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Students as Co-creators of an Online Learning Resource

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STUDENTS AS CO-CREATORS OF AN ONLINE LEARNING RESOURCE

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The Challenge (*Chris*)

I have been experimenting with student-led approaches in second-year engineering courses for the last five years at the Australian National University (ANU)—a research-intensive university with approximately 10,000 undergraduate and 10,000 postgraduate students. The two sister courses that I run are part of the compulsory, second-year courses in the Bachelor of Engineering at ANU with about 200 students each semester. Students often take the ‘design’ course in semester one, and the ‘analysis’ course in semester two.

Over time, I have become relatively settled in a process where the main goal of my teaching interactions was to prepare and empower groups of students to teach their peers through a series of student-facilitated tutorials. In this model, I provided students with a relatively structured, hands-on activity in groups of four or so. Students were responsible for connecting the week’s theory to the activity in an interactive and engaging way.

This was by no means a small task. With eight different tutorials each week, I had eight different groups delivering material to their peers, rotating over six or seven weeks of the course, constituting the main mechanism for delivery of content in the course. In light of the coordination required for this activity, I often reminisced about the idea that I could just revert to delivering three lectures a week. That is, of course, until I sat in on a tutorial and saw the extraordinary engagement and agency that this model of course delivery afforded students.

However, there were a number of minor problems with the model. For example, student feedback suggested that connections between topics were often difficult to see. More importantly, students were concerned that there was a high variability in the quality of the offerings between groups. In the background, momentum was (and still is) gathering across the

university for abandoning the lecture format due to low attendance and increasing pressure on the university timetable.

I sat down with my tutors after an offering of the course, and we discussed some of the broader ideas around future offerings. I can't quite recall the genesis of this idea but someone suggested that we could move the student-facilitations online—a student-created massive open online course (MOOC)—and then use the time in class to workshop their projects based on relevant topics. The novel part of this idea was that the students themselves would create the online resources; in doing so we could make the resources available to everyone and perhaps address the variability in quality raised in the feedback. I became captivated by the idea that we could help students to create their best work possible and that that work would be used to teach an audience beyond their immediate peers. We have called this activity the Online Classroom (OC), which includes a 3- to 4-minute video resource, a quiz to check for understanding, and a learning outcome. These OC lessons are posted online on a course website and are a common study resource for students.

There was no pressing need for such a change in course delivery. At the time of writing this essay the course is ongoing. In this essay, I reflect on the process of implementing the OC with one of my tutors and four students from the course. These co-authors were invited to be part of the paper after expressing constructive feedback about the activity during class.

Our Approach to Co-creation of Content (Yash and Chris)

When we were designing this co-creation partnership to develop the content, we were working with consideration of the skills, experience, and size of the student cohort, as well as within the sometimes-limiting course learning outcomes. Key requirements of designing this students-as-partners model were scalability, high levels of student engagement, and long-term sustainability. In this section, we describe the mechanics of the OC, group formation, the scaffolding we provided to the students, and how we ran a ranking process of the resources.

Mechanics of Facilitating the Online Classroom

The course was repackaged to contain 36 topics within three 'Parts.' All of these topics are regarded as being valuable to forming an understanding of systems engineering:

- Part 1: 12 topics in *Rules of Thumb* – these are general principles that can be used to frame or check system behaviour, such as back-of-the-envelope estimation, or the 80/20 rule. Rules of Thumb train engineering intuition that is indispensable in informing engineering application.
- Part 2: 12 topics in *Research Methods* – these are general approaches to conducting analytical research such as framing a research question through to detailed statistical analyses. These are formal methods that provide technical rigour to engineering analysis.
- Part 3: 12 topics in *System Perspectives* – these are different perspectives for analysing an engineering system, from consideration of human and cultural factors, through to energy,

material, quality, and costing factors. These points of view allow an engineer to step back from the analysis and consider multiple different perspectives.

