Getting the Most from Google Classroom: A Pedagogical Framework for Tertiary Educators

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Abstract: Many tertiary institutions have embraced digital learning through the use of online learning platforms and social networks. However, the research about the efficacy of such platforms is confused, as is the field itself, in part because of the rapidly evolving technology, and also because of a lack of clarity about what constitutes a learning platform. In this study, two early career academics and instructors examined the effectiveness of using Google Classroom for final year primary teacher education students to encourage student voice and agency, and to consider how the platform might influence future pedagogies at the tertiary level. The data showed that Google Classroom increased student participation and learning and improved classroom dynamics. It also revealed concerns around pace and user experience. This data was used to construct a framework to evaluate of the use of online platforms; it identifies four concepts (pace, ease of access, collaboration and student voice/agency) that explore the usefulness of other online learning platforms, as well as pedagogical practice.

Introduction

The role of blended and online learning, including 'flipped learning' (Hughes, 2012) as well as the use of various learning management systems or 'platforms' in tertiary education is the subject of much examination amongst scholars. There is growing interest in the way that online or cloud-based tools, and pedagogy implemented to support such tools, might generate greater participation and interaction between students, and between students and their teachers in tertiary education. While some scholars are avowedly 'techno-optimists' in that they believe that the use of such tools will revolutionise higher education by increasing student engagement, democratising access and enhancing learning (for examples, see Galway et al., 2014; Hilton, 2009, Siemens & Tittenberger, 2009) other scholars are more hesitant, recommending only limited or even no use of social media tools in the classroom because of limited impact upon student learning, the potential for distraction (Selwyn, 2007) and concerns about high drop-out rates (Freitas, Morgan & Gibson, 2015). Varying opinions about the effectiveness of online learning have led to greater confusion on how higher education institutions should deploy these tools (or even if they should deploy them at all) and how educators might use students' appetite for social media to enhance learning.

This discussion connects to the changing pedagogies in higher education and across all education sectors. As mobile devices become ubiquitous, educators need to consider the value of such devices, and how to best adapt their pedagogy to make use of 'anywhere/ anytime learning' (Rossing, Miller, Cecil & Stamper, 2012; Selwyn, 2007). However, there is relatively little research into what such pedagogy might look like, especially at a tertiary level, and this problem is compounded further by the rapid development of new technologies

and learning platforms. There is inadequate reflection and critical analysis of the learning tools as they are being implemented and the practitioners who embed mobile devices have little time to research its implementation (for more on this lack of research, see Abeysekera & Dawson, 2015). As a result, these technologies may be incorporated into classrooms with little understanding about their impact on actual teaching and learning practice. Such slipshod or ad-hoc implementation can often fail to improve learning outcomes or student engagement, not through the fault of the systems, but rather because of the lack of critical thought about how best to use these tools (Chen & Denoyelles, 2013)

As practicing educators and academics, we were interested in addressing these gaps by exploring our own use of technology. Working in a collaborative co-teaching context with a class group of 33 final year pre-service teaching students, we wanted to explore the efficacy of online and mobile technology to promote student voice and engagement, principally by allowing all students an opportunity to engage with the subject material and express their views about the weekly seminar topics. Our motivation was partly because of the large size of the class; 33 students meant that the wide-ranging and in-depth discussions which had been central to the subject in previous iterations (with smaller classes of 16 or 17) would no longer be feasible. Reflective thinking and critical discussions were a particularly vital component of this subject due to the philosophical nature of its content. We wanted to retain this teaching approach, as it had been valuable in terms of student learning, as indicated by student surveys from previous years, but we wanted all students to participate in these discussions, either during the class time or as part of their out-of-class preparation work, regardless of the large class size. We were curious to see if there was a way to utilise technology to cultivate a community of learners amongst pre-service teachers.

