Guide to Scaling Education

Produced by the Scaling Education
Education Focussed Community of Practice
2020

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Foreword

The Scaling Education EF Community of Practice (CoP) came together in 2020 to share experiences in teaching large classes. Through their discussions, the CoP developed this guide which is a collection of a variety of interventions relating to improving the large class student experience, streamlining administration of large courses, mobilizing teaching teams and pedagogy. Many of these interventions are work in progress which have been discussed, presented or workshopped at our monthly online meetings. The Guide acts as a glimpse into the 'world of scale' and aims to stimulate thinking about better teaching practice at UNSW.

We welcome your inquiries and feedback, which can be directed to our co-Academic leads:

- Steven Davis, Associate Head (Academic), School of Civil & Environmental Engineering; Faculty of Engineering;
- Jayashri Ravishankar, Deputy Head of School Education, School of Electrical Engineering and Telecommunications, Faculty of Engineering;
- Or the EF Team ef@unsw.edu.au

Interventions

The following section contains nine interventions on a variety of topics, all prepared by members of our EF Community of Practice:

1. Creating e-Teaching Team Culture
2. Managing a Large Number of Casual Academics
3. Efficiencies at Scale in Course Administration using Power Automate
4. Active Learning Initiative: How to 'activate' your virtual classroom in BlackBoard Collaborate Ultra and support resources for teaching an Active Learning Course
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Creating e-Teaching Team Culture

Natalie Oh, School of Banking & Finance, Faculty of Business

Situation

Covid-19 has forced many academics to build online community in the education space. Large classes are now more than ever under pressure to deliver quality education. School of Banking & Finance (SBF) have had amongst the largest student enrolments within the Business Faculty.

- Convening large classes within the School of Banking and Finance, Faculty of Business (SBF)– considering 'greater; to be more than 100 students to 1000+, however also with large numbers of teaching staff at different levels. For example, numerous tutors (10+); more than one lecturer, as well as PASS (Peer Assisted Study Sessions) leaders and current students.
- With students not attending face to face lectures even from before 2020 – the role of tutors and PASS leaders have become more important;
- Teaching team consists of Lecturers in charge (LIC's), lecturers, tutors and PASS leaders;
- Physical space allocated for 2 hours of lectures which are typically repeated up to 3 times for large enrolment classes; Tutorials – are 1.5 hours per week;
- As Course Convenor, difficulty monitoring quality of delivery across a large student cohort and with a large and diverse teaching team; How to build quality online community for large classes to promote better e- learning experiences? How to create an 'E-teaching team spirit'? How to implement an ongoing performance management E-tool for your teaching team to deliver quality teaching? Does better coordination lead to better delivery?
- When I was the Director of Coursework for SBF (2018-2019), I initiated and implemented ways to build E- teaching team culture to give quality teaching to students in large classes for reasons outlined below. Then, I didn't know that building e-teaching team culture would become critical for Covid-19 era where both the teaching team and students would teach & study remotely.

Tasks

- Organise large teaching team (lecturers, tutors and PASS leaders) to effectively communicate with students and meet their demands
- How to communicate effectively with large numbers of students?
- Use the existing LMS - Moodle
- Determine 'quality' communication between teaching team and students
- Who answers student questions on the LMS?
- How to incorporate tutor engagement with students online and remuneration under current duties to undertake; and
- How do we 'quality control' sessional staff when there are so many of them?

Actions

In consultation and with the support of the Digital Learning and Education Quality Teams, utilising the existing LMS and resources, a two - pronged strategy was devised:

1. Designate a space on Moodle- Moodle Discussion Forum - where students can interact with teaching body and engage, asking questions which are answered in a timely manner
2. Facilitate coordination amongst the teaching team through, for example, MS Teams

Communication between teaching team and students was through mandatory Moodle Discussion Forum for classes that had a "teaching team" – a central location. Isolated email communication with students about course work has been discouraged and eliminated.

- Teaching team provides timely responses to students about course queries and comment within the Moodle Discussion Forum
- Work in progress - building a culture of collaboration (vs silo operating mentality) amongst teaching body, e.g. tutors switching from representing themselves to being ambassadors of the SBF belonging to a leading educational institution

Challenges

- Ensuring equitable workload amongst team members. Potential hurdle of remuneration of tutors was overcome through efficiencies in time gained as a result of the implementation and through agreed rostering of staff to field questions on Discussion Forum
- Initial extra resources required for review of Discussion Board
- Educating students to write in a public domain- learning process for all

Preliminary Results

Benefits of bringing all teaching team and students to one e-location:

1. Quality Control for all teaching team
   - Transparency encourages quality response from teaching team. Everyone can assess and value what is written
   - Feedback mechanism - A metric which can be assessed: a way to assess student engagement or tutor performance
   - An audit trail, we know how quickly students are being responded to;
   - A metric of student engagement;
2. Time Efficiency
   - All student questions – except personal – are directed to the DB; saves time; removes pressure on teaching team
   - An expected outcome is that these strategies also save time for students
3. Active Education
   - Engages with students outside, shows care, students can themselves answer other questions (which are then reviewed); a way of encouraging participation

and mechanism or awarding contribution marks
- A way of giving timely feedback on student's learning especially on common discussion threads

4. Addresses criteria for SES & Quality Indicator for learning and Teaching Survey
5. Valuable Learning Platform -
   - As students have stepped away from face-to-face learning, we can look at learning management system data from students. On average as student discussion activity increases, their performance increases
   - Discussion Board becomes a location for E-consultation platform; Easier to pivot to 100% online in 2020

Director of Course Work is examining data related to the participation rate of tutors on the Moodle Discussion Forum across designated time frames; monitoring who is responding to what students are asking, and when on the Forum. This is part of a quality control measure, for both of sessional staff participation and curriculum coverage/ quality assurance.

Future Challenge

Examining data analytics behind student participation to see whether there is a correlation between performance and participation on Moodle Discussion Forum and consistency of results across terms.

