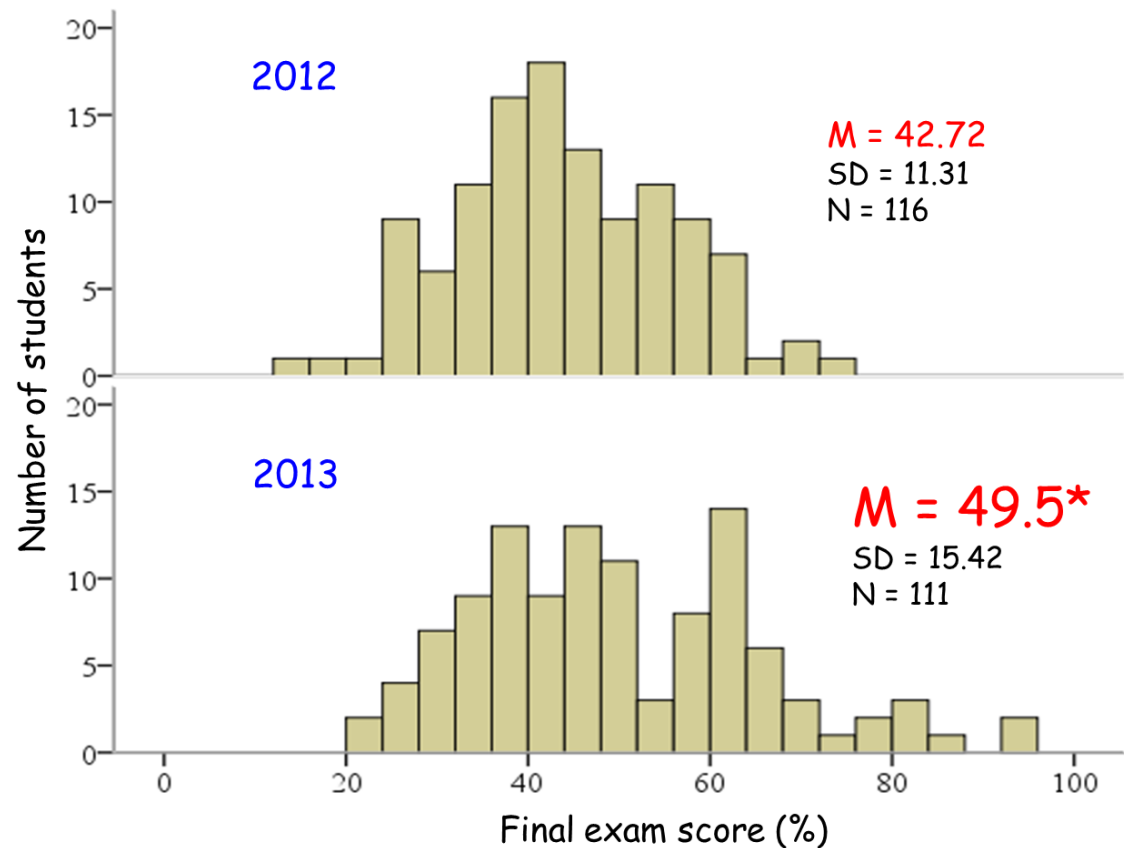
Results: Quantitative

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

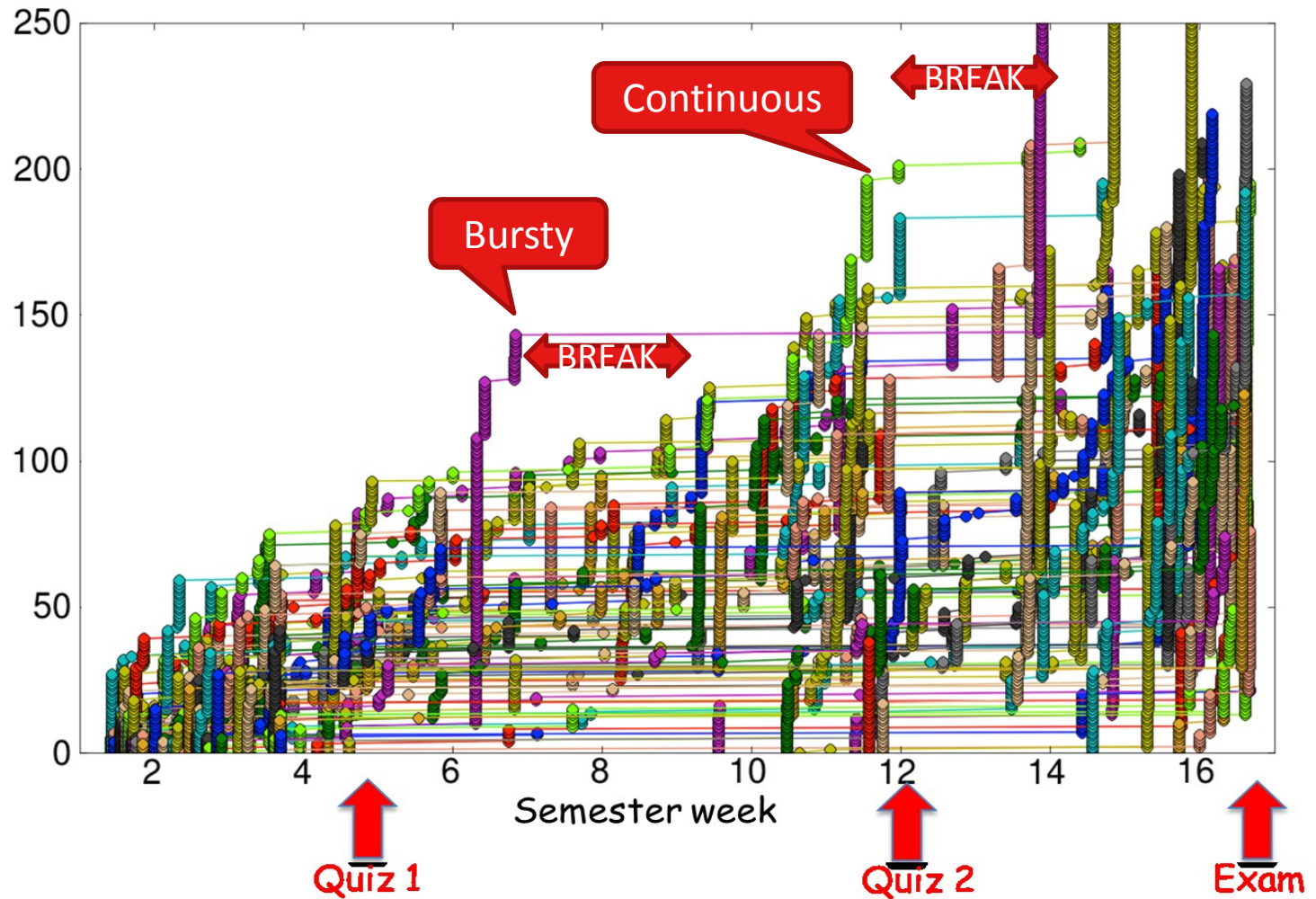


Results: Quantitative

- 7% gain & we did NOTHING else different!



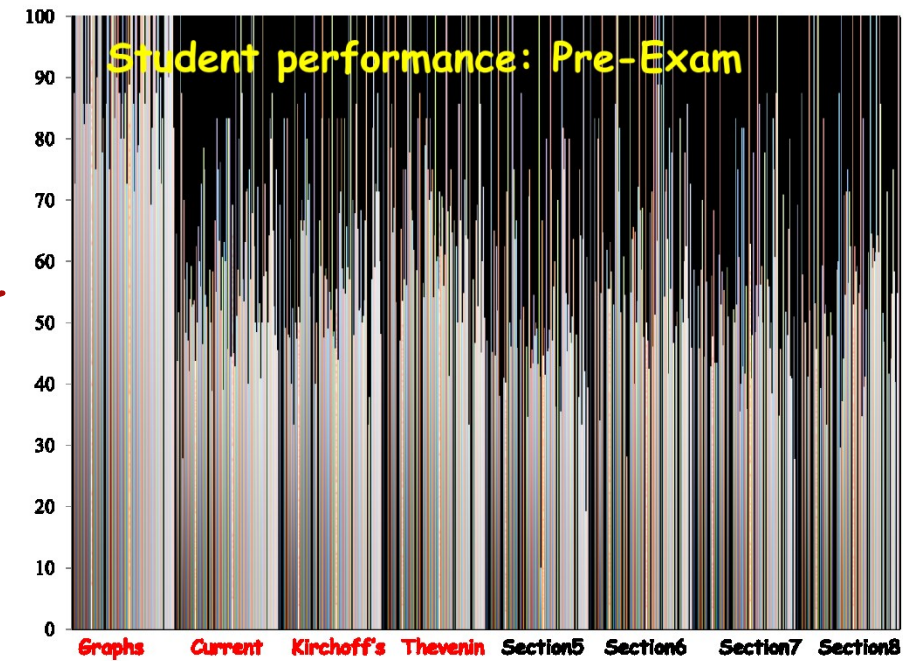
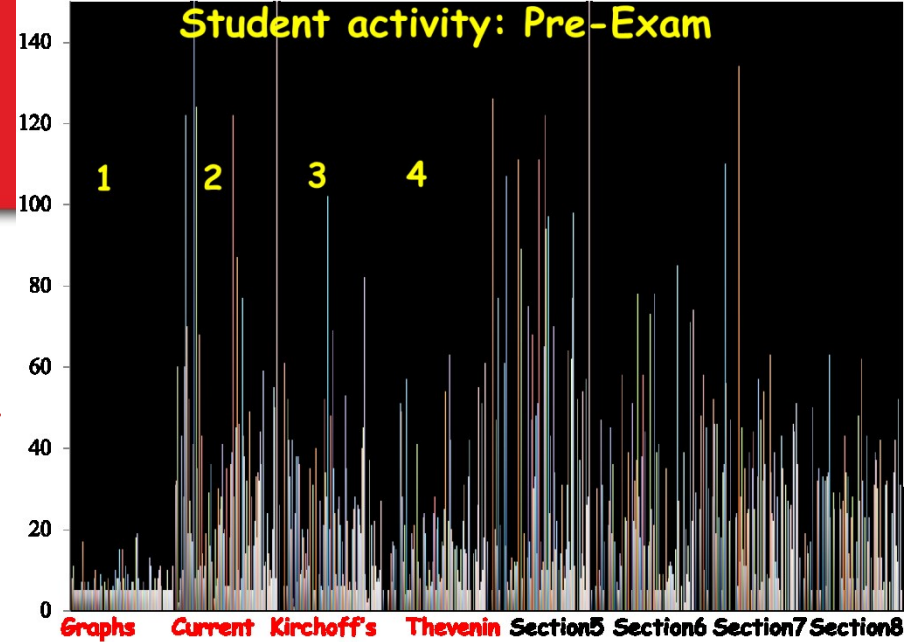
Student e-activity during semester



Results: Statistical

1 line/student/section
attempts
~20 Questions/section

% attempts correct



- 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 $\propto 1/n$

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

The END

Thank you

