Using an online collaboration platform to facilitate group work

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CONTEXT

The onset of COVID-19 necessitated moving three large-enrolment introductory engineering and IT subjects online after just one week of face to face teaching. All three subjects focus on facilitating students' learning through group work to solve a self-identified problem. Considering a key Subject Learning Outcome is 'to collaborate effectively in team processes', group work is integral to the aims of these subjects. Studies for both online and face-to-face group work identify the influence educators play in achieving successful learning outcomes and group satisfaction; for example, the importance of group work management (Xu, Du & Fan, 2015). While many challenges faced in online group work in education are common to face-to-face teaching (Roberts & McInnerney, 2007), it has been shown that "distance does matter" (Olson & Olson, 2000). The challenge was to facilitate the same level of cooperation between students and enable them to build teamwork skills without face-to-face interaction with teammates or educators.

PURPOSE OR GOAL

Moving three early-year subjects of approximately 600 students each onto an online collaboration platform over a short period provided new challenges. This paper will discuss the aspects of our transition to online group work that worked well, and those that did not, from the perspective of students and tutors. These insights into best-practice online learning will inform how teaching can shift into blended learning in 2021.

METHODOLOGY

Focus groups were conducted with students from one second-year and two first-year subjects. In these focus groups, students discussed their experiences of working in a group environment and how this experience can be improved. The comments from student feedback surveys and students' comments from the SPARKplus peer assessments were also used. In addition, feedback on classes and materials were taken from tutors and compared to the students' view of the online classes. Transcripts and comments were analysed to identify recurrent themes.

OUTCOMES

Students had mixed feelings about the transition to online classes. Despite the use of many different strategies, issues with engagement remain. However, some strategies have emerged that motivate the students, while successful ways for groups to work together were discovered. Our research also indicates that the use of a learning platform which facilitates instant student discussion is worth further investigation for online classes.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

Online classes make it more challenging to engage students in group work based learning. However, careful fostering of group team spirit helps to lessen individual isolation.

Some students thrive from the provision of instant feedback through an interactive learning platform.

In future work, focus groups need to be conducted with students who achieved lower marks or dropped out of the subject to understand the issues they faced. More attention needs to be paid to the tutor perspective and how activities can be better adapted to student needs.

KEYWORDS Transition online, group work, student engagement.

Introduction

At the University of Technology Sydney (UTS), our teaching philosophy revolves around social learning whereby interaction between students is considered vital to learning. This philosophy, based on collaborative learning and social constructivism, has students work in groups throughout their studies on real-world or simulated projects and is embedded in three of our largest subjects in the engineering and IT faculty. Each of these subjects had enrolments of approximately 600 students in the first semester 2020. The subjects needed to be transitioned online after a single week of learning due to COVID-19 restrictions. The challenge was not only transitioning to online content delivery but also transitioning group work, collaborative learning, and interactive tutorials online, for large-cohort classes for early-year students.

While research in online learning shows many benefits such as flexibility, accessibility, scalability, and affordability (Arkorful & Abaidoo, 2014; Li & Irby, 2008), many of these benefits are based on low student numbers or low teacher-student or student-student interaction models. Similarly, much of the literature available on changes necessitated by the COVID-19 disruption describes small classes and acknowledges that class size is significant (for example Baker, 2020; Zewail-Foote 2020). That is, much of the research into online learning focuses on either smaller cohort sizes or on Massive Open Online Courses (MOOCs), which usually do not contain the levels of student interaction, group work, nor teacher-student interaction typical in face-to-face teaching. Our approach sought to bring student interaction and group work as well as tutorials to the online space, marrying the benefits seen from in-person interactive and collaborative learning with online learning.

This paper reports on the experience of transitioning three large, project-based engineering and IT subjects to an online learning model, including the iterations made during the teaching session actioning student feedback. Student and tutor feedback in surveys, focus groups and feedback sessions are used to evaluate the initial experiences of this transition to online learning. This paper summarises learnings from our teaching practice across first and second-year classes, and contributes to the body of knowledge on online engineering education practice research.

Concerns About Transfer to Online Learning

We expected online learning to be quite a different experience from face-to-face. In making the quick change to online teaching, it was important to decide on what we considered critical to be learned. Before the pandemic, a key subject goal was to "Collaborate effectively in team processes, including self and peer evaluation." As two of the subjects were for first-year first-semester students, the majority of whom had not worked in groups before, we anticipated that successful groups would need significant nurturing. The primary concern was engaging students under these circumstances. It was decided that the tutor would act as a facilitator, and that as much work as possible would be carried out in interactive teams. The traditional model of ‘tutor speaking, students listening’ would not work when students could literally switch off. An immediate challenge was to give students clear and precise instructions with as little tutor talking time as possible. It was decided that individual study would be better conducted in pre-class work to enable in-class team interaction. A new tool would need to be found to allow students to work together without meeting. In addition, it was essential to develop an environment where students felt comfortable expressing their views and sharing their work.