References

Natalie's Scaling Education CoP presentation 31st March 2020, 'How to build quality online community for large classes in order to promote better E-learning experience?' https://thebox.unsw.edu.au/video/scaling-education-workshop-01-part-1

Percy, M. Scoufis, S. Parry, A. Goody, M. Hicks, I. Macdonald, K. Martinez, N. Szorenyi-Reischl, Y.Ryan, S. Wills & L. Sheridan (2008). The RED Report, Recognition - Enhancement - Development: The contribution of sessional teachers to higher education. Sydney: Australian Learning and Teaching Council, 24p. https://pdfs.semanticscholar.org/8d31/aadf9f304f6d27735fcf6fa558cc031a283f.pdf

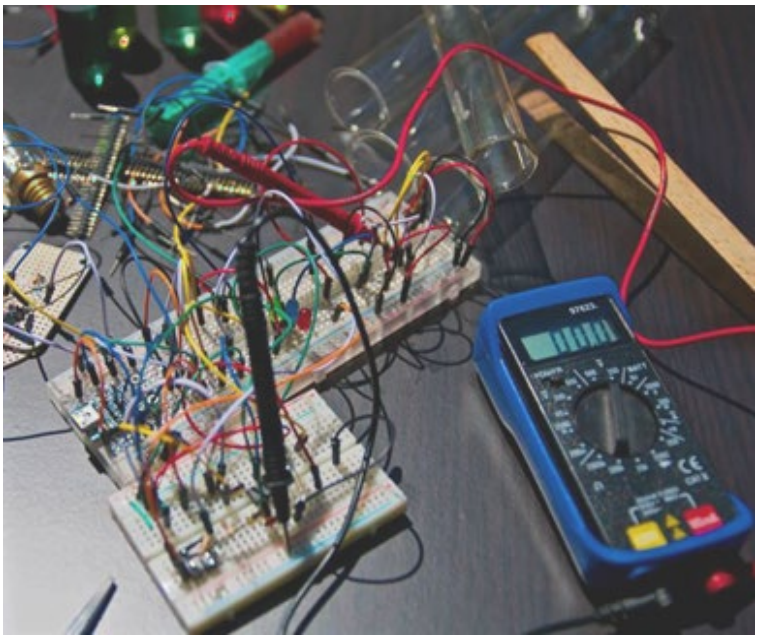
Whelan SA, & Kesselring (2005): The link between faculty group development and elementary student performance on standardised tests. The Journal of Education Research 98:225-230 https://primoa.library.unsw.edu.au/primo-explore/fulldisplay?vid=UNSWS&docid=TN_informaworld_s10_3200_JOER_98_6_323_330&frbrVersion=4&context=PC&query=any,cont%20ains,wheelan%20journal%20of%20education%20research&_ga=2.134156750.1790227394.1598346453-108522584.1594270720

Further Information

Author: Natalie Oh, School of Banking & Finance, Faculty of Business

Managing a Large Number of Casual Academics

Inma Tomeo-Reyes, Electrical Engineering & Telecommunications, Faculty of Engineering
Arash Khatamianfar, Electrical Engineering & Telecommunications, Faculty of Engineering



The School of Electrical Engineering & Telecommunications (EE&T) has a large number (100+) of casual academics being recruited from a pool of around 300 in any given term – most are returning, but a significant number are new academics who need training and considerable support.

- Before 2019 there was overreliance on PhD students who were teaching well above the recommended 6hr per week.
- To avoid negative impact on research performance and take advantage of the benefits of peer mentoring, the number of undergraduate students used as casual staff considerably increased in 2019.

As EE&T Laboratory and Casual Staff Coordinators, we aimed to:

- Ensure that casual staff are properly managed, supported & trained, regardless of number/experience.
- Respond to feedback and improve the existing training by providing lab demonstrator-specific training in addition to the existing OH&S and Faculty (or tutor-specific) training.
- Identify the benefits and challenges of peer mentors from the perspective of undergraduate students who were peer mentors and mentored by a peer.

In order to achieve our objectives, the following actions were carried out:

Training

- Casual staff training was re-designed and facilitated in response to feedback, with lab demonstrator needs in mind.
- Re-designed training is now 4 - 4.5 hrs long. It is delivered every term to new recruits (~30-40) and consists of:
  - **Health and Safety Training** (1 hr) - Run by Faculty OH&S representative (became video presentation with questionnaire in 2020).
  - **Lab demonstration training** (2.5 - 3 hrs) Run by Laboratory and Casual Staff Coordinators. Includes information related to School administrative matters and a workshop. Workshop consists of activities and small group discussions covering learning and teaching issues, and a Q&A expert panel led by senior lab demonstrators (presented via slides and self-reflection piece in 2020).
  - **Local lab induction** (30 min) Run by Technical Officers.

Management

- Streamlined new recruitment of lab staff (200-300 EOI's submitted from which to select).
- Shared email account for centralising communication with coordinators (recruiters).

Support

- Periodic monitoring of casual staff and students' learning experience through anonymous surveys.
- Conducted and consulted surveys specific for casual staff. Feedback was used to identify further support needed and enhance training

Peer mentoring

- Identified benefits of peer mentoring in the literature.
- Surveyed undergraduate students/casual staff who identified benefits and challenges of peer mentoring.

As a result of these actions:

- The new training was complimented and could (with permission) substitute Faculty compulsory training.

  Lab demonstrators felt better equipped for the teaching tasks they were being employed to undertake.
- There was a high degree of satisfaction with management and support strategies at the School level.

  Anonymous survey results showed that casual staff were extremely satisfied with their role (4.52/5 average rating), as well as with the application processes (4.5/5), selection processes (4.41/5), and especially the level of support received from the Laboratory and Casual Staff Coordinators (4.64/5).
- Undergraduate students who were both peer mentors and mentored by a peer, reflected on a significant benefit in terms of reinforcing learning and supporting students.