In particular, we were interested in whether the use of tools such as the Google Suite (including Classroom, Drive, Docs, Forms and Slides), would increase student agency and promote student voice by allowing all students opportunities to express their views. We were also looking to explore the utility of such tools: for example, did students use these during class time, outside of class time, or both? Which did they prefer? And, most importantly, in what ways did students use these tools – were they used in a social way, to share information and to discuss concepts raised in the class? Or were they used in a reflective way, as an aid to a student's developing learning?

Issues Surrounding Blended Learning and Online Learning Platforms

Social media, online learning and the use of technology in higher education is confused, especially in light of the interchangeability of terms. For example, Manca and Ranieri (2013) write about Social Networking Sites while Dabbagh and Kitsantas (2011) discuss Personal Learning Environments. There are slightly older terms, too, that are still in common usage – for example, Oliver (2001) writes about Learning Management Systems and Web 2.0. In addition, other scholars (Zainuddin & Hajar-Halili, 2016; Pienta, 2016) write about blended and flipped learning and Northey, Bucic, Chylinksi and Govind (2015) discuss asynchronous learning. From even the briefest assessment, there is a distinction between platforms and pedagogies: for example, Facebook, Twitter, Moodle and Blackboard can be classified as different kinds of learning platforms, while flipped learning, asynchronous learning and blended learning would be better described as pedagogical innovations. And other scholars have written about 'open' or distributed learning and Massive Open Online Courses (MOOCs; Norberg, Handel and Odling, 2015). This profusion of terminology means that it is difficult for educators to identify best practice, and hence, the use of technology has not proved to be unequivocally successful.

While it is true that there are significant differences between these terms, they do not exist in isolation. Instead, there is a level of mutual support between platforms and pedagogies. The success of a learning platform, for example, is at least partly dependent upon the pedagogy adopted by the instructor using it. One aspect of this study is to therefore explore effective ways of implementing the learning platforms. In addition, the terms are often used by academics, researchers and teachers interchangeably, and hence it is our intention to speak generally about the challenges and opportunities afforded by these approaches inclusively as we explore their practical uses in the higher education context. Suffice to say, when we write about online learning systems, we are discussing those online platforms (for want of a better word) that are in use in both formal and informal settings, and are devised both specifically for education (like Blackboard or Moodle) or for social use (like Facebook or Twitter) and those pedagogies which are often linked to the implementation of these platforms. This idea is discussed in more detail below.

There is little doubt that mobile and web-based technology is becoming increasingly ubiquitous in the lives of students of higher education. This has made students increasingly reliant on being connected to the internet at all times (Granitz & Koernig, 2011). In addition, students are increasingly time-poor (Stafford, 2011), and hence make decisions based on time constraints, rather than educational opportunities. In response to this, researchers have called for educators to creatively encourage student engagement in ways that promote learning while acknowledging these challenges (Taylor, Hunter, Melton and Goodwin, 2011). One popular approach is the idea of blended learning (discussed in detail by Halverson, Spring, Huyett, Henrie, & Graham, 2017), where face to face classroom instruction is supported by an online learning environment and activities. Northey, Bucci, Chylinski and Govind (2015, p. 172) explain the possible benefits of such an approach: 'To this end, advances in the blended learning space may enable the creation of a student-focused learning ecosystem that is supported by both in-class activities and outside-of-class, or asynchronous, learning opportunities.'

Benefits and Challenges of Blended and Online Learning Platforms

There has been some recent exploration of the benefits and challenges afforded by online learning platforms and supporting pedagogies as described above. In addition to the work of Hilton (2009) and Siemens and Tittenberger (2009) mentioned earlier, Greenhow (2011) has suggested that the use of social media might support learning outcomes by providing peer support, and stimulate social and civic benefits both online and offline. Siemens and Weller (2011) have suggested that such sites might promote peer to peer dialogues, promote sharing of resources and foster the development of communication skills. Writing specifically about Personal Learning Environments (PLEs), Dron (2007) suggests that the effective use of such tools allows students to engage in their own meaning making. Rubin (2010) argues that PLEs can be tools for educational self-empowerment because they encourage self-direction of learning. Bosch (2009) examined the use of learning platforms from the perspective of students. Students listed numerous benefits, including making it easier to find learning material, having their questions answered, and being able to more easily collaborate, while Fewkes and McCabe (2012) identified examples of learning platforms being used to support the educational experience of students.