The OCs were created by groups of three students, and each student simultaneously participated in three different groups. This structure provided both a small logistical challenge and the opportunity for collaboration and cross-fertilisation of good ideas.

Group Organisation

Students were organised into six tutorials of 36 students, aligning with the 36 topics. Each tutorial had a distinct engineering context and students self-selected into these contexts: wearable technologies, World Solar Challenge, sustainable cities, humanitarian engineering, STEM outreach, and inclusive design. During the first tutorial, students were asked to self-organise into three groups of 12 based on their perceived strengths: video skills, written narrative skills, or mathematical skills. These skill groups were then given a random allocation of one Rule of Thumb, Research Method, and System Perspective topic, creating 36 unique groups in total. This division ensured a reasonable spread of skills between the groups.

Online Classroom Requirements and Scaffolding

We wanted the OC lessons to be relatively self-contained; each OC required the design and creation of a video, including: topic, learning goal, summary, video, self-check quiz or worked example with answers, transcript, bibliography, further reading, and acknowledgements. Students were given popular examples to emulate such as MinutePhysics, Engineering Explained, and Khan Academy.

We gave students a curated ‘Analysis Toolkit’ as support material which had a one-page description of each topic, including fundamental ideas, example applications for the OC, steps for performing the analysis, and core reading on the topic. The Analysis Toolkit was meant to serve as a starting point in the students’ inquiry.

We wanted to give the opportunity for lots of feedback in the creation process and so ran a weekly peer-review session. Groups were required to submit a ‘Secret Plan’ in tutorials, which outlined a learning goal, storyboard, indicative quiz, and indicative transcript. We staged the submission of secret plans over three subsequent weeks to encourage prioritisation and learning over time, and to ensure that students began to work on their OC in time.

We found that the students initially found the peer review process difficult to adjust to: “I don’t know anything about the topic. What review can I give?” However, the quality of peer reviews improved over time. We wanted students to focus on actionable feedback and assisted this by structuring in according to the PARK model, which asked reviewers to consider an aspect that the group should Protect, Acquire, Remove and Keep-Out. Reviewers also provided an indication of quality, from “Needs a lot of work” to “Was great.” This was often then translated into a mark out of two ahead of their final submission mark out of eight.

In many cases, students were distrusting of receiving feedback from their peers and considered tutor feedback to be more credible. To assuage these concerns, the tutors often provided additional feedback, typically reiterating the points brought up by their peers in the peer review for the purpose of providing the perception of credibility.

Ranking Process

We also wanted students to be active in the marking of the OCs. We set up a review process to rank the relative quality of the different OC lessons. Students were assigned a topic and watched all six videos that were produced on a topic. Students were asked to rank the lessons against one another from one (most best) to six (least best) and completed a brief feedback sheet for each video. The review process was not marked but data collected formed the basis for the final marking of the OC lessons.

After the ranking process, the two ‘most best’ lessons were made available to students on a website where students could utilise the student-developed resources. Students could still access all the videos, including our now-outdated lecturer-created videos. This resource, as it stands, is somewhat similar to a modular Massive Open Online Course (MOOC) but with the qualities of the creation being distributed and challenging the role of instructor.

Reflection

Initial Thoughts (Chris)

Reflecting on the co-creation model to date (the course is still running at the time of writing), I have found it was somewhat surprising that the model worked at all given that it was a massive undertaking with over two hundred unique groups co-creating over two hundred unique learning resources. I am genuinely impressed with the level of engagement of students and the overall quality of the resources. At my estimation, approximately 20 per cent of videos are of a higher standard or were more imaginative than I could have created in the constraints of an academic timetable. Seventy-two ‘most best’ resources have been showcased for the students and are an invaluable study tool. This in itself demonstrates how a students-as-partners model can be empowering to the students involved.