  Relatability was identified as the main advantage of peer mentoring and having authority undermined as the main disadvantage

Some challenges and work in progress include:

- Challenges to training format during 2020 were remedied by adopting use of training video recordings, slide presentations and questionnaires/self-reflection pieces.
- Further consideration might be given to automating comments on candidate applications and use of Discussion Forum as a way of fielding student feedback on lab work.
- Welcome feedback on other people's experience of using undergraduate students in peer mentoring context.

Further Information

- Authors: Inma Tomeo-Reyes, Lecturer and Arash Khatamianfar, Lecturer, School of Electrical, Engineering & Telecommunications, Faculty of Engineering
- Scaling Education Workshop: 'Managing a large number of casual academics – How to survive and succeed', 31st March 2020. Link: https://thebox.unsw.edu.au/video/scaling-education-workshop-01-part-2
- UNSW Engineering Education Showcase: 'Students mentoring students: Use of undergraduate students as casual academics for learning enhancement', 16 August 2019. Slides available upon request.

Efficiencies at Scale in Course Administration Using Power Automate

Peter Neal, School of Chemical Engineering, Faculty of Engineering

Situation

Context - Business discontinuity triggered by COVID-19. With business as usual at the start of 2020, students applied to do the Thesis Program through filling in a PDF and emailing it to an academic / staff for approval. Overseas students also followed the same process for Thesis A – which is a distance option (Thesis B/C are lab dependent and therefore not the preferred option for COVID-19 affected students).

Issue – The prospect of having to process 20-50 forms (as opposed to the usual 5) for approval from overseas students via PDF/email with its concomitant issues to do with volume processing, accuracy, manual tracking, and data security was not desirable.

Task

With the rapid pivot to online remote learning, we needed to ensure appropriate supervision for all honours and PG thesis students, including overseas students, within the School of Chemical Engineering.

Concern was that there would be a large volume of email related to up to 250 expected applications, and that there was a risk that applications would get missed or not attended to in a timely fashion.

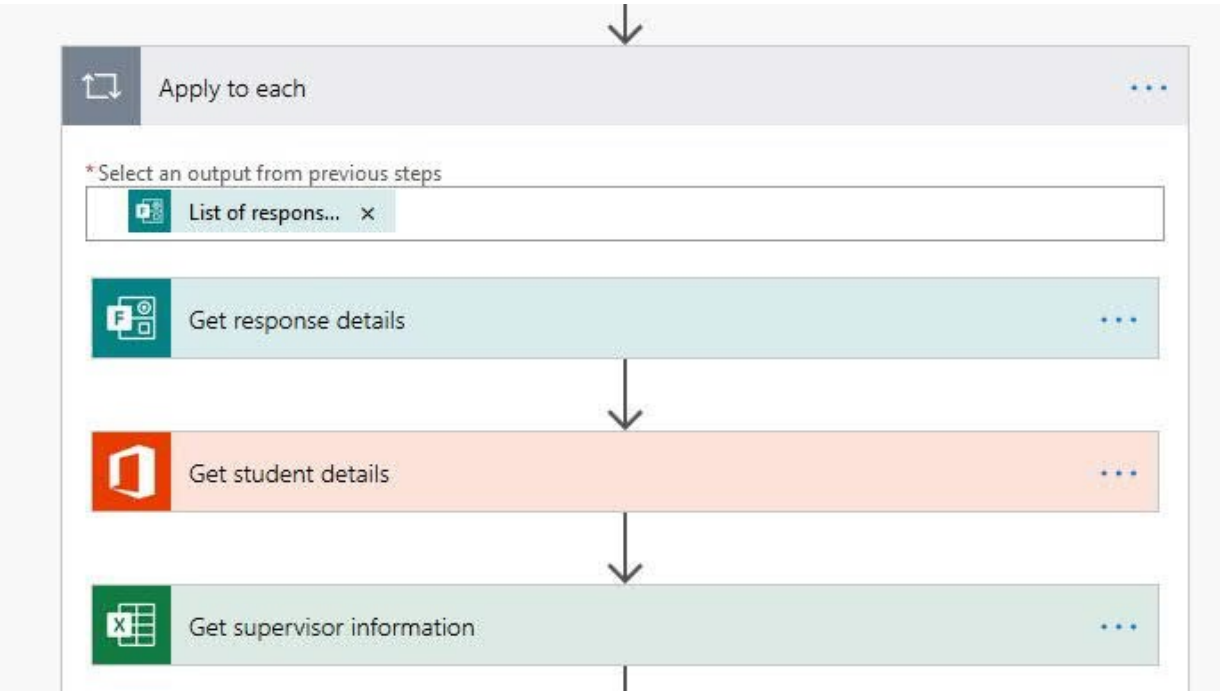
Scale: 200-250 applications for one Thesis Coordinator.

Action

Solution was to develop a processing and tracking Thesis Program approval process using Microsoft Power Automate which would capture overseas applicant data, as well as streamline the approval process:

1. Developed a flow which would collect a student's thesis application
2. Checked that the supervisor had signed off on the application
3. Created a record in an application spreadsheet
4. Sent the application to Thesis Coordinator for final approval
5. Notified both student and supervisor of the outcome (approval or non-approval).

Illustration of key steps in Power Automate



Results

Benefits of using Power Automate for this process:

- Easy to check which students had or hadn't received thesis approval;
- Creation of automated application and tracking tool (spreadsheet) which populates from the completed MS Form;
- Academic/staff in charge benefit – reduce email load; maintenance of accurate student records; academics can provide resources to students as required;
- Thesis students are provided with adequate and appropriate supervision;
- Benefits to students, especially those impacted overseas – faster response; more secure; ensures accurate form input data;
- Reduced response times to student inquiries.

More generally, Lee Sellen writing at Rencore[1] says

> *'Those who experience using Power Automate (Flow) say it helps them optimize everyday communication and organization for them to work better within the modern workplace.Setting up a personal workflow that automates a simple process can help the delivery of automated emails, point individuals to the correct content, funnel notifications into one single place making organization easier'.*

Costs of using Power Automate

The time to create a Power Automate Flow can take from a few minutes to several

[1] https://rencore.com/blog/office-365-flow-beyond/ accessed 30/09/2020.

days. The amount of time depends on the complexity of the Flow and user experience. This application took about a day to develop. However, the Flow has now been operational for three terms with little need for additional work. Therefore, time invested has yielded significant time savings over the year.