Central to these optimistic views of the use of technology are the different kinds of pedagogies used in conjunction with the technology. Zainuddin and Hajar-Halili (2016, p. 173) argue that the 'flipped classroom has become one of the emerging technologies in

education and it can be a standard of teaching-learning practice to foster students' active learning in higher education.'

Everson, Gundlach and Miller (2013) support this idea, writing that the integration of digital materials in blended learning contexts can increase student engagement. The reason this happens, according to Brown and Adler (2008) is because 'knowledge becomes socially constructed through conversations and interactions between students and educators during cooperative learning opportunities.' Li, Greenberg and Nicholls (2007) are even more explicit about the benefits: 'this type of experiential learning leads to more effective learning' (p. 26).

Not all scholars and teachers are convinced about the advantages of blended learning and online learning platforms. Again, like the optimists above, these concerns can be linked to the platform, the pedagogy or some combination of both. Pienta (2016, p. 2) is sceptical about the benefits of flipped learning, citing time-poor students (and perhaps also time-poor educators): 'Flipping the classroom sounds easy. Making it work for all of our students is the bigger challenge.' He explains how busy students may have little opportunities to complete work outside of class time, and educators might have limited time or ability to prepare compelling materials for 'flipping'. Halverson (2011) identified three major challenges of online learning: privacy, conflict between the learning goals of the participants and the goals of the institution, and challenges related to a student's possible desire to construct a holistic identity versus an institution's desire to frame participants as students. The notion of conflict over identity is also raised by Manca and Ranieri (2013), and, to a lesser extent, by Dabbagh and Kitsantas (2011) who identified that there might be conflict over the level of personalisation available on the site.

Google Suite of Educational Tools (GAFE)

These introductory remarks are important as they identify some of the issues that are relevant to the use of the learning platform in this study: Google Classroom and the Google Suite. However, there is considerably less literature on the specific use of the Google Suite of educational tools (which is sometimes referred to as Google Apps for Education or GAFE). This is symptomatic of the challenges of studying online learning platforms: the nature of the learning platforms changes very rapidly, and research into the educational strengths and weaknesses of such tools is often well behind the deployment and uptake of these tools by educational institutions. There are, however, some scholars who have started to engage with the Google Suite – notably Crane (2016, p.56), who stated that 'using the flexibility and power of GAFE technology, academic institutions can create an accessible learning ecosystem to engage the global learning community'.

Crane goes on to list several benefits that are specific to GAFE, including the ease in setting up to share information, the simplicity of assignment management and enhanced communication. Crane also identifies that there is the potential to further increase the functionality of GAFE by the use of third party add-ons within the GAFE ecosystem.

Regarding the benefits of GAFE, Crane is quite clear: 'using the GAFE product in teaching methods increases both the educator's and student's competency in using twenty-first century technology' (p. 57). In addition, there is the opportunity for learners to engage anywhere and anytime. It is, Crane believes, a 'key engagement tool' (p. 57). However, Crane also offers a note of caution. Such engagement is not a function solely of GAFE, but rather requires significant changes to pedagogy: 'Finding the best opportunities to use the GAFE products will require experimenting with new teaching methods, as well as developing curriculums that offer students the opportunity to actively practice building twenty first century skills' (p. 53).

Part of our intention was to explore what these new teaching methods might look like, and how a platform like Google Classroom increase student participation, collaboration and agency and improve learning outcomes.