Another issue was to encourage groups to work together when not meeting face-to-face. It was assumed that students would become more isolated and would be more likely to disengage without face-to-face contact. Moreover, some students may feel more isolated in an environment where students often preferred to conduct conversations by text message. A further consideration was possible group conflict due to mismatched expectations and perceptions of individual contribution. Group conflict has previously been an issue when groups work face-to-face, so being online may aggravate the situation. It was too easy for students to 'ghost' online, e.g., stop returning messages, not attend classes, or not contribute

in class. Under these circumstances, the tutor has to locate the absent student and help the rest of the group navigate the increased workload.

Evaluation Approach

In order to assess the effectiveness of the strategies used to teach group work online, an evaluation was conducted through multiple mechanisms:

- **Student focus groups:** Two focus groups were run with a mix of first and second-year students from the three subjects. All students who completed the subjects were invited to participate in the focus groups. However, those who volunteered were those who achieved high grades. Twelve students attended the focus groups, the majority of whom achieved a distinction grade (75%) or above. The focus groups discussed students' experiences of online group work through the lens of inclusivity. The results were recorded and analysed for emerging themes relating to the transition and interventions identified.
- **Student feedback surveys:** Run at the end of the semester, all students had the opportunity to complete these surveys with students able to comment on any aspect they chose. As group work was a significant focus of these subjects, many comments were directly relevant to the discussion in this paper.
- **Student self and peer-assessment:** As part of their group project, students completed self and peer-assessment ratings for group work using the SPARKplus platform (Willey & Gardner, 2009). This platform allowed students to express an opinion on how groups functioned, and provide their peers with numerical ratings and written feedback.
- **Informal tutor feedback:** Through discussion and weekly tutor meetings, the tutor experience of classroom activities was gathered. This tutor feedback was used to better understand classroom practice from a different perspective.

Teaching Strategies Adopted

The reported subjects were initially designed to use large collaborative classrooms, where up to 350 students could interact and share knowledge supported by a team of tutors in the room. Each subject had a cohort of over 600 students. The COVID-19 disruption necessitated a rapid transition to online learning with tutorial groups of 30 to 40 students and a redesign of class activities and assessment.

The subject coordinators collaborated as a teaching team, with tutors and colleagues facing similar challenges to identify the major concerns in this transition. Strategies were developed to address these concerns, and activities were adapted throughout the semester based on the success and usefulness (or not) of various interventions. The following strategies were adopted to facilitate the transfer of subjects to an online environment:

Pre-class work:

- **Individual work was moved to pre-class work**: The subjects adopted a flipped classroom approach in which students engage with key content before coming to class. This allowed class time to be used to clarify and apply the pre-work content in group work. This technique has been used successfully with engineering students in the past, albeit with face-to-face classes (Simco et al. 2019; Gardner, Willey, Velassas & Li, 2014). In order to engage students, there needs to be a direct link between the pre-work and the in-class tutorial content. Initially, pre-work was moved from the Learning Management System (LMS, e.g. Blackboard, Canvas) to Microsoft Powerpoint files to enable interaction. Following in-semester student feedback, this was shifted to PDF files to enable students to enter their pre-work responses into Google or Microsoft

Forms. The advantage of online forms is that it allows tutors to tell at a glance whether a student has completed the pre-work. More recently, a lack of pre-work completion has triggered a pilot of sending automatic reminders to students by email. The efficacy of this intervention will be evaluated at the end of the current semester.

In-class work:

- **Activities were developed to foster team spirit.** Building trust between group members and their tutors was even more important online than face-to-face. One of the major issues was the difficulty in helping students to become confident in speaking out. Usual cues such as body language were not available or were more difficult to interpret online. It was therefore necessary to give more time to forming groups and building rapport. Tutorials included extended ice-breaking activities to develop better group understanding. The better group members got to know each other, the more they felt comfortable playing an active role in discussions. Ideally, students would feel they could fail or make mistakes without negative criticism. Zewail-Foote (2020), in describing moving project-based laboratory classes online, includes the building of a sense of community as a suggestion for successful transitions to online.
- **Activity length:** Students and tutors find it more tiring, difficult to concentrate and engage online. Therefore, activities were shortened, group interactivity increased, and expectations on the volume of material covered per lesson were reduced. This is in line with other findings that students perceived the same amount of hours worked online as more onerous than in person activities (Zewail-Foote, 2020)
- **Building cohesion in the teaching team:** It was important to develop trust among the tutors and between tutors and subject coordinators. To do this, it was necessary to acknowledge that we were working in a new environment, where we would make mistakes. Each subject had weekly meetings, where tutors would check-in, discuss their classes, look at the following week's materials and make suggestions. Teaching online was not easy, so people needed an opportunity to discuss challenges. At the same time, a positive attitude needed to be maintained. The regular meetings and ongoing team chats over Microsoft Teams and WhatsApp were vital in maintaining rapport and access to instant help and support.
- **The introduction of technology tools:** The introduction of technology was a significant feature of the move to online learning. It was expected that using the same tools every tutorial would soon become boring for students. This was particularly true as students spent most of the time working with the same group. One example of an introduced tool was Mural, which allowed variation of the group size, including whole-class activities, as well as a larger collaborative space for student work. Microsoft Powerpoint was also useful as it allowed for communal in-class interaction. Students could work on an issue as a team, as well as seeing and evaluating ideas produced by other teams. Mentimeter and Kahoot were also useful as they allowed tutors to present surveys and collect opinions in a non-threatening manner. The introduction of technology was not always easy, tutor conversations often centred on technology failures and troubleshooting.
- **Microsoft Teams** was chosen as the online learning platform, as unlike Zoom, it was available for group interaction after class. Given the group work focus, 'stickiness' of in-class group chats and activities was required. Student groups could also create their own Teams sites to host their work, interact with team members, and include the tutor in the project as needed. The Microsoft Teams platform allowed students to interact in different ways - through voice, video, live chat, and interactive activities through plug-ins. This diversity of interaction is not readily available in face-to-face classes where speaking is the primary form of interaction, favouring students who are confident in speaking, sharing their ideas, and their communication capabilities.

Outside class:

- **Asynchronous/synchronous interaction:** Typically, our subjects have been taught synchronously in face-to-face classes and asynchronously with student interaction via email and LMS announcements. Similar to social media interfaces, students are familiar with live chat, and this was identified early as a major success of Microsoft Teams. Students posting questions onto Teams 'channels' enabled organisation of common threads of discussion. Initially, the teaching team answered students' queries, but over time, the students felt comfortable enough in their learning environment and with their peers to answer questions amongst each other. That is, the Microsoft Teams platform has enabled Q&A interaction where LMS platform discussion boards have generally failed in student take-up in the past. However, timeliness of responses matters to students, who are used to fast responses in typical online interactions. Thus, setting up expectations early between students, tutors, and coordinators was critical. Each tutor communicated to students their maximum response time at the beginning of the semester, and most queries were answered within half a day.

Feedback:

- **The importance of regular feedback:** Transitioning to teaching online was new for both the students and the teaching team. Setting up a safe learning environment for all was critical, where vulnerability and acceptance of learning through mistakes was the norm. Typically, students are surveyed by the university in Weeks 4 and 12. However, the type of feedback in these surveys is not as specific or timely as may be necessary in an online context for in-semester adaptation. For this reason, each student project team was canvassed regularly on progress and issues arising. All subjects had student 'drop-in' sessions, which were not greatly utilised, but seemed to be appreciated by those who did. Feedback was important in updating content to meet student needs, but the open availability helped to establish trust between tutor, subject coordinator and student.
- **Design Guides:** Relatable role models (higher year level students) and industry professionals, bringing the real-world into the classroom, were included in the subjects at regular points throughout the semester. Students could approach these guides for assistance with subject work or other questions, adding another angle of feedback to students on their progress. An advantage of being online is that Design Guides did not need to be located in the same city as the university (as would be required for face-to-face classes), and this broadened the diversity of guides available.

Findings

Having analysed the focus group discussions for student perceptions of the online transition intervention (pre-class activities, in-class activities, out-of-class activities, and feedback), we found three emergent themes:

- Motivation
- Group working styles
- Online interaction platform

Note that while student feedback was anonymous, we could distinguish first-year and second-year students. Pseudonyms have been used for focus group responses.

Motivation

Motivation was influenced by the group the student found themselves in. When a group 'gels' and students work together on a common cause, motivation is high and students enjoy the group interactivity, as a first-year student said:

> *The connection to a team of people and working together, especially during these COVID-19 times, it felt refreshing to bond with others and strive for a similar goal.*

However, the online environment makes it harder for students to self-motivate. Students and tutors reported inefficient meetings, constrained communication due to technical issues, the lack of non-verbal cues, and a reduced sense of personal accountability. Jenny described meetings as:

> *lasted hours while because I'm pretty sure we were distracted. I was distracted with your phone and other things and your camera is off. And in front of a computer. Yeah, we definitely work was very slower [sic].*

If a student disengages when online, there is no body language or face-to-face meetings to bring them back. This personal accountability was a common theme with a second-year student stating in the subject survey:

> *80% group work? I get that you are trying to make sure we are ready for the working environment but there is one slight difference: my group members could not care less.*

A related factor was psychological safety. If a student did not feel supported by the team, participation would be reduced. Ankit stated that when group discussions got heated, he:

> *used to make stories of no internet, no camera and use to mute the conversations and that is how I used to escape the situations.*

Students are unlikely to contribute, when voicing their opinions may provoke hostility or ridicule from their peers.

