

With a little help from my friends: The power of building partnerships with students

Dr Katharine Hubbard

1. Background

“Katharine approached lectures with an energy and passion to teach like no other. We all felt like she personally cared that everyone in the room achieved their absolute best”
- 1st year student

I firmly believe that if education is to be successful it must be student-centred. My course feedback routinely highlights the strong relationships I build with students, which were recognised with a Student-Led Teaching Award in 2015. However, the teacher-student relationship becomes more powerful when students become true partners in educational design (Healy et al. 2014). Here, I describe a student-partnership project developed to improve first year biology practical class teaching within the Natural Sciences degree programme. This was conducted during my first departmental teaching position which I started in the summer of 2013, held within the Department of Plant Sciences at the University of Cambridge.

Cambridge is an ‘elite’ research-intensive institution which places a heavy emphasis on traditional didactic teaching methods and end of year examinations, and where diversity of intake is under considerable scrutiny. My own student-centred teaching philosophy was somewhat at odds with that of the institution, and I therefore decided to use my Teaching Fellowship to demonstrate the need for pedagogic innovation. In common with many UK universities, Teaching-Focussed staff within Cambridge struggle for recognition, and are not appointed to permanent academic roles (Hubbard et al. 2015). This case study therefore also explores the potential for Teaching Fellows to influence teaching at an institutional level.

2. Reasons for Introducing this Teaching Method

I explored what first year students really felt about our practicals through end-of-year surveys. Although most students had a broadly positive experience of practicals, many described them as ‘stressful’ (27%) and ‘confusing’ (28%). This was mainly associated with students who had had limited practical experience at school, and was more common in those from state schools (Figure 1). Lack of funding for practical science in state-schools is a recognised issue (SCORE report, 2013), so it concerned me that students who were already potentially disadvantaged continued to struggle due to a lack of confidence with equipment.

Pre-practical tutorials including videos and online quizzes have proved a successful strategy in increasing student confidence and

preparedness in laboratory classes (Cann, 2014; Cameron, 2010; Whittle and Bickerdike 2015). After discussing pre-practical tutorials with colleagues at other institutions, I piloted resources in my own

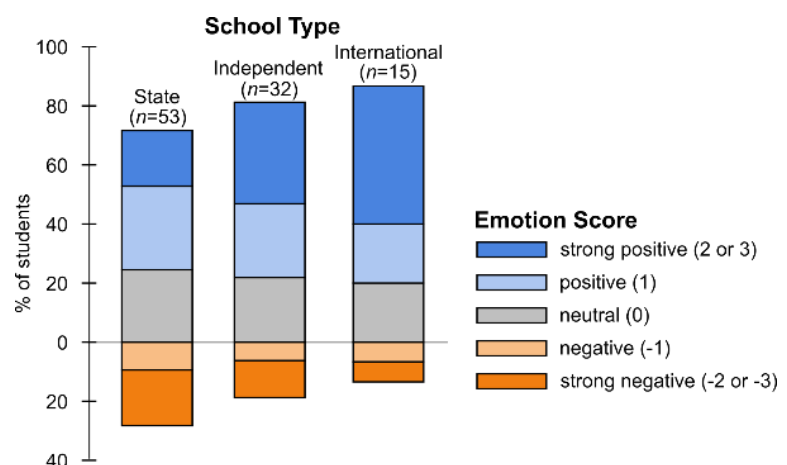


Figure 1: Students from state schools are more likely to use negative emotional words to describe first year practicals (unpublished data)

introductory biochemistry classes. On the basis of this I persuaded both my department and the Physiology department to let me extend the approach across two first year courses. These covered a broad range of different practical techniques including enzyme assays, polyacrylamide gel electrophoresis and spirometry.

I wanted to make sure that any additional resources were appropriately targeted and engaging. With funding from the University of Cambridge Teaching and Learning Innovation Fund I recruited 4 undergraduate interns to work on the 'Bridging the Gap' project for the summer of 2015. For the first time within Cambridge, the 'students as co-producers' model was adopted, which can benefit both students and staff (Lee et al. 2006; Ryan 2013; Healy et al. 2014).



