Background

Or what problem are we trying to address?

- Civil Engineering BSc course
  - Y1 intake ~450
  - Y2 intake ~400
Background

Or what problem are we trying to address?

- **Soil Mechanics course.**
  - New lecturers
  - New language (mainly English)
  - New place in the curriculum (from this year twice as long)

- **Up to 450 students taking (or retaking) the exam.**
  - Opportunity for streamlining learning and reducing teaching load
  - Quite anonymous teaching

- **In the past**
  - Students not very engaged
  - Low lecture attendance
  - Low exam pass rate (approx. 50%)
Potential (attempted) solution
Mixed mode of ICT, lectures and practicals

- Lectures
  - Theory based – concentrated on major concepts
  - Recorded and placed on Collegerama

  - Trialling in-class voting
    - Using the Turning Point software

  - Trialling online tutorials
    - Targeting giving students help depending on answers

- Practical laboratory sessions

Traditional Lecture and Exam supported by ICT
Implementation

In-Class Voting

- Used two options for students
  - Clickers
  - Smart phone software (available for Android, iOS, Blackberry)

- Students can log into the system

- If you want to see an example of how it went:

- Simple concept questions, at the start of the lecture, e.g.:
  ‘What is effective stress?’
Implementation

In-Class Voting

More involved multiple stage questions:

Calculate the vertical total stress at location A:

1. 180
2. 144
3. 120
4. 60

ysat = 20 kN/m³
ydry = 16 kN/m³
ywater = 10 kN/m³
Ka = 0.333, Kp = 3
Implementation
In-Class Voting

More involved multiple stage questions:

- Calculate the vertical total stress at location A:
- Calculate the pore water pressure at location A:
- Calculate the vertical effective stress at location A:
- Calculate the horizontal stress at location A:
I asked for student feedback in the trial and students also gave feedback in the end of year review.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes / a (Num., %)</th>
<th>No / b (Num., %)</th>
<th>Don't mind / c (Num., %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did this system help you to understand the course content better?</td>
<td>94 88%</td>
<td>13 12%</td>
<td></td>
</tr>
<tr>
<td>Are you in favour of using this system more often?</td>
<td>88 80%</td>
<td>8 7%</td>
<td>14 13%</td>
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<tr>
<td>If yes, were the technical questions...</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>• Too easy</td>
<td>30 26%</td>
<td>2 2%</td>
<td>81 72%</td>
</tr>
<tr>
<td>• Too hard</td>
<td></td>
<td></td>
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<tr>
<td>• About right</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If no, why?</td>
<td>4 27%</td>
<td>4 27%</td>
<td>7 47%</td>
</tr>
<tr>
<td>• Waste of time</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Couldn't use them</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• Other</td>
<td></td>
<td></td>
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</tbody>
</table>
Feedback
Students – In-Class Voting

Via email:

‘Helped me understand the course better’
‘Helped me concentrate on the lecture for longer’

‘The system is good, but takes a lot of time’
‘I liked the clickers, but please don’t replace traditional examples classes’
Feedback
From teachers – In-Class Voting

Advantages

- Very simple to make slides.
- Dynamic feedback in lectures is useful.
  - Students struggle with things other than you (or they) expect.
  - It adds an unexpected element to the lecture

Disadvantages

- Adds an extra thing to go wrong.
- It takes time – about double.
- It adds an unexpected element to the lecture – this takes more time to prepare.
- Students have fun with the system.

Don’t use all the time - could get boring - variation is interesting for students.
Implementation

Self-guided homework

- Two options investigated:
  - Blackboard (natively)
  - Maple TA integrated into Blackboard

- Maple TA seemed to offer better use of mathematics and better long term prospects of integrating images and ‘branching’ questions.
Implementation

Self-guided homework
Implementation

Self-guided homework

Question 2: (1 points)

Three soil samples are taken from the same soil stratum and tested in the laboratory. The pore water pressures and applied stresses are controlled. The first sample has a pore water pressure of 59 kPa and an applied isotropic stress of 409 kPa, the second sample has a pore water pressure of 175 kPa and an applied isotropic stress of 206 kPa, and the third sample has a pore water pressure of 193 kPa with an applied isotropic stress of 240 kPa.

a) Are any deformations in the sample likely to be distortion or compression?

☐ Distortion
☐ Compression

b) Calculate the effective stress experienced by the samples.

Sample 1: ______ kPa
Sample 2: ______ kPa
Sample 3: ______ kPa

c) What comparative deformations can be expected if the material is considered to be linear elastic? Take sample 1 as reference.

Sample 2: ______
Feedback
From teachers – Self-guided homework (Maple TA)

Advantages

- Very simple to make simple online tutorials.
- Provides an additional tool, that some students find more accessible.
- Branched questions (and dynamic help) are (just about) possible.
- Randomised numbers in questions.
- Can be extended to online exams.

Disadvantages

- Not quite all it would like to be (yet).
- Some difficulties in getting everything working.

Can end up being quite a time investment - but will save time in the long term
Future plans
What else can we do?

- Extend the same technology to other modules
  - Has been included in one other module.
  - Student Assistants have now been trained and has become a ‘service’ offered to others in the section.

- Introduce part of the examination process electronically
  - Concept quiz prior to exam to reduce exam failures (and marking).
Any Questions?

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