Two factors seem to influence the success of online group work. The first is the use of icebreakers to help group members become comfortable in each other's company. As Bhavna, a second-year student stated:

> *there was always an activity breaking down into smaller groups and you all have to work individually and having fun activities to do actually helped us connect.*

The second factor was tutor support. Focus groups suggested tutor enthusiasm and willingness to engage with groups was a significant factor in maintaining cohesiveness and building a psychologically safe learning environment. One student survey response stated:

> *[The tutor] was always very respectably, approachable and professional. [They] also created welcoming environmental that was free from judgment.*

Thus, the tutor showing that the welfare of students is important to them keeps students involved who otherwise might disengage:

> *Our tutor would constantly check on our progress and ensure that we were comfortable.*

Group working styles

Groups worked in two main ways: they divided the tasks based on equality of workload, or they looked at member's strengths and weaknesses and divided the work accordingly. Groups divided by quantity of work tend to be less cooperative and suffer from disengagement. As this way of working requires students to work more independently, students feel less supported and more isolated. As a first-year student said:

> *For us, we delegate tasks and there were people who did not do their part but we just took up the slack and did the work for the rest of the team.*

Groups who took into account members' capabilities tended to be more cohesive. As Bhavna, a second-year student said in the focus group:

I think strength based allocation helped a lot with the quality of the task.

Dewi, another second-year student, agreed, saying:

we ended breaking down tasks based on strengths… There was no definite line but more of a collaboration going on.

This suggests activities such as a group contract and a Trello board (or similar) are useful in inclusivity as well as time, team and project management.

Online interaction

Surprisingly, there are mixed feelings whether online or face-to-face classes work better. Several students in the focus groups preferred online learning because of the speed of response from tutors and team members. In addition, some students felt it was easier to arrange spontaneous meetings and have questions answered online. As Dewi said:

I feel like the online semester better than physical one because I thought people were willing to attend the meetings rather than coming to physical locations.

In contrast, some students missed the face-to-face classes. In particular, they contrasted the first week, which was face-to-face, with subsequent online classes. As commented in the subject survey:

I enjoy the online classes and collaboration via online media, but it really is not the same as it would have been when I would have met my teammates.

This may suggest that group dynamics determine a successful online transition or that the strong students from the focus groups are better able to transfer to online learning.

As stated in the strategies, a variety of activities is important. One student commented:

The variety of videos, Powerpoint slides and pdfs we are given as learning materials are very effective at keeping us engaged, as PowerPoints alone are difficult to learn from.

Perhaps the most significant advantage of the Microsoft Teams platform was the opportunity it afforded students to hold conversations and share information. This facilitated student-to-student learning as well as tutor-led learning, with a second-year student saying in the student survey:

Using MS Teams as the platform is really helpful too, as files can be shared among tutors, lecturers and students to maintain contact as well as the tutorials and interactive sessions.

With a view to blended learning in future, in addition to using other technology teaching tools, the Microsoft Teams sites (or similar platforms) with Q&A channels and live chat interactions may be useful to facilitate student communication within groups when subjects return to face-to-face delivery.

Conclusions

The transition to online learning was difficult for both tutors and students. However, student feedback from surveys and focus groups suggests that certain factors help keep students engaged and allow them to negotiate online learning successfully. It is clear that motivation is a major issue when there is no face-to-face connection. Students easily become isolated when it is easy to hide from face-to-face communication. This is particularly true for students with no previous experience of university or group work. Icebreakers and a rapport with the tutor helps to foster group cohesiveness and keep students involved. A further indicator of successful online group learning is how tasks are assigned. Groups that look at students' skills and collaborate on tasks to include all members have better retention rates than ones who divide work by equality of effort. Finally, online interaction platforms provide some advantages in that students keep in constant contact with their group and the tutor. They are also easily able to share files and work collaboratively. In the best cases, this leads to constant contact

and lasting relationships developing. This aspect of online teaching may be adapted to face-to-face learning in blended delivery.

Further research is needed to interview a more representative body of students with students who received a more diverse range of grades. Unfortunately, these students tend not to volunteer for focus groups, as we observed a strong self-selection effect in our participants. In addition, more formal focus groups with tutors would help to get a different perspective on the transition.

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