Teacher Educators as Researchers

Another key consideration was the effective implementation of these online platforms through practitioner reflexivity and inquiry. The authors were not only interested in embedding new technologies into their teaching, but they also aimed to maximise the effectiveness of these tools by taking on a critical reflexive and inquiry orientated approach. Redman and Rodrigues (2014) highlight that teacher educators need to proactively develop their own professional skills and knowledge and be able to demonstrate such capabilities for preservice teachers. They argue that teacher educators need to be 'skilled, knowledgeable, and insightful people, who are multifaceted, flexible and highly skilled communicators' (p. 5) in order to cultivate similar qualities in future teachers. As teacher educators 'teach' the art of teaching, Redman and Rodrigues (2014) propose that teacher educators need to be lifelong learners who are able to reflect and evaluate their practice to continue refining their teaching skills. These principles were demonstrated as the authors researched their use of online tools to model critical reflexivity to their teacher education students.

This paper is therefore positioned as a self-study (Ham and Kane, 2007) into the new technologies that were trialled to maximise student participation and engagement. In her early work, Adler (1993) has positioned teacher educators as researchers who integrate inquiry with their teaching (p. 160). She refers to Blumberg (1990)'s 'scholarship of practice' to affirm that the most effective teacher educators are in fact researchers as they systematically reflect on their practices. The co-teachers shared Adler's views of teachers as reflective practitioners who 'move[s] from being in the midst of experience to exploring that experience' (p. 160). The researchers aimed to demonstrate critical or phenomenological reflexivity by searching for patterns or core themes to focus their research (Van Manen, 1990). They critically reflected on their use of Google Classroom and the Google Suite to determine what impact it had on student learning. In particular, they explored how the online tools enhanced student agency and voice, as well as the utility of such tools and the ways students used the tools to learn.

Research Methodology

As stated above, this study took place during the teaching of a final year, pre-service teacher course. The course introduced students to the ideas of ethical practice as teachers, and some of the philosophies of education that the students would encounter throughout their career. The subject was taught in the second semester of 2016, to 33 students. This group was composed of mostly primary school pre-service teachers, although there were two students who were from other majors. The face to face teaching component was one three-hour seminar each week, and students were expected to engage with a variety of reading materials and to view specific videos between the seminars. The methods used to gather data about the students are described in more detail below, but included surveys, a focus group and participant observation.

The course had two instructors (the authors of this paper) who collaboratively co-taught the subject to the whole group. Both instructors were experienced educators, and had some experience using GAFE, but neither had used Google Classroom before. The institution

in question had its own learning platform: a customized version of Blackboard that all students and staff had been used in the past. However, students had complained about the platform, arguing that it was 'clunky' and difficult to navigate and use when interacting with each other. The institution had recently provided the Google Suite to all staff and students, and part of that was Google Classroom. Both instructors were eager to try a new system, and Google Classroom was appropriate as it was already linked to the university's systems. It also seemed to meet the students' requests for a simpler, easier interface that allowed more interaction.

Google Classroom (and several other apps that are part of the Google Suite) was used throughout the semester. The class was invited to the Google Classroom before the session began, and all students had signed up by the end of the first week. It was an expectation that all students would participate via Google Classroom, and we were very clear from the start of session that we would use the Classroom for distributing information and interaction; the material would not be available on other sources, like Blackboard. Originally, our use of Google Classroom was quite basic. For example, in the first week we asked students to indicate on a Google Document (that was shared via the Google Classroom) which week they would take the lead on the class discussion. In the past, we had discussed the previous week's readings in class and no students were required to lead the discussion. However, before the start of the semester, we had identified this as a possible way of encouraging students to complete readings and to contribute to discussions. It was our hope that the use of Google Classroom would engender discussion about the reading before students attended the class, and so better inform the activities that would take place during the seminars.

As the semester progressed, we gradually made use of more of Google Classroom's features and more broadly within GAFE. This was brought about by a burgeoning confidence with the tool, and the desire to increase student engagement. This meant that we began to use Google Classroom's questioning capabilities to require students to reflect upon their learning, and then share that learning via the online platform. One such example took place after students had examined the ethical issues that might arise from a teacher's interactions with parents. In previous years, this activity had stimulated a lively discussion about potential points of conflict between parents and teachers. However, this year, we were concerned that such a conversation might limit the opportunity for all students to contribute (as 33 students is significantly larger than the 19 or 20 students that was the normal number for a class) and so students were asked to contribute via Google Classroom.