Advice

In developing a Flow it is important to:

1. Map the purpose, requirements and structure of the Flow ahead of time as it will simplify the development stage, and
2. Test the Flow and all it's possible inputs and outcomes – perhaps enlist an interested colleague to be your tester or test subject.

If you do encounter an error while the Flow is live, you can rerun any job after you've corrected the issue.

Recommendations

Personally, I have also developed Flows to handle

- Expressions of Interest from students to potential thesis supervisors
- The collection and processing of marks for poster sessions and seminars
- Collecting attendee information for COVID Safe events
- Adding students to Teams groups, based on their Moodle groups (via a PLD triggered email).

My colleagues in the Faculty of Engineering, Dr Michael Stevens and Prof. Tracie Barber, have developed Flows that include

- Managing the submission of Thesis manuscripts to a central file repository
- Assignment of markers and facilitating their responses using Microsoft Forms and Planner.

Further Information

- Author: Peter Neal, Senior Lecturer School of Chemical Engineering, Faculty of Engineering
- Twitter thread documenting the Distance Study approval Flow https://twitter.com/elementalish/status/1241169858353459201?s=20
- UNSW Flow Champions (on Teams) https://teams.microsoft.com/l/team/19%3a8c45cc7df2ce488d8ceee493ec7b022c%40thread.skype/conv ersations?groupId=c25b02f7-574e-4948-8943-57eece5c82a4&tenantId=3ff6cfa4-e715-48db-b8e1- 0867b9f9fba3
- Use Power Automate to Increase Productivity (Microsoft Education course) https://education.microsoft.com/en-us/course/02c53b0c/overview

Active Learning Initiative: How to 'activate' your virtual classroom in BlackBoard Collaborate Ultra and support resources for teaching an Active Learning Course

Joanna Kartheritsas, Learning Environments, Officer of the Pro-Vice Chancellor – Education

Situation

The Active Learning Initiative was established to address some of the challenges faced by academics in the use and adoption of active learning spaces available on UNSW's Kensington campus. These include:

- Lack of awareness on latest trends in teaching and learning and exemplars from within UNSW on effective active learning techniques in the classroom
- Guides, examples, information, evidence, and academic evaluations on how these spaces are improving learning outcomes, student satisfaction and the Scientia Educational experience

Task

The Active Learning Initiative works with academics to support the adoption and practice of an active learning pedagogy by forming links and leveraging from other initiatives within the UNSW teaching community like summative peer review, educational-focused positions, and academic development.

The need for support and leveraging from each other within the UNSW's teaching cohort has become more prevalent as the University pivoted quickly and adeptly to teaching remotely in recent months. Now more than ever the student learning experience and support to those teaching online is vital.

Action

A number of resources and tools have been developed under the Active Learning Initiative which support active learning to take place at any time and in any place. In addition, the *'Let's Meet: Active Learning'* series was launched, creating a platform for a 'virtual' meeting place where discussion on ideas, experiences, learnings, and exemplars are encouraged to be shared.

The workshop *'Active Learning Initiative: How to 'activate' your virtual classroom in Blackboard Collaborate Ultra and support resources for teaching an Active Learning course'* provided an insight on the types of tools available within BlackBoard Collaborate Ultra and suggestions on how they can be used to 'activate' the virtual classroom and engage students during a lecture, tutorial, seminar etc.

A 'simulated' activity was run in the presentation using the 'Breakout Groups' tool enabling attendees (mostly members of UNSW's teaching cohort) to experience first-

hand what it would be like for students participating in an online group discussion and presentation to their peers.

The activity included a set of questions which attendees need to discuss responses with their fellow group members as well as guiding instructions on how these responses should be presented back to all attendees using BlackBoard Collaborate Ultra's whiteboard tool.

Information on Active Learning Tools and Resources as well as Support available was shared and discussed.

Result

The workshop provided valuable insights for attendees who were preparing to teach remotely, in using BlackBoard Collaborate Ultra's tools as a way of engaging students in a virtual classroom and thereby enhancing their learning experience.

Attendees were able to share and collaborate on ideas, learnings, experiences and gain awareness of the Active Learning resources, tools, and support through the Active Learning Initiative.

The Active Learning Initiative continues to collaborate with and support UNSW's teaching community through innovation of the latest trends in teaching and learning and exemplars from within UNSW on innovative and effective active learning techniques.

Further Information

- Author: Joanna Kartheritsas, Learning Environments, Officer of the Pro-Vice Chancellor – Education j.kartheritsas@unsw.edu.au
- For more on Active Learning Resources, Tools and Support, please visit https://www.learningenvironments.unsw.edu.au/resources/active-learning

Early Intervention in Student Teamwork

May Lim, Chemical Engineering, Faculty of Engineering

Situation

- Teamwork is a requirement in many engineering courses, particularly higher-level courses
- Requirement of Engineers Australia Competency Standard
- Important for developing graduate attributes
- For T2 2020, teamwork was conducted online – so it was not possible to monitor students directly
- This intervention relates to a Level 3 Chemical Engineering design course
    - 100 students (up to 150 students)
    - Intensive – 7 contact hours per week
    - Inquiry Based Learning – additional learning outside of contact hours
- Students work in groups of 5
    - Forced team
    - Students must deliver a team report by Week 7
    - Interim tasks for students to work on as a group between Week 1 and Week 7.

Task

Previously, Moodle Team Evaluation was conducted only *after* students submitted a final piece of work in Week 7. At this point in the term, if students are not working well together, it is too late to rectify or intervene and the opportunity to facilitate learning to work within teams is lost.