Figure 2: Planning notes from the project, an example quiz question, a video screenshot and the project students themselves.

3. Lecturers perspective

I gave the interns a high degree of autonomy in shaping the work and choosing the resources they would like to create; my role was that of facilitator. For example, the interns identified that post-practical resources would help to consolidate understanding. The students worked with practical organisers and myself throughout to ensure they were creating high quality resources that were useful to both students and staff. Over 200 Moodle quiz questions were written by the students, who were encouraged to design questions with high educational impact using Blooms Revised Taxonomy as a model (Anderson and

Krathwol, 2001). One student created 14 animations of laboratory techniques including PCR and oxygen electrodes (<http://www.sms.cam.ac.uk/collection/1777876>) which are also embedded in the VLE.

4. Students perspective

There has been considerable engagement thus far despite the resources being optional; there have been ~7000 video hits thus far (Streaming Media Service Statistics). Student feedback has been very positive with 90% of students considering resources to be good or excellent. Deployment of the resources is ongoing; impact on student confidence will be evaluated at the end of the year.

“Using the post-practical resources has saved me so many times when I need some hints for questions or a full run through, definitely has helped my learning!” - 1st year student

There was also impact on the project students:

“It has made me realise that I need to be more inquisitive in regards to my learning and think more about what I learn.” - Project intern

5. Benefits of this teaching method

(i) Using students to design course resources

One student had considerable prior experience in video editing and animation, meaning the resources created were of higher quality than would otherwise have been possible. The students also became experts in Moodle quiz design, and wrote a ‘How to Moodle’ guide which is now being used by other departments including the Vet school.

(ii) Use of pre- and post-practical resources

There was positive effect on the laboratory environment; as a practical organiser I noticed the lab was significantly calmer after introducing the resources. Questions from students were less about how to use the equipment and more about the scientific ideas behind the practical.

“I think the videos were a great help. They seemed to be more independent this year, asking less questions and more confident about what they were doing.”
- Post-graduate demonstrator

“Students have made good use of this material and have particularly enjoyed the video explanations – indeed, they are clamouring for more! I can only thank and congratulate Katharine for her vision in driving this project, which has benefitted both myself as practical course organizer and hundreds of our first-year students.”

- Dr Matt Mason, University Physiologist

6. Issues with this teaching method

(i) Using students to design course resources

Recruiting good interns is key to success; less capable students would have produced significantly less. One first-year intern felt *“my perspective as a student was not sufficient to incorporate new quizzes for students”*, although others didn’t think their relative lack of knowledge was a problem. The interns required careful supervision to ensure they were working effectively as a group and producing well targeted resources, which the students noted: *“future student participation projects need the same sort of good management and planning which have helped ours to succeed.”*

(ii) Use of pre- and post-practical resources

Having made the resources optional, there has been mixed levels of engagement, particularly with the post-practical quizzes. Some students (25%) have completed nearly all of the quizzes, while others (20%) have completed very few. We anticipate that engagement with the resources will increase as students approach end of year examinations. Some students disliked the fact that information was presented in multiple formats, with some preferring to just read the practical handouts.

7. Wider Impact

Perhaps more significant than the impact on students is the way the project changed how other academics thought about teaching:

“Katharine Hubbard made a transformational contribution as teaching fellow in the Department of Plant Sciences. She stimulated new thinking about teaching delivery, organised modernisation of the course content and inspired our students”.

- Prof Sir David Baulcombe, Head of Department, Plant Sciences

The interns presented ‘Bridging the Gap’ to a meeting of the University Directors of Teaching. Feedback from attendees was extremely positive, with many describing the project as *“inspiring”*. Other departments have adopted the use of video and audio to support their teaching; the Biochemistry department has created a collection of resources for teaching with Medical and Veterinary Sciences which have had over 2200 hits.