As the course is still ongoing, our formal analysis of the strengths, weaknesses, and outcomes of the activity is ongoing. There are, however, a number of initial observations raised by our co-authors worth reflecting on. These views were collected initially through a personal reflection on the ‘highs’ and ‘lows’ of the OC activity between authors and then individual authors collated and assimilated ideas around each observation.

Retention of Concepts and Life-long Learning (Brock)

There is an emerging wisdom that with the growth of knowledge readily accessible on the Internet that a platform such as the Online Classroom will become the way that students access learning beyond higher education. Being involved in the creation of these resources helped me understand the concepts in a way that I might not have experienced in a traditional format. Forming a more thorough understanding of the resources I created has since helped me make useful ties to further assessment within, and outside of, the course. Accessing resources on the OC that I didn't create also gave me resource that was easy to refer to. Having the experience of creating such a resource has given me confidence if I am ever tasked with being a part of knowledge creation again.

Does Partnership Equal Lazy Teachers? (Ellen)

Asking students to assume the duties of a tutor and grade students' work makes tutors and the lecturer appear obsolete and lazy. It appears that all they do is check over our marking to ensure quality control. But if students are the ones closely reviewing work and producing a corresponding grade, are they not acting as the tutors? It's scary to give students so much power over our peers' grades. Most students don't feel like experts – that's for the tutors. We respect their broader and deeper knowledge of topics we barely know anything about. How can you accurately mark work you don't understand? How do you know if it's correct? We expect tutors to have the answers and therefore know how to mark accordingly, not students.

Scaffolding the Learning Process (Brock)

The submission of the secret plan prior to the video resource was formative in improving the quality of my video resource. I found that prior thoughts regarding the quality of ideas for the assessment item were either affirmed or built on from the peer review feedback. I also found the submission process to be a motivation for greater time management as a bulk amount of work for the video resource was required in the secret plan. Depending on the quality of peer review comments, I found feedback recommending larger changes was difficult to act upon due to the short turn-around between submission dates.

Quality versus Content (Arlene)

Do students learn better when the content created is of a high quality or whether it was technically brilliant? This is a potential pitfall to the OCs where the videos were peer reviewed, and that the peer review could be seen as subjective. I feel that students preferred lessons that exhibited high production values rather than those that might have been more technically accurate. On reflection, this is akin to a brilliant lecturer who can't communicate to his or her students. Perhaps it is an important reality to understand that, while both the production value and the content are important, students appear to prefer high production values in online learning.

Being Experts in the Unknown (Arlene)

The peer review process was often the first time that we looked at another topic. Although we had the Analysis Toolkit to refer to, is the peer review process the best way to learn how to do something correctly? It was difficult to know exactly what was expected from us when there was nothing to base it on. Having an example secret plan would have been beneficial to give a baseline understanding. The peer review process also was sometimes limiting, being too rigid for genuine feedback with categories seeming to lead on from one another.

Details versus the Big Picture (Anthony)

For us as students, every mark counts. In the OC, much of the feedback given by our peers focused on the details, rather than the big picture. For example, if the video was a few seconds over time, this was the focus on the feedback rather than recognising that the peer review process resulted in self-appraisal that would generally not occur for assessments that are only submitted for final grading. The final student videos provide more than interpretation on each topic resulting in a great resource, which I intend to use for further learning to complete the remaining course requirements.

Learning from Group Members and Other Groups (Anthony)

Working in groups is a vital skill to develop, but my experience was that the group work didn't occur as intended. Groups with weaker members placed increased workload on the others members. This in turn affected their ability and willingness to take on tasks for the other two groups to which they were assigned. On the other hand, tricks learnt in one group quickly moved to others with the opportunities to look at other groups' work.

I found that the group work, at times, negatively impacted my learning experience. For example, forming short-term small groups of students with varied abilities (for example, age, nationalities, and experience) meant that I found I was taking the role of teacher rather than team member. Students as partners in Australian Higher Education has the potential to achieve great learning outcomes assuming that the lectures, tutors, and students are supportive enough to monitor and step in when required.

