Increasing online lecture engagement- 
assessment of online education technologies 
for providing in-lecture interactions

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Hicks

Special thanks to: Chris Scott and Mike Cahill
Outline

1) Why?
2) Technology and student engagement
3) Methods
4) Results
5) Conclusions and where to next
1. Why?

- Student engagement in recorded lectures and tutorials is a key concern for many online courses.
- Generally, online students perform just as well as internal students, however, many studies have found that students often display a poorer retention rate which may suggest something is lacking in our ability to engage them.
- CSU has identified online student retention as a core objective in many learning and teaching plans.
Why?

- Our use of technology is changing as are students expectations
- A study of over 30000 people (median age 21 years) found average daily use of smartphones (alone) was 167 minutes for females and 154 minutes for males.
- People checked their phone every 12 minutes
- See http://menthal.org/ for publications and information
WHY SHOULD WE INCREASE ENGAGEMENT?

‘I'm not sure why it is, but the further I get through the degree, the less interactive the subjects become.’

‘Any way that DE students are able to respond to questions in a lectures is desirable.’

‘In a lot of my lectures its just like watching them talk and I think you sort of switch of really quickly.’
2. Technologies and student engagement

• A range of technologies are available to help encourage students to be more involved in university studies even if they study in DE mode

• Clickers or audience response systems commonly used to improve student engagement and learning in classroom environments but not yet used in DE
Response systems, polling and questioning

- Classroom response systems (clickers).
- Suitable for a range of teaching situations and pedagogies (e.g., active learning, student-centered, collaborative learning etc)
- Used to electronically answer questions and allow results to be reviewed immediately.
- Many studies report improvement in grades and engagement.
Poll everywhere simulation
Poll everywhere-1

Your poll will show here

1. Install the app from pollev.com/app
2. Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help
or
Open poll in your web browser
Your poll will show here

1. Install the app from pollev.com/app
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Still not working? Get help at pollev.com/app/help or Open poll in your web browser
Poll everywhere-3

Your poll will show here

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2. Make sure you are in Slide Show mode

Still not working? Get help at pollev.com/app/help or
Open poll in your web browser
In-lecture question and clickers

- Clickers or audience response systems have been used widely over the past few decades to improve student engagement and learning.
- With correct design, application and feedback they are considered a useful educational tool.
- Recent studies have found that in-lecture questions are positively received by a large class of multi modal students at CSU, even by online students who rely just on lecture.
In-lecture question and clickers

• Traditional clickers are not a realistic option for DE students or where a lecture is broadcast to multiple campuses, but new apps available for mobile devices

• Challenges of delivering online teaching is the dependence on technology
  • quality in audio/video input and output;
  • ability to interact and engage students
Project aim

• This project aims to investigate if in-lecture questioning or audience response systems increase engagement of online students.

• A core outcome of the study will be to detail how these technologies could be integrated into teaching and learning at CSU and to offer training and documentation into their use. ED support is available NOW!
3. Methods

- In order to investigate student views on the role of educational technologies on engagement, a two stage approach was used. This included:
  1. An initial focus group trial of 4 technologies
  2. Trial of technologies in two service teaching subjects in the School of Biomedical Sciences at CSU.
Part 1: Focus group

The technologies examined.

1. Turning technologies
2. Blackboard
3. Echo360
4. Adobe connect
Turning Technologies

- Suitable for use across multiple sites, but only synchronously
- Also able to be incorporated with Bb
- Seamless incorporation into lectures/powerpoint but currently no interactivity for DE students viewing recorded lectures
Turning technologies

- Apps now available and a combination of both BYO devices and clickers can be used
Example questions

Which of the following is not an intermediate of the citric acid cycle?

1. Citrate
2. Acetyl-CoA
3. Oxaloacetate
4. Succinyl-CoA
5. α-ketoglutarate
Interact 2 (Blackboard)

- Bb mobile app lends itself to using test and surveys on BYO devices in class and in DE situation synchronously and asynchronously
- Available for both internal and DE students
- Analytics possibly more advanced than many classroom response systems
- Linked to Grade Centre and can easily be used for assessments
i2 (Blackboard tests)
# Bb Item Analysis

## Unit 7 Quiz

**Analysis Last Run October 16, 2012 1:41 PM.** Run Item Analysis again to display the latest question data

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Discrimination</th>
<th>Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Points</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Possible Questions</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>In Progress Attempts</td>
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<td>0</td>
</tr>
<tr>
<td>Completed Attempts</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Average Score</td>
<td>31.67</td>
<td>2</td>
</tr>
<tr>
<td>Average Time</td>
<td>00 hr 16 min</td>
<td>1</td>
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</tbody>
</table>