“Dr Hubbard’s rigorous and imaginative approach to designing teaching and learning has attracted significant interest beyond her own department. Interest in her work is so high that though she has now left this University she has been invited back to speak at Cambridge’s first Teaching Forum and we hope for continued engagement in the years to come!”

- Dr Meg Tait, Head of Academic Practice

“Whilst [Katharine] was at Cambridge she made a significant impact on the teaching of Plant Sciences ... ‘Bridging the Gap’ is a project in which other parts of the university are very interested and which we hope can be rolled out widely.”

- Prof Graham Virgo, Pro-Vice Chancellor for Education

8. Reflections

As an early-career teaching fellow, it is easy to feel overlooked and that you cannot make a substantive contribution beyond your own classroom. This project was transformative in the way I thought about my own status and value; for a Teaching Fellow and four students to have made a conservative institution think differently about education is something I am very proud of, and demonstrates that student-teacher relationships can be more powerful than even I had thought.

“You transmit so much energy and enthusiasm to us through your teaching, and you are encouraging to everyone, even when we’re not doing so well. You had amazing teaching resources, including videos and example answers. All the examples were real reasonable targets for us to try and meet; you made it seem that nothing is unattainable”

- 3rd year student

9. Dissemination and Publications

Hubbard, K. et al., 2015. Challenges and opportunities for early-career Teaching-Focussed academics in the biosciences. *F1000Research*, 4, p.76. Available at: <http://f1000research.com/articles/4-76/v2>.

The project will be presented at international meetings, and will published so it can have impact beyond Cambridge.

References

Anderson, L. W., Krathwohl, D. R. & Bloom, B. S. (2001) *A taxonomy for learning, teaching, and assessing : a revision of Bloom's Taxonomy of educational objectives*, Abridged edition. New York: Longman.

Cameron, G. 2010. *EBioLabs - A Personalised Virtual Environment to Support Laboratory-based Bioscience*. JISC report [online]. Available at:

<http://www.webarchive.org.uk/wayback/archive/20140615033913/http://www.jisc.ac.uk/media/documents/programmes/curriculumdelivery/eBiolabs%20final%20report%20v3.pdf> [Accessed 16th February]

Cann, A.J. 2014. Increasing Student Engagement with Practical Classes Through Online Pre-Lab Quizzes. *Journal of Biological Education*. DOI: 10.1080/00219266.2014.986182

Healey, M., Flint, A. & Harrington, K., 2014. Engagement through partnership: students as partners in learning and teaching in higher education. *Higher Education Academy*. Available at:

https://www.heacademy.ac.uk/sites/default/files/resources/engagement_through_partnership.pdf [Accessed February 25, 2016]

Lee, M.J.W., Chan, A. & McLoughlin, C., 2006. Students as Producers: Second Year Students' Experiences as Podcasters of Content for First Year Undergraduates. In 2006 7th International Conference on Information Technology Based Higher Education and Training. IEEE, pp. 832–841. Available at: <http://ieeexplore.ieee.org/lpdocs/epic03/wrapper.htm?arnumber=4141716> [Accessed February 23, 2016].

Plant Sciences Practical Class Videos [online] Available at : <http://www.sms.cam.ac.uk/collection/1777876> [Accessed 17th February].

Physiology Practical Class Videos [online] Available at: <http://www.sms.cam.ac.uk/collection/2059559> [Accessed 17th February].

Ryan, B.J. (2013). A walk down the red carpet: students as producers of digital video-based knowledge. *International Journal of Technology Enhanced Learning*, 5, 24-41. DOI: 10.1504/IJTEL.2013.055950

Science Community Representing Education (SCORE), 2013. *Report: Resourcing Practical Science at Secondary Level*. London. Available at: <http://www.score-education.org/media/11805/score%20resourcing%20secondary.pdf> [Accessed 22nd February]

Whittle, S.R. & Bickerdike, S.R., 2014. Online Preparation Resources Help First Year Students to Benefit from Practical Classes. *Journal of Biological Education*. 49, 139–149. DOI: 10.1080/00219266.2014.914554