Student Generated Learning Materials

A study of three very different cases

Sam Nolan

Today

• Why is student generated content a good idea?
• Three Studies:
  • Case Study 1 – Interactive Screen Experiments
  • Case Study 2 – Linking Outreach & Teaching
  • Case Study 3 – Student Generated eGlossary
• In each of the three cases:
  • Project
  • Student Role
  • Outcomes & Feedback
• Overall Conclusions & Future Work
Why is student generated content a good idea?

Report to HEFCE on student engagement, CHERI, 2009

‘Institutions view student engagement as central to enhancing the student experience, but more emphasis seems to be placed on viewing students as consumers and rather less on viewing students as partners in a learning community. For student unions, the emphasis tends to be on the latter aspect. Notions of students as “partners in a learning community” seem to be stronger in certain subject areas (for example, Art and Design and Performing Arts) than others.’

What differs in these three cases?

- The three cases are very different:
  - Case 1: Screen Experiments
    - Summer students employed
    - Developing materials for a module they’ve done
    - Mix Foundation Level/Undergraduate students
  - Case 2: Outreach and Teaching
    - Fourth year Undergrad students
    - Preparing teaching materials for GCSE
    - Summative work
    - Links to outreach
  - Case 3: eGlossary
    - Student generated e-Glossary
    - Part summative/part formative
    - Foundation Level students
Interactive Screen Experiments (ISEs)

Making Physics Labs Less Scary

with Lowry Mccomb
Ifan Hughes
Marek Szablewski
Simon Rees

What are they?

Inspired by ISEs developed at the Open University

‘a highly interactive movie of an experiment filmed as that experiment was being performed’

User interacts with movie as if carrying out the experiment
Why did we use ISEs?

- Used in two departments for two different reasons:
  - Physics Dept
    - Used with 1st year undergraduates
  - Main issue
    - Disparity of practical physics experience at school
      - Some – Significant Experience
      - Many – Very Little
    - Used to overcome anxiety caused by lack of experience
    - Deployed as a summative pre-laboratory task
  - Written up for HEA – New Directions

Why did we use ISEs?

- Used in two departments for two different reasons:
  - Foundation Centre:
    - Local mature students
    - International students
    - The diversity of the cohort is a strength, but in this study each student group had its own issues
    - Local mature students
      - Often little formal education in their recent experience
    - International students
      - Learning in a second language
    - Both have somewhat of a culture shock
    - ISEs used as pre-laboratory tasks to overcome anxieties
How do you make an ISE?

- Take an experiment
- Storyboard interaction
- Take photos
- Stitch together
- Develop into a teaching tool

Student involvement

- All students involved were recent veterans of the laboratory classes.
- Students were employed to be involved in all parts of the development cycle.
- This has been going for five years now.
- Almost every year, last year’s student acts as a consultant to help this year’s student.
What did the student developers get out of it?

- Chance to improve the learning experience of other students
- Chance to gain skills in Flash programming and digital photography
- Chance to drive a project
- Chance to write up project.

http://level1.physics.dur.ac.uk/ISE/Callipers.php
What did the student learners get out of it?

End of module questionnaires

- ‘The interactive screen experiments (ISEs) provided as preparatory tasks for some of the Full Experiments helped my understanding of the experiment.’
- Of the 191 responses 131 students agreed or strongly agreed.

Focus groups

- 'I used the experiment as soon as you sent it out, before the class, after the class and when I was writing the report. I haven’t done practicals in Brazil and really appreciated this.’
- 'I wish we could have had more of these sent out earlier to give us something to do over the summer.'

What did we get out of it?

- Development of 12 ISEs (in Physics, Chemistry & Biology)
- Physics website cited by BBC as a resource to explain the concept of experimental errors
- Additional funding to study impact on student learning
- Additional funding to host workshop
- Many students progressed on to PhDs
- New development ideas:
  - ISEs to support staff understanding of carbon footprint
  - Internal mapping of buildings using Wi-Fi hotspots
  - Use of augmented reality to aid in conceptual understanding of Physics
  - Development of pre-arrival materials for students
Linking Outreach & Teaching

Using 4th Year Physics Students to Develop Teaching Materials for Schools

with Paula Chadwick
Over the last three years we’ve run 4th year M.Phys projects for students who:
• Would like careers in science communication
• Would like careers as science teachers

These projects are to develop outreach resources for the Cherenkov Telescope array and have included:
• Outreach website
• Podcasts/vodcasts
• Leaflet for use in schools across Europe
• Lesson plans

Primarily assessed on physics with a secondary assessment on suitability of materials produced
Lesson Plans

Many GCSE and A-Level school topics link to the outreach of CTA
- Lifecycle of a star
- Big Bang
- Photoelectric effect

Many resources created

- Students developed cartoons around the lifecycle of a star and CTA science, e.g.
  - [http://www.youtube.com/embed/E73GfaMgOYE](http://www.youtube.com/embed/E73GfaMgOYE)
- Flash games, e.g.
  - [http://obspc23.phyast.dur.ac.uk/Jigsaw.swf](http://obspc23.phyast.dur.ac.uk/Jigsaw.swf)
- Website for teachers
  - [http://obspc23.phyast.dur.ac.uk/Home.html](http://obspc23.phyast.dur.ac.uk/Home.html)
What did the student developers get out of it?