### Filter Questions

**Select Question Type:** All Question Types

**Select Discrimination:** All Discrimination

**Select Difficulty:** All Difficulty

<table>
<thead>
<tr>
<th>Question</th>
<th>Question Type</th>
<th>Discrimination</th>
<th>Difficulty</th>
<th>Graded Attempts</th>
<th>Average Score</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which one of the following planets has no satellites?</td>
<td>Multiple Choice</td>
<td>-0.66</td>
<td>16.67%</td>
<td>12</td>
<td>1.67</td>
<td>3.9</td>
<td>1.13</td>
</tr>
<tr>
<td>Which of the following are included in the definition of solar system?</td>
<td>Multiple Answer</td>
<td>0.59</td>
<td>66.67%</td>
<td>12</td>
<td>6.67</td>
<td>4.03</td>
<td>1.43</td>
</tr>
<tr>
<td>_____ is the easiest object in space for us to observe.</td>
<td>Fill in the Blank</td>
<td>0.59</td>
<td>66.67%</td>
<td>12</td>
<td>6.67</td>
<td>4.93</td>
<td>1.43</td>
</tr>
<tr>
<td>Which of the following is the largest planet orbiting Sun?</td>
<td>Multiple Choice</td>
<td>0.66</td>
<td>83.34%</td>
<td>12</td>
<td>8.34</td>
<td>3.9</td>
<td>1.13</td>
</tr>
<tr>
<td>Between which two planets does the Asteroid Belt lie?</td>
<td>Multiple Choice</td>
<td>0.66</td>
<td>83.34%</td>
<td>12</td>
<td>8.34</td>
<td>3.9</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Displaying 1 to 5 of 5 items | Show All | Edit Paging...
Unit 7 Quiz
Analysis Last Run October 16, 2012 1:41 PM.

<table>
<thead>
<tr>
<th></th>
<th>-0.66</th>
<th>16.67%</th>
<th>12</th>
<th>1.67</th>
<th>3.9</th>
<th>1.13</th>
<th>1</th>
</tr>
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<tbody>
<tr>
<td>Discrimination</td>
<td>Poor</td>
<td></td>
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<tr>
<td>Difficulty</td>
<td>Poor</td>
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<tr>
<td>Graded Attempts</td>
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<tr>
<td>Average Score</td>
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<tr>
<td>Std Dev</td>
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<tr>
<td>Std Error</td>
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</tr>
<tr>
<td>Skipped</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Multiple Choice:

Question:
Which one of the following planets has no satellites?

<table>
<thead>
<tr>
<th>Answers</th>
<th>Total</th>
<th>Top 25%</th>
<th>2nd 25%</th>
<th>3rd 25%</th>
<th>Bottom 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Venus</td>
<td>9(75.0%)</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>b. Jupiter</td>
<td>2(16.67%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>c. Neptune</td>
<td>0(0.0%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>d. Mars</td>
<td>0(0.0%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Interact 2 (Bb)

• Useful analytics
• Bb mobile app allows in class quizzes but immediate feedback could be better
• Bb mobile app has restriction on the type of questions and settings (e.g. can’t use timer) so is not suitable for all tests
• Useable both during lecture and post lecture, so suitable for DE students
CSU Replay (Echo 360)

- Powerpoint ribbon - build questions for the active learning platform
CSU Replay (Echo 360)

- Numerous features for in class and recordings (bookmark, flag, notes and Q&A)
CSU Replay (Echo 360)

• Currently no ability to add questioning to recorded lectures in CSU replay
• New version with lecture tools currently being trialled
CSU Replay (Echo 360)

- Example of Q&A (student or teacher can post question)
Adobe connect

- Use of current polling pod suitable for online lectures
- Many add-on’s also available
Adobe connect

- Poll and Q & A pods available
Focus group data collection

• The primary method of data collection for the students' perspectives on the use of the technologies was a focus group trial.

• Two focus groups (10 participants) were conducted simultaneously at Wagga Wagga and Orange campuses with some interaction occurring between the 2 groups.
4. Results

- Of the 4 technologies trialled for in-lecture questions, Adobe Connect incorporating Quiz Connect was ranked the highest by participant, with 70% of participants ranking it as number one.
**Results**

- Overall, respondents favoured the ease in use of the Adobe technology due to its simplistic approach compared to the other technology (“Seamless and not having multiple screens”; and general ability to have “paced learning”).

  “we are use to having lectures in Adobe Connect so that’s something we feel familiar with already but those other ones are fun.” – Wagga Participant 1

  “I think particularly for DE I like Adobe Connect because it seamless, it’s all there in one technology. Your not jumping from one screen to another” - Wagga Participant 3
Part 2: Subject trials

<table>
<thead>
<tr>
<th></th>
<th>BMS129</th>
<th>BCM210, BCM211, BCM411, DOH231</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of students</td>
<td>210</td>
<td>250</td>
</tr>
<tr>
<td>Technology</td>
<td>Adobe Connect with Quiz Connect</td>
<td>Interact 2/ Turning technologies</td>
</tr>
<tr>
<td>Target</td>
<td>Revision tutorials</td>
<td>Recorded lectures (CSUreplay)</td>
</tr>
<tr>
<td>Survey monkey (open and closed questions)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Analytics</td>
<td>Adobe connect and Bb</td>
<td>Bb, YouTube and Test Centre</td>
</tr>
</tbody>
</table>
Results