In addition to the questioning tools available in Google Classroom, we also integrated a much wider range of GAFE tools. We used Google Forms to create surveys and questionnaires (including to evaluate student use of the platform), Google Slides to share materials and enable student to contribute to the teaching and learning resources in real time. We also used Google Drawing tools to create mind maps with students and to help them to engage in critical thinking about key philosophical and ethical issues.

To gather information about the efficacy of Google Classroom, we had narrowed the focus of our data gathering to a specific focus: that is, we wanted to know whether the use of Google Classroom could increase student engagement. In addition, we were curious about whether Google Classroom would encourage a wider range of students to participate, as opposed to learning discussions dominated by select students.

To this end, we devised the following research questions:

- In what ways did instructors and students use Google Classroom?
- How did this change as the course progressed and the practitioners developed new theories about the use of Google Classroom?
- What does this reveal about the level and type of student engagement in this class?
- What do these findings suggest about future changes to pedagogy at a tertiary level?

In order to answer these questions, we gathered data from a number of sources. Firstly, all students were asked to complete a brief survey in the final week of the course. This survey sought to identify broad themes about students' use and perception of Google Classroom. Students were asked:

1. Have you used Google Classroom in other subjects at university?
2. Have you used Google Classroom in your schools?
3. Overall what did you think of Google Classroom and the way it was used in the subject?
4. Do you think you will, if you have the opportunity, use Google Classroom in your teaching?
5. Did you use Google Classroom mostly in class, out of class, or both?
6. What did you think was good about Google Classroom and the way it was used?
7. What do you think was not so good about Google Classroom and the way it was used?

For question three, students were asked to indicate their feelings on a scale between one (not good at all) and five (very good). 24 students out of 33 completed the survey. Questions six and seven required a paragraph-length response, and the other questions were simple yes/no questions. The results of this survey were analysed once the course was completed. The findings are presented below.

In addition, both instructors aimed to research their practice by keeping detailed reflective journals about the classes. These reflective journals were completed after each session and were wide-ranging in scope, and reflected both on the session that had been completed, but also each instructor referred to and considered each other's thoughts. This meant that the teaching practice was being iteratively developed over the course of the subject. The teacher reflections on the use of Google Classroom were included as data in this paper.

Finally, the Google Classroom itself became a source of data. As described above, students were required to make regular contributions to the Google Classroom over the semester. These contributions were then analysed in terms of the frequency and the nature of the contributions. This was to determine how much students were using the platform, but also the ways in which they were interacting with other students and the platform itself. In particular, we sought to identify whether the contributions were related to students' thoughts regarding the articles or class discussions, or if they were of a more reflective nature.

The Benefits and Challenges of the Google Suite

The use of Google Classroom and the other tools from the Google Suite was generally very well received by the students. Most had used Google Classroom before in tertiary education, although, interestingly, not many (only 17%) had used it in their schools. 91.7% of the students rated the effectiveness of Google Classroom, as it was used in the course, as either good (4) or very good (5), and 87.5% indicated that they would use it in their classrooms in the future, if that should be possible. 75% of students used it both in the classroom during the seminars, and also outside of the classroom.

In the qualitative section of the survey, students identified several aspects that they felt were instrumental to the successful use of the platform. In particular, students valued how Google Classroom made it easy to access all the material that was required for the course:

> *All the information we needed was in one place and we were able to submit assignments as well as contribute to discussion through this medium. It was also*

accessible through various devices (laptop, phone, ipad/tablet) (Student submission).

