Enhancing Teaching and Learning with Electronic Voting

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Learning and Teaching Conference, 2014
Electronic Voting

• Large-scale e-voting
  – National elections
  – ERC Starting Grant on “Self-enforcing e-voting: trustworthy elections in the presence of corrupt authorities” (€1.5m, 2013-2018)

• Small-scale e-voting
  – Classroom voting (this talk)
  – Based on the self-enforcing e-voting technology
Pump-priming by UTLSEC

• £5,000 to fund a student project in 2012
• We decided to build a Verifiable Classroom Voting (VCV) system
• Motivated by two observations:
  1. TurningPoint voting systems are not verifiable
  2. Maintenance of voting devices is problematic
A working prototype

• A prototype completed in 2012 summer
• The interface later extended to whole campus
  – [http://evoting.ncl.ac.uk](http://evoting.ncl.ac.uk)
  – Need a campus account to create election
• Trialled in real classroom teaching
  – Positive student feedback
An example of student feedback

**Question 11:** Does the voting make the lecture more fun?

<table>
<thead>
<tr>
<th>Answer Number</th>
<th>Text</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>1</td>
</tr>
</tbody>
</table>

1 | 95%
2 | 5%

**Question 12:** Does the voting help you learn?

<table>
<thead>
<tr>
<th>Answer Number</th>
<th>Text</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>19</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>0</td>
</tr>
</tbody>
</table>

1 | 100%
2 | 0%

**Question 15:** Do you recommend classroom voting for teaching the same module next year?

<table>
<thead>
<tr>
<th>Answer Number</th>
<th>Text</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
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<td>15</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>0</td>
</tr>
</tbody>
</table>

1 | 100%
2 | 0%
Overall architecture for VCV system
Summary of key features

• Public verifiability
  – Voting results can be external audited
• Anonymity
  – Voting is anonymous (we don’t track students’ answers)
• Flexible authentication options
  – Group password (suitable for classroom voting) or individual passwords
• Zero-maintenance on voting devices
  – Students maintain their own smart phones
• A range of voting options
  – Android app, iPhone app and Web interface
• A range of supported questions
  – Single, multi-choice, free numeric, free text
• Fail-safe
  – Backend PDF for voting questions
• Re-create election
  – Quickly reusing voting questions created in previous academic year
Powerpoint Plug-in

• Developed by a CS student in 2013 summer project
• Freely available at: http://sourceforge.net/projects/evotingplugin/
Demo

Visit: [http://evoting.ncl.ac.uk](http://evoting.ncl.ac.uk)

- Election ID: **425**
- Passcode: **1256**
TurningPoint Demo

• “Should school uniform be compulsory in the 6th form?”
  – 6th Students were asked to voted their answers using TurningPoint during a visit to University of Surrey

![Bar chart showing 80% Yes, 20% No](chart.png)

(Curtsey of Prof Steve Schneider)

Actually the instructor swapped the answers, but no one was able to tell.
Our preliminary trial experience

• When to have classroom voting?
  – First 10 min in a lecture is good

• What type of questions?
  – Spontaneous questions are good

• What kind of discussion is needed?
  – Peer discussion before sending answers

• What’s the most important in classroom voting?
  – Keep it fun for students to participate
Conclusion

• Newcastle E-Voting [https://evoting.ncl.ac.uk](https://evoting.ncl.ac.uk)
  – Available to anyone with a campus account
• Preliminary trials in real classroom teaching
  – Positive student feedback
• Future plan
  – Upgrading the backend server (done by Aug, 2014)
  – Form a special-interest group on classroom voting
  – If you wish to join, contact [feng.hao@ncl.ac.uk](mailto:feng.hao@ncl.ac.uk)