Action

We designed an intervention method which relies on students submitting formative Moodle Team Evaluations in weeks 3 and 5 after completing interim tasks. This allows us to monitor the team dynamics and intervene if the team is on a downward trajectory.

The Moodle Team evaluation involves each student grading self and team member performance (peer evaluation). We review evaluations and interview team members separately to identify any source of friction within the team. For example, some team member would complain that a member is not contributing to discussion and we identify that it is due to a language barrier. Depending on the cause of friction we then provide coaching within the team. In the example above, we suggested providing more time for the member to think and speak, and to use the chat function in Microsoft Team to communicate.

Result

By facilitating early evaluation of student teamwork and stepping in and preventing team conflict from escalating, we ensure the students have a better team experience and better understanding of and empathy for others. A stitch in time save nine.

At the moment, we extract and analyse the team evaluation data “by hand” which would be time consuming for larger cohort (>500).

Refinement would involve automating the data collection process, so that the Moodle Team Evaluation data can be processed and analysed automatically in order to identify teams that are on a downward trajectory.

Further Information

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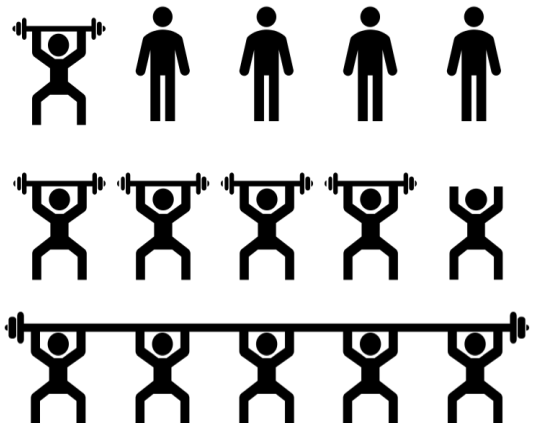


Remote Laboratories for 200 students- Control Systems Course

Arash Khatamianfar, Lecturer, Electrical Engineering & Telecommunications, Faculty of Engineering

Most STEM based courses include practical experimental activities in the laboratory. The aims of practical work broadly encompass the following:

- Cognitive learning which is often elucidated as the integration of theory with practice,
- Inquiry methodology which includes hypothesis forming, experimental design and methodology and evaluation of results,
- Vocational aims which include awareness of current practice and the inculcation of professional ethics,
- The development of personal skills such as communications, report writing and team working skills

Despite COVID, there has been a need to deliver the critical laboratory component of Electrical Engineering coursework, conducted within the physical laboratory.

Task

The aim of the Remote Lab Design Team has been to create a learning environment – a remote lab- wherein students have had an opportunity to, through remote access, operate as if in a physical laboratory, thus ensuring opportunity for the achievement of learning outcomes. There have been 200 students enrolled, and working in pairs, 10 lab sessions of 3hrs duration set up per week of Terms 2 2020 for Control System Course ELEC3114.

Action

- There was initial trialling of different platforms; The screen sharing feature of MS Teams and the fact that it was readily available made it the platform of choice;
- The entire Control System Course (ELEC3114) has been set up in Microsoft Teams, including the Remote Laboratory Sessions. Students have been given facility to remotely operate laboratory equipment and conduct experiments with live video feed of equipment in action;
- Lab sessions are run by Lab staff/mentors and while they can be located remotely, they have been located within physical lab space under COVID safe distancing rules. An additional Lab staff member was employed to assist with the remote delivery;
- Microsoft Teams has been used for remote desktop sharing and staff interaction with students;
- New comprehensive general Course Guides have been developed and provided for

each subject, including a separate demonstration laboratory work orientation;
- Creation of separate private channels and channels for each scheduled experiment on MS Teams enables students and Lab staff/mentors to communicate, seek help, problem solve, discuss, securely share files, and achieve learning outcomes;
- The Remote Laboratory sessions have been a space in which students can
    - Conduct experiments
    - Realise conceptual understanding through practical application;
    - Practise problem solving, connecting theory to real world problems;
    - Design processes, and work within lab as when in person operations,
    - Manipulate the equipment remotely and observe the results live through video feed (some extra equipment like data acquisition devices and actuators were used to enable remote operation and manipulation);
    - Receive continuous feedback from Lab Demonstrators.

Success

- The collaboration and delivery of Remote Laboratory innovation was successful and has been applied to 8 other courses in EE&T at 2nd, 3rd, and 4th year level.
- MyExperience results to date (T2 2020) indicate that Remote Labs rating for the Control Systems Course surpassed course, faculty and university mean responses across all criteria with an average of 5.82 (with Median of 6) from 77 respondents (around 40% participation in the survey).
- 100% of respondents agreed with the 'overall satisfaction with the quality of the course': 'The labs were very well executed….. as close as it could've been to the real deal.'
- Providing time zones are considered when lab sessions are scheduled; remote lab work enable students to participate no matter where they are in the world.

Challenges

- Compressed time frame-3 weeks- to pivot to an online remote solution using existing resources;
- Use of Microsoft PowerShell to assist with logistics (e.g., to bulk add a group of students into a private channel/lab time slots;
- Incompatibility of software, e.g., MATLAB with MS Teams meant that Lab Staff needed to be available to resolve issues;
- Some delay in the way MS Team remote control works (bandwidth issue);
- Potential workload issues for Lab staff as they are undertaking some of the lab work on behalf of students;
- Ensuring secure and private access to Remote Labs is work in progress.

Transferability

- To date, T2- Six courses went to using Remote Laboratories; with extra 2 course

inT3, giving a total of Eight courses which have been transferred to Remote Laboratory delivery (with some courses in slightly modified formats);
- Limited to existing software and resources; Full realisation of Remote Lab work for other subjects would be with substantial additional investment through, say, use of robotics;
- Process recommended for other science based professional disciplines; Not a replacement of face- to-face laboratory work, but alternative to those who genuinely cannot be present on campus.

