USING SMARTPHONE TECHNOLOGY TO HELP IMPROVE THE INTERACTIVITY, ENGAGEMENT AND THE LEARNING EXPERIENCE OF STUDENTS IN THE TRADITIONAL LECTURE ENVIRONMENT.

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Introduction

• Most of the students studying at University these days have grown up with general availability and accessibility to computer technology, communications networks and the Internet.
  – Prensky [1] termed our students as digital natives who have enormous access to these digital technologies.
• IDC [2] predicts the worldwide smart connected device market, comprised of PCs, tablets, and smartphones, is forecast to grow 27.8% year over year in 2013.
• IT departments in many institutions have developed strategies to cater for “Bring Your Own Device” (BYOD) which manage the introduction of such devices to the internal infrastructure of the company so students can use these devices in the classroom.
• The capabilities of mobile devices have improved to the point that such devices can easily be deployed within an educational setting to provide a variety of different learning experiences for our students including increased feedback and engagement opportunities.
Introduction

• This research explores the possibility of improving and enhancing the lecture experience through the use of audience response systems (ARS) and the use of the ubiquitous smartphone.
• Such a method will hopefully lead to improvement in students' conceptual reasoning and ultimately in examination performance due.
• Initial system usage was based on the use of relevant and targeted multiple choice questions interspersed within the lecture.
Introduction

• Instant feedback of the chosen answers will be displayed to the students in the form of a graph.

• Used to engender discussions;
  – helping to expand student understanding of the topic area.
  – Allowing the lecturer to better judge the level of the students understanding of the subject area.

• Timeliness of the feedback is crucial.

• Feedback, both summative and formative, an essential part of the students learning process.
Introduction

• ARS systems can be expensive.
• This project will build a cost free, platform independent solution,
• Easy for both staff and student audiences to use.
• uses the cloud and the student’s smartphone.
Pedagogy of the Project

• Typical lecture - Information imparted in a relatively one way passive communication format.

• A traditional didactic approach - used for centuries.

• Enhancing the lecture experience through the use of technology.

• Encourage active learning by introducing two way interactions with the student audience.
  – Pascarella and Terenzini [3] highlight the relationship between student engagement, student development and success where they emphasize engagement in class discussions and involvement with staff.
Pedagogy of the Project

• ARS technology provides a means for the lecturer to engage and interact with the students.
• Using the responses to offer the student audience feedback.
• This should lead to further discussion and the opportunity for student reflection.
• Murphy and Sharma [4] identifies two pedagogical aspects of interactive lecturing:
  – dialogic form of learning
  – and active learning.
Pedagogy of the Project

• Interactive lecture will *stimulate engagement* and interaction with the student audience through the use of *instant feedback*.
• This feedback will engender in both the student audience and the lecturer the need for *reflection*.
• Use of *relevant* and *targeted* questions to *focus* and *expand* student discussions.
• Both students and lecturer better able to judge the level of the students understanding of the subject area.
Pedagogy of the Project

• Gannon-Leary et al. [5] reported positive aspects to arise from interactive lectures including:
  – improved concentration,
  – greater enjoyment
  – and improved attendance.

• Simpson et al. [6] cited *anonymity* played an important part in *encouraging* students to contribute to answering questions.

• Both suggest that the *design* of the questions is *very* important to the process.
Pedagogy of the Project

• Saravani and Clayton [7] conceptual framework referred to as A.C.E.
  – Three A’s: Awareness, Action, and Accomplishment;
  – three C’s: Context, Content, and Capability;
  – and the three E’s: Enabled, Engaged, and Empowered.

• The *three E’s* fits the concept driving interactive lectures as the use of mobile technology enables, engages and empowers *both* the student body and the lecturer.
Pedagogy of the Project

• We have identified a framework composed of **five** main processes
  – BACDE (pronounced ‘based’):

<table>
<thead>
<tr>
<th>Process</th>
<th>Who</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUILDing the question</td>
<td>Lecturer</td>
<td>Before</td>
</tr>
<tr>
<td>ASKing the question</td>
<td>Lecturer / Student</td>
<td>During</td>
</tr>
<tr>
<td>CONSIDERing the question</td>
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<td>During</td>
</tr>
<tr>
<td>DISCUSSing the question</td>
<td>Lecturer / Student</td>
<td>During</td>
</tr>
<tr>
<td>EVALUATEing the question.</td>
<td>Lecturer / Student</td>
<td>After</td>
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</table>
Initial Phase - QR Codes and Google (Law [9])

- Generated using Google Spreadsheet.
- Can be generated free online and saved as an image or cut & paste.
- Encodes the uri for submitting response.
- Uses Google Forms, Spreadsheet and App script.
Question Design

• Initial tests developed to
  – introduce the interaction concept in a gradual staged manner.
  – strategically punctuate the lecture to gain maximum benefit for the students.
  – Integrate technology within the lecture stimulating interaction with the students.
  – natural break points, such that the questions could be inserted to maximise their impact.
  – aim of giving both the student and the lecturer instant feedback on the comprehension of the material delivered.
Initial phase
Issues

• Creation and integration of QR codes into a lecture may prove challenging for a non-computing subject specialist.
• size and positioning of the QR codes impact on the accuracy of the scanning process.
• Direct scanning of QR code from slide prohibitive due to current camera capabilities.
• Duplicate code scanning.
• Time management of both the interactions and the subsequent discussions.
• Reliance on all the students in the lecture having a smartphone.
Phase 2 – QUBED(Q3)

• Developed a more user friendly interface to the software to allow cross discipline use and be easier for staff and students to use.
• Our developed system is initially called QUBED (Questions Utilising Broad Evaluation and Discussion).
• The Qubed (Q3) system is created around following basic steps
  – Build,
  – Ask,
  – Consider,
  – Discuss and
  – Evaluate
• follows the ideas of Beatty, Gerace et al [9] who proposed the question driven instruction (QDI) cycle
Phase 2 – QUBED (Q3)

Lecturer builds the question and answers

Lecturer asks a question by making the question available
Phase 2 – QUBED(Q3)

Student considers the question and responds by choosing an answer.

Lecturer views responses and leads discussion on given responses.
Phase 2 – QUBED(Q3)

Evaluate

**Lecturer/Student** evaluates what has happened
See screenshot opposite: for current options:
Conclusions

• When building the question bank it is extremely important to take time to think about the questions that you use!

• You need to decide:
  – how many questions you will need to gauge whether you have got your point across.

• Also, the instructor should not be afraid to adjust the pace of the lecture in the face of 'feedback' from your charts

• Always consider using the Evaluation to allow improvements in your teaching

• Don't try and force the use of the technology into the learning environment when it isn't appropriate.
References