Peer Collusion, Review, and Interventions (Yash)

As the peer review process was the key driver for the mark of the Secret Plan, full marks (2/2) could lead to false expectations towards a final mark. It was important to emphasize the distinction between a good initial draft and the work needed to refine that draft into a good final idea. Furthermore, as the peer review process involved a community of peers rather than a

community of relative experts, questions about the quality of the insights raised in the review process were raised by students.

Familiarity between students and the interest of promoting a high mark amongst the entire tutorial group caused students to award each other full marks, creating an informal collusion effect. The tutors had to intervene in these scenarios and moderate the mark, while providing some concrete reasons and feedback as to the reasons why. The best method used to deal with this collusion was to structure the mutual exchange of peer reviews students between unfamiliar groups so that they could feel comfortable in giving comprehensive feedback.

Group Diversity (Ellen)

Working in three randomly selected groups produced mixed results. While it may have theoretically ensured students deviated from their normal patterns, it did not necessarily increase the diversity of the groups. Each group's life cycle was relatively short (three to four weeks) but all students were splitting time simultaneously between three groups. This meant that the logistics were often challenging and efforts in one group were traded off against efforts in another.

I believe that our original skill set (video skills, written narrative skills, or mathematical skills) had little impact on who performed each role in each group, as someone who was the 'writer' was often also burdened with being the 'videographer' and 'mathematician.' Issues were also encountered with this method when not all students' role matched up with their skill set, either by initial miscommunication or an uneven distribution of skill sets in the DLab. Overall, some individual talents were permitted to shine but in the majority of cases it felt like good students assumed most of the work and gained new skill sets.

Preparing Students for Role Redefinition (Chris)

As highlighted by my co-author's reflections, there were both positive and negative perceptions about the OC. I believe that one of the largest shifts in perception required in this students-as-partners model is helping students and tutors to get on board with the redefinition of roles in a teaching environment. This disconnect is highlighted in many of the reflections above with many of the traditional roles in a classroom being challenged in this mode.

I have learnt that it is important to consider the alternative metaphors that students bring to class. For example, a students-as-customer metaphor elicits comments from students such as, "I'm paying for this – you teach me." Further, a teacher-as-guru metaphor elicits comments from students such as, "Tutors know more than I do, so their feedback is more valuable." It is clear that students have expectations about interactions in the classroom and that deviating from these expectations can be difficult to reconcile.

This observation, however, devalues the amount of behind-the-scenes work that is required to make a partnership work from provision of resources well ahead of time to the facilitation of

processes and opportunities for interaction. Ensuring that the activity is explained, discussed, and reviewed is an important process as well as ensuring that there are still purposeful front-facing roles for the teachers.

Next Steps (Chris)

The creation of an OC in a students-as-partners model has highlighted that students can be active agents in the construction of relevant teaching material and thus benefit their learning. Time will tell whether these resources are used into the future and whether the students who created them will be active in the development of further resources.

The process itself could benefit from more scaffolding. Students are trained and understand how to write an essay or report, and there is a plethora of academic skills workshops and other material that students can access. No such resource exists for this new media. The Institute for the Future (Davies *et al.*, 2011) list of skills required for future workplace includes skills such as ‘new media literacy,’ a ‘design mindset,’ and ‘virtual collaboration’: all aspects developed in the co-creation of the OC. A clear set of guidelines or collected wisdom for students on the creation of online lessons such as copyright aspects, moral rights of collaborators, and what happens to the resource in perpetuity is required to ensure quality of ongoing practice.

One exciting future opportunity is the potential of the toolkit approach beyond the course boundary. One could imagine breaking every concept in a degree program into these student-created lessons, allowing the open exploration of topics outside the constraints of a course structure. Fundamental concepts could be shared across courses. For example, a student-created series on Academic Integrity could be set as a prerequisite for any written reports in a program, and would be a strategic way of breaking down institutional barriers between students and faculty.

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