Best practice tips, pros/cons

- Assessment becomes integral to delivery methodology, learning objectives, and has been re- considered and redesigned as a result; In this instance, to cover deep knowledge as well
- as experimental results (practice). And with re-design assessment timelines needed to be modified;
- To minimise social isolation of students, maintain lab staff within physical laboratory with Webcam turned on, and within safe COVID practice guidelines;
- Ensure students working in pairs swap and experience of remote desktop access;
- UNSW IT can create class Teams for you which are automatically linked to enrolment status of students;
- Invest in high resolution webcams, ensure proper laboratory lighting; backup demonstrator computers when there are compatibility problems;

Further Information

- Author: Arash Kathamianfar, Lecturer Electrical Engineering and Telecommunications together with EE&T team members Nelson Fu, Zhenyu Liu, Roy Zeng, Dr. Chris Lu and Yen Nee Ho.

References

- General Staff Guide to EET Remotely Accessed Labs: https://unsw.sharepoint.com/:b:/s/ELEC3114ControlSysDevelopment/EfCQNLp6p3xNu1WtktP1jVoBvLoBP 5OlXiiLwlwOYjT6tw?e=hhAcjY
  The website reference for MS PowerShell programming is provided in this guide – comprehensive guide on how to set up communications; (PowerShell is the shell framework developed by Microsoft for administration tasks such as configuration management and automation of repetitive jobs- Please the websites provided for more info).
- The role of laboratory work in engineering education: student and staff perceptions, Norrie S. Edward, International Journal of Electrical Engineering Education 39/1 (accessed http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.915.2121&rep=rep1&ty

pe=pdf)

- Reimagining education from the lab to the living room, https://unsw.sharepoint.com/sites/Education- Focussed/SitePages/Reimagining-education-from-the-lab-to-the-living-room.aspx 1st July 2020.
- Promotional Video of EET Remote Labs https://unsw-my.sharepoint.com/:v:/g/personal/z3356241_ad_unsw_edu_au/EcMTDadYwGpAvguwIz- HX6kBdsamJGAkuOxi1Bu4Eyexdg

Publication forthcoming about the Remote Lab innovation and implementation planned for 2021.

Enhancing student learning through online lectures using Moodle quizzes

Liz Angstmann, First Year Director, School of Physics, Faculty of Science
Kate Jackson, Deputy First Year Director, School of Physics, Faculty of Science

Situation

- Large class sizes (500+)
- Dropping attendance (usually 50% by the end of the course)
- Some students have clashing lecture times, or are uncomfortable attending large lectures
- Lecture recordings do not capture demonstrations or working from the board

Task

- Give students the opportunity to enrol in one of the following lecture streams:
    - 1 of 2 x f2f lecture streams (term 1 and 2, or one f2f stream term 3)
    - 1 x web stream lecture stream (no f2f lectures timetabled – only complete the online lectures)

  Note: Pre-COVID all students attend a 2-hour lab and 2-hour problem solving workshop f2f each week.

- Develop videos/lessons with best-practice teaching
    - Short videos with equations and key points appearing on the screen to reduce cognitive load
    - Regular questions allowing students to practice what they've just learned
    - Include solutions videos to allow students to learn from their mistakes ("formative-type")

- Decided to create Moodle quizzes to stand in for lectures for the following reasons:
    - Can implement "Description" question type for video/content delivery, intersperse questions throughout
    - Wide variation in question types (e.g. MCQ, short answer, STACK, etc.)
    - Marks can be fed through to a not-for-marks category in Gradebook so completion can be easily monitored
    - It is the LMS used at UNSW (familiar to students)

Action

- Structured the lecture (set up as Moodle Quizzes)
    - Align with learning outcomes for that lecture (~4/week), listed at start of lecture and tested in assessment tasks
    - 1 quiz per lecture
    - Create a "shell" for the lecture, research best way to present material
- Scripted the videos (either with notes or with PowerPoint slides)

- Produced short videos using camera at-home or in film studio
    - Including theory, small demonstrations, solutions to problem videos
- Edited videos using video-editing software (e.g. Screenflow)
    - Adding key words to screen (to reduce cognitive load/emphasise key concepts), pictures, formulas, etc.
- Identified students who seemed to be falling behind in lectures
    - Email to gently remind to keep up-to-date

Result

- Flexibility of delivery (asynchronous)
- Can make better use of class time for f2f students, while these were developed for online students it means students can be directed to watch long proofs online, freeing up class time for discussion and problem solving
- Allowed for easy pivot to fully online learning due to COVID-19
- 1A web stream data indicates that students learn at least just as much (possibly more) than those who attend f2f lectures
    - Tracked completion via Gradebook from Moodle lecture quizzes
    - Anecdotal feedback from students: appreciated the reminder to complete the lectures, appreciated the care for individual student progression
    - Data includes learning gains – peer-reviewed concept inventory tests measuring the learning gains of students regarding particular topics
- Measurements of student's emotional engagement in Physics 1A showed that students covering lecture content online were less emotionally engaged than those learning f2f.
- Work in Progress with data for 1B web streams (1B web streams first implementation in T3 2020)

Pros/cons

- Con:
    - Time consuming!
    - Need to refresh every few years
    - Completion depends on student intrinsic motivation
- Pro:
    - Lectures can be used for quite some time afterwards
    - Students tend to learn more provided that they actually complete them
    - Students are invested in learning due to increased responsibility of having to complete the lectures themselves

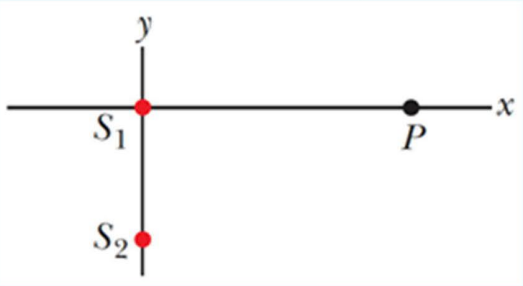
Screencap of part of quiz with video

We are going to touch upon a couple of interesting concepts in this video, including:

- **Constructive** and **destructive interference** - you'll remember these from Physics 1A.
- **Coherent light**, which is characterised by the electromagnetic waves being *in phase* with each other.
- **Monochromatic light**, which is light that is of a *single wavelength*.
- **Diffraction**, which describes how waves bend around openings where the size of the opening is of the same order of magnitude as the wavelength of light.