Students also identified that the use of Google Classroom changed the nature of the classroom in a positive fashion. Students liked that it made the learning atmosphere more relaxed as it allowed them to interact dynamically with classroom content, but also more focused on the learning experiences. Students also valued the opportunity to use the learning tool at any time, not just in the classroom:

Google Classroom enabled to work on the materials anytime. So all the discussion which ended during class could be kept discussed in Google Classroom! (Student submission).

One of the student's responses is particularly pertinent to our own research interests, which was to use Google classroom to strengthen student voice and agency. In this response, the student in question identifies that they could have a voice in the classroom, which allowed them to contribute in a way that they felt comfortable with:

Being able to express ideas when unable to in class. I had the flexibility to get to task in my own time. I could take as much time as I need on the task. I could do the task in my own time (Student submission).

Accessibility Problems

Issues with accessibility also became apparent. Students identified that they had some concerns regarding the use of Google Classroom. One concern that was raised in four different responses was the 'stream' or 'feed' based' nature of Google Classroom. Messages, discussions and activities are posted in the Google Classroom stream, with the most recent messages appearing at the top, while older messages move further down the stream as new messages are added. This means that it can be harder to find older messages as more and more posts to the stream are made, which can necessitate a lot of scrolling for students and instructors. Some students were annoyed about this:

If you wanted to find an article from week 1 I found that it was difficult to find as you had to scroll down (Student submission).

In some way it is quite unorganised because if you look for materials from the weeks before you have to really search for them (Student submission).

The stream. Had to stroll down a bit sometimes to find information that had been posted the week before (Student submission).

The instructors' reflections identified similar themes as the students', although it should be noted that much of the reflection that pertained to the use of Google Classroom was focused on the pedagogical and technical aspects of the platform rather than how useful it was or how easy it was to use. For example, one of the instructors is quite clear about how he or she envisions the Google Classroom to be of use:

I am hoping that our use of Google Classroom might be a good way forward in addressing this; specifically, by sharing our resources, I am hoping that students will be able to find a way to communicate that they feel comfortable with, and allows them to have a meaningful discussion and learning experience (Instructor reflection).

The above reflection is from quite early in the semester. It is interesting to note that the other instructor mirrors the same theme:

I think to get a sense of how PST's conceptions change over time… we definitely maximised the google classroom… We need to post some good questions

regularly, where students write reflections that reveal what they are thinking (Instructor reflection).

Active Student Participation

Researchers observed two main differences in the level of student participation. The instructors noted when the use of the learning platform was successful and allowed students to engage with the material:

I liked the way that Keith was able to get students to record comments on the powerpoint he shared. It broke up the spaces where students traditionally just sit and don't make any input into the instructional tools or materials. Although not everyone participated it did not matter as at least the option was available (Instructor reflection).

The researchers were also reflective about the process of investigating student participation. Analysing the Google Classroom platform itself proved to be challenging. Google Classroom itself has no built-in analytics, so it proved to be quite difficult to track individual students' contributions, or even specific discussions around readings or activities. However, it was possible to identify the number of contributions made by students, as well as undertake a rudimentary analysis of the kinds of contributions made by students.

Frequency and Depth of Student Participation

The number of responses to the readings set for each week is valuable for this purpose. There were more than 243 individual contributions made by students over the course of the semester, which averages to slightly over 30 comments made per week. The highest weeks were Week Two (49 comments) and Week Four (47 comments) while the lowest was Week Seven (15 comments).

In total (including the discussions and all the other interactions on the platform), more than 30 students made 11 or more contributions to the Google Classroom. One student did not make any contributions at all, which was disappointing. The contributions were linked to one of the assessment tasks for this subject – students would receive a grade based on the quality and regularity of their contributions up to a total of 10% of the final grade. These contributions varied greatly in their nature. Some were quite straightforward commentaries about the articles set for readings:

The article provides an informed, structured analysis of the motivations for actions and the choices that people make (Student comment).

But others were more nuanced reflections about their own thoughts on particular issues:

This article also spurred me to reflect upon my own motivations and choices for the actions I make. For me, I find the root of my actions throughout day to day life align with an intrinsic motivation to do good - for myself and others (Student comment).