Biochemistry

- Edited recordings utilised by ~9% of students on a weekly basis (Echo360 used by ~20% of students), but more students were completing the tests.
Results

Biochemistry

• Feedback given in the live lecture was appropriate for students viewing the lecture recordings.
Results

BMS129
• Adobe Connect recording were initially only utilised by a small portion of the students (<10%), but this increased substantially after quizzes were introduced.
Results

- How did you find your overall experience with in-class questions and the technology used to deliver this?
- Has the use of in-lecture questions and the technology influenced your level of engagement in class?
- Did in-class questions help you gauge your understanding of course content?
- Did you find the feedback given for any poorly understood concepts useful?
- Do you think that in-class questions should be used in more subjects at CSU?
### Results

**Main themes identified in open ended comments**

<table>
<thead>
<tr>
<th>Increased engagement</th>
<th>Key themes</th>
<th>Technical or platform issues</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adobe Connect</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It was good to have real time quizzes on content specific to our subject as it's a great tool for learning</td>
<td>Relevant questions, gained clarity on a number of confusing topics</td>
<td>It was way too fast!</td>
</tr>
<tr>
<td>A very powerful learning tool, hope it is adopted across campus.</td>
<td>Unexpected questions that truly test your knowledge as would actual exam without exam pressure, great for doing prior to the online mini tests</td>
<td>The short amount of time for questions. Some people read slower which this didn't quite take into account.</td>
</tr>
<tr>
<td>It's fun (as long as the results don't count towards a final grade :-)!)</td>
<td>It helps you understand things/concepts you aren’t 100% comfortable with.</td>
<td>Some questions were a bit lengthy, by the time you read them, the timer was nearly done.</td>
</tr>
<tr>
<td>Key themes</td>
<td>Increased engagement</td>
<td>Consolidate learning</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Live lecture</strong></td>
<td><strong>Forces you to ask yourself if you were paying attention to the content</strong></td>
<td><strong>A great way to ensure you were understanding most concepts while they were being taught, also it encouraged me to stay on top of the work from previous lectures and continue writing notes for the current one</strong></td>
</tr>
<tr>
<td></td>
<td><strong>It made it easier to concentrate in class as it was fun and engaging</strong></td>
<td><strong>The clickers, able to see what we understood from what was taught</strong></td>
</tr>
<tr>
<td><strong>CSUreplay</strong></td>
<td><strong>I was more engaged in the lectures anticipating the questions and hoping to get them right</strong></td>
<td><strong>Good gauge of understanding and example questions for exams</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Really liked to guess the answers to the questions even though wasn’t participating - made me pay more attention and retained more info.</strong></td>
<td><strong>It made me realize whether or not I really grasped the concept.</strong></td>
</tr>
<tr>
<td><strong>Interactive lectures</strong></td>
<td><strong>I felt I could participate in the questions rather than just watching</strong></td>
<td><strong>The MCQ in-lectures helped me to understand better.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>I liked being able to view lectures and respond on my own device in a relaxed manner</strong></td>
<td><strong>I was also able to use the questions for revision</strong></td>
</tr>
</tbody>
</table>
5. Conclusion and where to next

THE WAY FORWARD

TAKE ON FEEDBACK AND IMPROVE ACTIVITY FURTHER

- "I'd like better integration otherwise I will stick to the normal lectures."
- "Having to open another screen. Using the app was ok, but much of the info was missing."
- "The other thing is with every lecture, every subject I have, almost use a different technology."

PROBLEM

WHY SHOULD WE INCREASE ENGAGEMENT?

- "I'm not sure why it is, but the further I get through the degree, the less interactive the subjects become."
- "Any way that DE students are able to respond to questions in a lectures is desirable."
- "In a lot of my lectures it's just like watching them talk and I think you sort of switch of really quickly."

SOLUTION

- "Relevant questions, gained clarity on a number of confusing topics."
- "It made me realize whether or not I really grasped the concept."
- "I liked being able to view lectures and respond on my own device in a relaxed manner."
- "I felt I could participate in the questions rather than just watching."
- "I liked connect its cool... and we are more use to it and the learning curve is a lot less."

THE WAY FORWARD

TAKE ON FEEDBACK AND IMPROVE ACTIVITY FURTHER

- "I'd like better integration otherwise I will stick to the normal lectures."
- "Having to open another screen. Using the app was ok, but much of the info was missing."
- "The other thing is with every lecture, every subject I have, almost use a different technology."
Final comments

- Students expect quality lectures
- In lecture questioning is an effective way of increasing engagement in online resources
- Technology needs to work well, be well integrated and not overwhelming to students.
- Many options, so course teams should have discussions (with DSL/uImagine) as to the most suitable for their needs.

(https://www.polleverywhere.com/vs)