To recap some revision of interference, I'm going to do the question below. Attempt it before watching me do it, or just skip to watching so you can remind yourself of how to attempt questions like these, and then move on to trying for yourself.

Two isotropic point sources of light (S1 and S2) are separated by distance 2.70 μm along a y axis and emit in phase at wavelength 900 nm and at the same amplitude. A light detector is located at point P at coordinate x_P on the x axis. What is the greatest value of x_P at which the detected light is minimum due to destructive interference?



In the video below, we discuss the similarities and differences between electric and gravitational forces. As there are many similarities between these fields many of the techniques that you learnt in Physics 1A for dealing with gravitational fields can also applied to electric fields. Linking this new material, you are using what you already know will make it much easier to learn.

This part is optional. If you want a recap of Newton's shell theorem, it is covered in the video below. Note that the video is half an hour long and you would not be asked to reproduce this so feel free to skip it!

Use Coulomb's law:

$$F = \frac{kq_1q_2}{r^2}$$

where $k = \frac{1}{4\pi\varepsilon_0} = 9.0 \times 10^9 Nm^2/C^2$ to calculate the magnitude of the electric force between a Hydrogen nucleus (a proton) and an electron when they 120 pm (the radius of a Hydrogen atom) apart.

N

Hint: When entering numbers in scientific notation use "E", so for example the charge on an electron $e = 1.602 \times 10^{-19} C$ would be entered as 1.602E-19.

Figure: Theory videos are added into Moodle quizzes as “description type” questions. These can then easily be distributed in quizzes along with other question types to gauge whether students have understood what they have just learned. Solution videos and formative explanations and feedback are also provided with each question.

Further Information

- Authors: A/Prof. Liz Angstmann, First Year Director, School of Physics, Faculty of Science and Dr. Kate Jackson, Deputy First Year Director, School of Physics, Faculty of Science
- Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students’ learning with effective learning techniques: Promising directions from cognitive and educational psychology. Psychological Science in the Public Interest, 14(1), 4-58.
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Online Teamwork in Large Courses

Jayashri Ravishankar, Electrical Engineering & Telecommunications, Faculty of Engineering

Situation

Teamwork activities play a key role in developing essential graduate attributes in students. COVID 19 has triggered all courses to adapt to an online instruction. Designing teamwork activities in an online setting for large courses (150+ students) comes with many challenges. Smaller team size, requirement of teaching assistance, scheduling synchronous sessions, providing personalized feedback, maintaining fidelity among casual teaching assistants, assessing teamwork-leadership skills, and maintaining student engagement are some to name a few. A thorough literature review, structured plan and course design based on fundamentals of learning theories were key to addressing the above challenges.

Task

The primary motivation was to improve the quality of online learning to boost the professional attributes required by Engineers Australia stage 1 competencies, specifically 3.6 on “Effective team membership and team leadership”. The task involved facilitation, management, and quality assurance of the techniques implemented.

Action

A Systematic and evidence-based approach was taken to design the course of 172 students. Six students that had previously finished the course with excellence were appointed as mentors. Mentors therefore, did not require extra training on the course content. Teams were formed as groups of five students, and each mentor was appointed to six different teams. Private MS Teams groups were created for team interaction and collaboration. Case study assessment (CSA), which has been a successful and popular team activity in the face-to-face offering was chosen to be the final team project. Every week teams had dedicated time for internal and mentor meetings lasting an hour and 45 minutes, respectively. The student-mentor meetings were structured to introduce basic teamwork concepts and ran short online team building exercises (simulating a corporate meeting, involving weekly milestones) to supplement the discussions for the CSA project. Roles and Responsibilities for team members were rotated every week. Mentors had their collaborating meetings among themselves at the start and end of the week to discuss issues, maintain fidelity in advice given and track student progress. Mentors provided students personalized feedback, group feedback and individual marks per week based on the VALUE teamwork marking rubric.

Result

The result indicated improvement in student’s communication, teamwork, and leadership skills. Evaluations will be consolidated at the end of the term. Student feedback was positive in terms of course involvement, balanced workload, and staff support.

References

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- Al-Hammoud, R., Hurst, A., Prier, A., Mostafapour, M., Rennick, C., Hulls, C., Jobidon, E., Li, E., Grove, J., and Bedi, S.: 'Teamwork for engineering students: Improving skills through experiential teaching modules', Proceedings of the Canadian *Engineering Education Association (CEEA), 2017.*

Further Information

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Customising Moodle Forums for Individual Personal Communication with Students

Steven Davis, School of Civil & Environmental Engineering, Faculty of Engineering

Situation

Dealing with private student questions via email results in student correspondence being separated from the eLearning system where all other information is kept. Students often have questions and issues that they need to raise with their lecturer. Many of these may be personal to particular individuals, for example queries regarding feedback they received on their own assignment, and submission of late assignments. In large classes (300 – 500 students) queries can be numerous and can easily become lost amid other email communication.

Task

The aim is to organise and track personal student correspondence within Moodle.

Action

A grouping was created in Moodle where every student was placed into single person groups. Forums were set up that used this grouping so that whenever a student posted to one of these forums only the lecturer and the particular student could read the posting. The lecturer could then reply to the posting in the forum, which also kept the reply private. The lecturer can also initiate a posting to an individual student by finding out the group that the student belongs to and posting to that group via a dropdown list.