Authentic Student Participation

Students also spontaneously discussed topics that were beyond the scope of the readings presented, as they attempted to link their own experiences to the ethical framework of the course:

> *I can't recall many ethical dilemmas in my schooling life. However a dilemma I have sometimes found at uni is with group assignments and being one of the members who does most, if not all of the work. It is hard to approach the fellow student/s in your group and tell them to pull their weight. Going to higher authorities in the uni to deal with this dilemma is also complicated as the students will know you have said something about their work ethic or contribution, which then paints me in a bad light. This is sometimes an ethical dilemma for me (Student comment).*

It is also worth noting that teacher contributions to the discussions didn't seem to influence the discussions in any meaningful way. Originally, both instructors felt there might be a need to lead the discussion, but the number of contributions made to the discussions decreased over the course of the semester as students took more ownership of the Google Classroom.

Discussion

As described above, both the instructors and the students were broadly pleased with Google Classroom as a supplementary tool for classroom learning. Students used it both in class (when directed by the teachers and also to communicate and ask questions of each other) and outside of class to discuss readings and share resources. Based on the student feedback and our own reflections, we have identified a number of concepts to consider when deploying GAFE in a tertiary classroom setting. These concepts provide a framework that will be useful to educators in tertiary institutions on pedagogical practices that make best use of the available technologies. The concepts may be particularly useful in classes with high numbers of students or for subjects that require deeper levels of critical thinking and reflection. Although our analysis and reflection was based on the use of GAFE, we believe that the components of the framework outlined below could apply to other learning platforms. We have also developed this framework into a continuum of online learning practice (figure 1), where we describe our understanding of the relationships between the concepts and how they contribute to the improvements in student learning that were identified by both students and instructors.

The first concept that educators need to consider is *accessibility.* Students will not willingly use a learning platform that is perceived to be 'clunky' or difficult to use. Such platforms also need to be both device and browser agnostic, so that students can access them from laptops, desktops, tablets or even mobile phones. In this respect, Google Classroom was most satisfactory: both the students and the instructors found Google Classroom quick to learn and easy to use:

> *Its relevant and so easy to use. Its relaxed the learning atmosphere but enhanced the learning experiences. Majority have a device to access it and most would much prefer to type than write (Student survey submission).*

The second concept that should be considered is how effectively the platform encourages *collaboration*, especially between students. In our subject, collaboration was essential as students needed to discuss topics and complete assignments by working together. Every seminar had some aspect of collaborative work, and we hoped that Google Classroom would further develop this, even with the large class size. Fortunately, this was the case, as students found the ability to co-construct texts in real time, and to leave comments on different materials that were accessible to all participants in the class to be invaluable:

> *Think, pair share was a great way to compare results and encourages discussion (Student survey submission).*

And:

> *I liked)… that we could work on a document as a class, the discussions about the different texts (Student survey submission).*

The third significant concept is *student voice/agency.* This was central to our planning for this subject, and it was our intention that Google Classroom was to be used to encourage student voice for all students, and not just the most vocal, who might otherwise dominate physical classroom discussion. Again, Google Classroom proved to be an adept tool for allowing all students to contribute in this respect. Several students enjoyed the fact that they could contribute electronically, rather than verbally, and that they could do so at a time that suited them:

> *Being able to express ideas when unable to in class (Student survey submission).*

And:

> *I had the flexibility to get to task in my own time (Student survey submission).*

And:

> *I could take as much time as I need on the task (Student survey submission).*

While this is a worthy idea in its own right, we were pleased to see some students recognize that Google Classroom allowed them greater autonomy over their own learning, too:

> *People being able to post any relevant information or articles they find that they found interesting and engaging, and want to share with others. It was a great platform to engage in conversation and share any relevant information (Student survey submission).*

The final concept to consider is the *pace* at which the materials and learning experiences are deployed. This aspect caused some concern for students, as they felt that, because of our use of the learning platform, we moved too rapidly through some of the material, and this meant some students felt that they were being left behind:

> *We went through some task(s) too quickly in class. At times I felt left behind... Something to think of... additional students in the class who do not work at the same pace as everyone else (Student survey submission).*

Upon reflection, this is one aspect that we did not consider, and it was not raised during the semester. We can see how the use of Google Classroom might indeed feel rushed to some students; as people contribute to the conversation or post resources, it would be easy to feel overwhelmed by the amount of material. It is certainly something that will need to be remedied for the next semester of this course. One possible way of doing this is to make better use of the tagging system that exists within Google Classroom. If done correctly, this might allow students to filter the amount of information they receive, and thus feel less overwhelmed.

It is also worthwhile to note that although less than a fifth of all students had used Google Classroom in their own teaching, over 85% of students planned to adopt this platform in their future practice. This indicated that students saw the clear value of these technologies to promote collaborative and quality learning experiences.

Another aspect worth considering is how the students' experiences using Google Classroom compared to their previous experience with Blackboard. We were conscious that students felt Blackboard was too clunky, but it would have been interesting to see how students responded when asked to compare the two different platforms and determine which aspects they preferred from the different systems. Our preferences were clear. As a simple, easy to use and all-in-one solution, as teachers, we much preferred Google Classroom.

We have formulated our ideas into a continuum (Fig. 1) to explain how the thoughtful use of Google Classroom might lead to improved teaching and learning outcomes. This continuum seeks to explain the 'how' of using online learning tools. While it is specifically focused on Google Classroom and the associated applications, it has the potential to be applied to other learning platforms as the structure it uses is generic. We have begun with the principle that quality learning at the tertiary level, in a pre-service teaching classroom, includes collaboration and student agency and voice. While these are not the sole requirements for quality learning (and this definition of quality learning is based on our own assumptions about knowledge and pedagogy that are beyond the scope of this paper) we feel that they are necessary for learning in the classroom. The question, then, becomes how can educators use online tools in order to develop collaboration and agency. Based on our experiences, Google Classroom made this possible by enabling increased pace of content delivery and improved accessibility for all students in the class. As discussed above, the use of the learning platform was generally perceived to be a positive experience, although some students did identify some concerns regarding the rapid delivery of the content, and the danger of overwhelming students through pace needs to be carefully managed.

It is important to recognise that the tools are not an end in themselves; rather, their use fostered collaboration and increased agency and voice amongst students, attributes which were seen as desirable in this subject and which would, we imagine, be equally desirable in other subjects. This agency and collaboration, in turn, led to quality learning, as evidenced by both the students' own experiences and the reflections of the teachers.

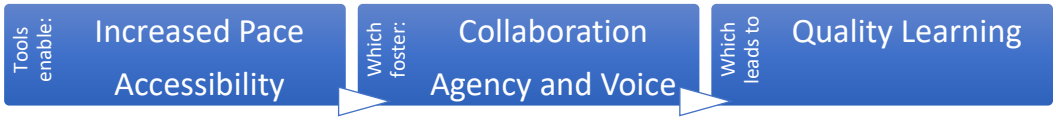

Figure 1: Continuum of online learning

Conclusion

As tertiary institutions come to rely more heavily on digital platforms to structure the learning experiences of students, it is important to carefully consider how pedagogical practices need to change in order to capitalise upon these changes. While studies of such pedagogies are still in their infancy, we believe that the framework outlined above, can provide a guide on making judgements about the efficacy of a learning platform and how best to use it in a tertiary setting. It can also encourage teacher educators to be self-reflexive and inquiry orientated about their use of technology and its impact on students. Our framework identifies four key concepts that will influence the likelihood of success of a learning platform. These concepts are ease of access, collaboration, student voice/ agency and pace. It is our hope that instructors considering learning platforms will find these concepts useful in both conceiving how they wish to utilise the platform, but also in constructing meaningful learning experiences for students.

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