- Chance to improve the learning experience of other students
- Chance to improve their science communication skills
- Chance to gain skills in web design
- Chance to visit teachers to get a feel for secondary school teaching
- Chance to drive a project
- Summative mark

This developed & tested a huge range of skills, more than a normal physics project’  S Lindsay

What did the teachers/kids get out of it?

- Two lessons plans developed and tested at Akeley Wood Senior School (Buckinghamshire) and Tudhoe Grange High School (County Durham)
- Comments from teachers:
  - ‘This was enjoyable for students and rather different as well. Some good (and tricky!) concepts addressed successfully. I will be using much of this again.’
  - ‘Again, some very useful and attractively presented material. This will enhance my future teaching and was appreciated by students.’
- 80% of students ‘completely’ or ‘pretty much’ understood the concepts covered in the class
- Confirmed by teachers
What did we get out of it?

- Development of many excellent outreach resources
- Helped our students develop as science communicators
- Forged stronger links with local schools
- Students to help with Royal Society Summer Exhibition
- Students progressed onto successful careers in science communication

Student Generated eGlossary

Developing a Student Authored Resource

with Simon Rees
Why an eGlossary?

- **Used with Foundation Students**
  - Local, mature students
  - Younger, international students
- **Technical language can be a barrier to learning**
  - Unfamiliarity
  - Learning in a second language
- **For example**
  - ‘Hi Simon, Sorry to bother you over the holidays but......I think I am being a bit thick but i just do not understand the use or meaning of The Avogadro Constant. Is this only applicable to carbon 12...’

What is an eGlossary?

- Together we’ve developed a wiki for Foundation Level science with definitions of common subject specific language and links to online multimedia content.
- **We:**
  - Summer student developer started eGlossary
  - Current students add/amend to the eGlossary
- **Initially used as part of a summative exercise, but use continued when it became formative**
- A focussed, subject specific resource
- Appropriate level of explanation
- Student contributions and scavenging content
- A variety of explanations
- Explanations in different languages
What vocabulary do we target?

Nation (2001) divides vocabulary into three main groups:

- **High frequency words** – covering about 80% of most texts.
- **Academic vocabulary** – words which are reasonably frequent in academic writing and comprise roughly 8%-10% of words in academic texts (Coxhead, 2000). Also known as sub-technical vocabulary (Anderson, 1980; Yang, 1986) or semi-technical vocabulary (Farrell, 1990), these words are relatively uncommon in non-academic texts.
- **Technical vocabulary** – differs by subject area and covers up to 5% of texts.
What subjects to we cover?

- **1st year of project**
  - Chemistry
- **2nd year of project**
  - Chemistry & Physics

- Introduced as part of a summative exercise
- [http://www.dur.ac.uk/foundation.science](http://www.dur.ac.uk/foundation.science)

What did the student learners get out of it?

**Questionnaires:**

- When I ask the lecturer I can feel embarrassed. When I still don't understand so I try to look it up.
- Visualisation and modelling – I find it easier to understand and learn when I can physically see or make what I am trying to understand.
- Analogies – every day experience so it tends to stick in my brain easily.
- Glossaries, because you can sit down and have a session of learning them.
What did the student learners get out of it?

Focus groups:

'I really enjoyed looking for something.'

'Make it more user friendly – people are lazy.'

'it’s good…I don’t have much time with kids and that, this helps'

'like facility to share good links with my friends'

What did we get out of it?

- All students engaged when summative.
- Many (around half) used the e-glossary beyond the summative tasks.
- Students get access to this resource whenever/wherever.
General Conclusions

Conclusions & Future Work

- Each case has enriched the learning of the students generating the content and those using it.
- The skills developed by the students generating the content are both subject specific and general (personal–transferable).
- Future work
  - More screen experiments
  - Further students engaged in science communication (possibly at post graduate level also)
  - E-glossary for physics
- Writing papers with the students currently
With Thanks To

- Interactive Screen Experiments
  - Dan Maxwell
  - Matthew Shipton
  - Andres del Castillo Dubuc
- Outreach Generated Content
  - Annabel Yip
  - Susannah Lindsay
- eGlossary
  - Andres del Castillo Dubuc
  - Foundation Class of 2012

What if a student mis-defines a word?

- Occasionally students might make a mistake and put an incorrect definition to a word.
- We keep a watch, but:
  - Students very supportive of each other’s learning
  - Discussions occur on the glossary which are productive and allow the student who knows to explain to the student who doesn’t