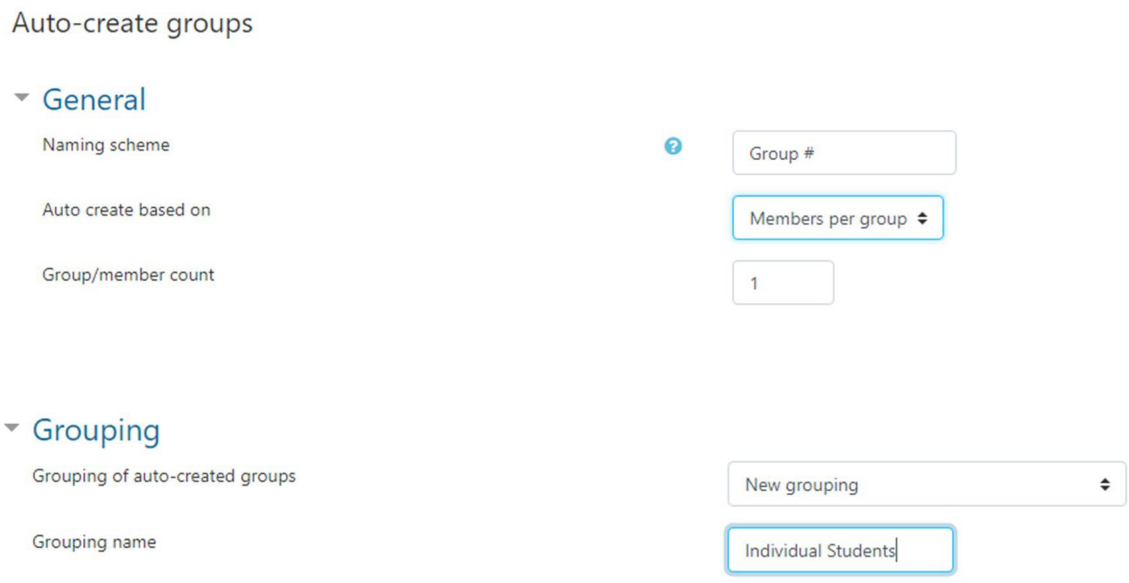

Figure 1. Creating groups with one member each

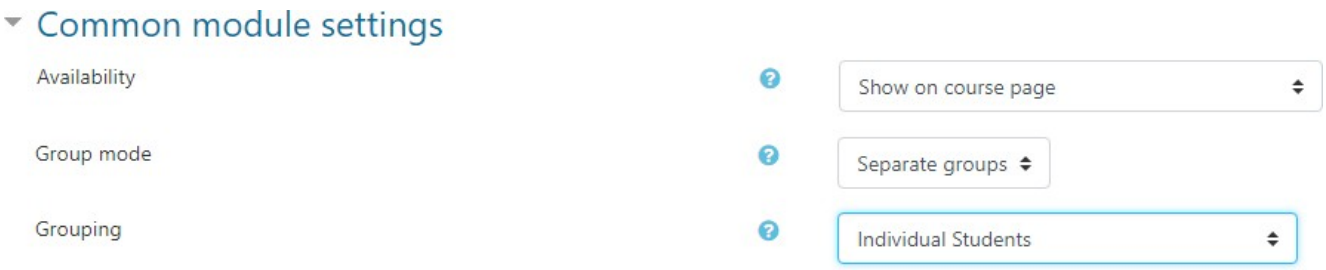

Figure 2. Applying the grouping to the forum

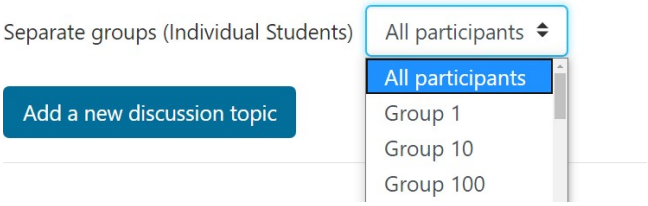

Figure 3. Selecting a group to initiate communication with an individual student

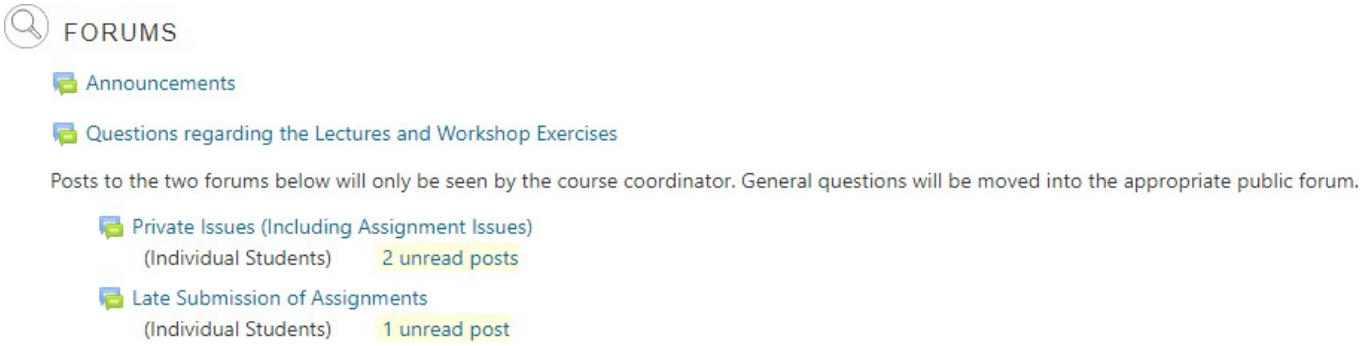

Figure 4. How the forums appear on the main Moodle page

Result

- Individual personal communication with students is collected into one place for a course.
- Posts can be left marked as “unread” until they have been answered, so that unanswered posts can be easily identified.
- Communication for a single course to be processed at one time, making it easier to apply consistent approaches to different students with similar issues.
- Efficiency is improved because many postings will require logging into the same web page and these can be left open between resolving issues for different students instead of needing to re-login for each student query.
- Responsiveness is improved

Presentation

See the seminar presented to the Scaling Education CoP and Discussion on 4 December 2020: https://thebox.unsw.edu.au/video/using-moodle-forum-for-managing-individual-student-communication-in-large-classes

Further Information

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For More Information

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