Fostering purposeful engagement by building staff-student communities

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Summary

This case study discusses one department's response to the Covid-19 pandemic which, like many other institutions, rapidly moved to online delivery of teaching. The School of Mathematical Sciences at the University of Nottingham took several approaches to adapt student engagement to the online environment in the hope of minimising any negative impact on student attainment and retention. These approaches included induction processes to foster new online communities, initiatives to boost academic and social interaction, development of close partnerships between staff and students in shaping the pandemic response, and the creation of an online staff community to discuss pedagogic practice and share training resources. The effectiveness of these approaches has been evaluated throughout the pandemic via staff-student meetings and surveys of staff and students.

More than half the cohort joined an online student forum showing students appreciated online social interaction. However, for studying, students engaged in new one-to-one study-buddy and peer-mentoring schemes which students reported reduced their isolation and anxiety associated with online learning. Students reported online discussion forums to be one of the most useful tools for online learning. Students tend to favour learning platforms where their anonymity is preserved (Jong et al., 2013), particularly in the case of international (Ghannamn et al., 2020) and female students (Sankar et al., 2015). The feedback from students was that the initiatives were beneficial for those who engaged. Most staff adopted elements of flipped learning, setting asynchronous tasks such as directed reading and online quizzes to be completed outside of contact hours between the synchronous online teaching sessions, to maximise student-student and student-staff interaction in the limited contact time.

Description of project

The School of Mathematical Sciences at the University of Nottingham has around 900 undergraduate students studying 3-year BSc or 4-year MMath single honours or joint honours programmes in mathematics. There are approximately 70 academic staff involved in the delivery of these programmes alongside their mathematical research. These programmes had always been delivered in-person until the overnight move to online learning in March 2020 prompted a rapid re-evaluation of how the School was going to maintain student engagement and belonging. In this context we follow Koh (2009) in defining student engagement to encompass both their direct participation in activities linked directly to positive educational outcomes but also the interactions with staff that foster that participation, perhaps through empowering students to shape their educational experience (Trowler, 2010). We see academic engagement as one

dimension of belonging to a student's university community, along with other dimensions such as social engagement and the physical surroundings (Ahn & Davis 2020). At the time of the pandemic there was a fear that a move to online learning and physical isolation from the school community would discourage students from engaging with their work, teachers, friends and other support structures which would negatively impact student progression and success (Crawford et al., 2020). Our aim was to mitigate this by actively devising mechanisms to keep students connected to the school community whilst enhancing their learning experience and supporting retention (Tinto, 2006).

In response, the School created a number of initiatives to foster online community and interaction, both synchronously and asynchronously, in order to combat any reduced sense of belonging created by physical absence from campus (Mulrooney & Kelly, 2020). In particular, the asynchronous activities provided topics for students to discuss in online forums between synchronous classes. The initiatives were instigated by the Student Experience Officer and Digital Learning Lead but were rapidly taken up by all staff in the school. The initiatives aligned themselves, see table below, to Thomas' (2012, p16-17) model of early engagement, academic and social spheres (see also Ahn & Davis 2020), partnership between staff and students, and staff co-ordination, as important influences on student engagement. Many of the initiatives were new, whereas others were adapted from the previous face-to-face context.

	Synchronous	Asynchronous
Early engagement	Welcome activities (adapted)	Discord (new) Staff profiles (new) Welcome resources (adapted)
Academic sphere	Study-buddy scheme (new) Peer-mentoring (new)	Discussion forums (adapted) Use of VLE (adapted)
Social sphere	Social events (new)	Discord (new)
Staff-student partnership	Staff-student forum (adapted) Virtual town hall meetings (new)	Student reps (adapted)
Staff co-ordination	Digital workshops (new) Reflective seminars (adapted)	Discussion forums (new) Digital tool user guides (new)

Early engagement

We were concerned that students, particularly new students, would find it difficult to interact with their peers online (Lishchynska & Palmer, 2021). The Digital Learning Lead set up a Discord server, a community-building application originally designed for the online gaming community, to facilitate video calls, text messaging, file sharing and chat rooms and all students were invited to join. Although the server was initially set up by staff (for security reasons), the channels were moderated by students so they could feel comfortable interacting with each other. These channels were opened for new students before the start of the academic year to encourage early engagement and remained open to foster ongoing social interactions. This approach was based

on prior successful implementation on the university's Computer Science courses due to Discord's popularity in the gaming community.

A dedicated page was created on Moodle (our virtual learning environment) containing all the induction information that students needed for the first week. Through a series of tasks, students were introduced to the online learning and assessment tools they would use throughout their course. Tasks included a quiz containing questions about Nottingham itself, and where to find a variety of university services and resources; a series of videos to simulate how they will access much of their course content; and an opportunity to upload and submit a document about their interests. For these tasks, a newly created video that showcased the School was deliberately chosen to build a sense of community and collective identity and the submission task not only enabled students to practice submitting their work, but their responses were shared with their personal tutors so they had a more rounded picture of their tutees. This helped to build community and relationships in the absence of usual induction, ice-breaking and social activities.

Asynchronous activities were complemented with online synchronous welcome week induction sessions that included additional student support to provide reassurance and revision material to boost confidence. The aim was to improve understanding and ease anxieties.

Academic sphere

To improve student engagement with learning resources a standard Moodle template was used for all modules so that students could navigate the page by week (see Figure 1). Each task included a check box for students and staff to track their progress. Many modules also used Piazza, an online discussion forum, for students to post questions anonymously and lecturers and peers would respond to strengthen understanding.

Students were invited to take part in a study-buddy scheme. Participants were paired according to characteristics (e.g. course, year, preferred time of day) and encouraged to study simultaneously while video calling each other. The aim was to foster solidarity and resilience whilst working in an environment not conducive to studying and, hence, combat student isolation in lockdown. A parallel student-mentoring scheme partnered new and experienced students in a similar way, with the School's Student Experience Officer coordinating and informally supporting the mentors.

Social sphere

Students identify the social sphere as important in creating a sense of belonging (Ahn & Davis, 2020). With physical separation, students found it hard to connect and the aim here was to supplement classroom interaction with social events to give further opportunities for engagement. Enthusiastic students were encouraged in creating new online activities such as pub quizzes, book clubs and an online baking competition. Staff supported the events by advertising them in a new weekly email newsletter which also contained informal profiles of staff members.

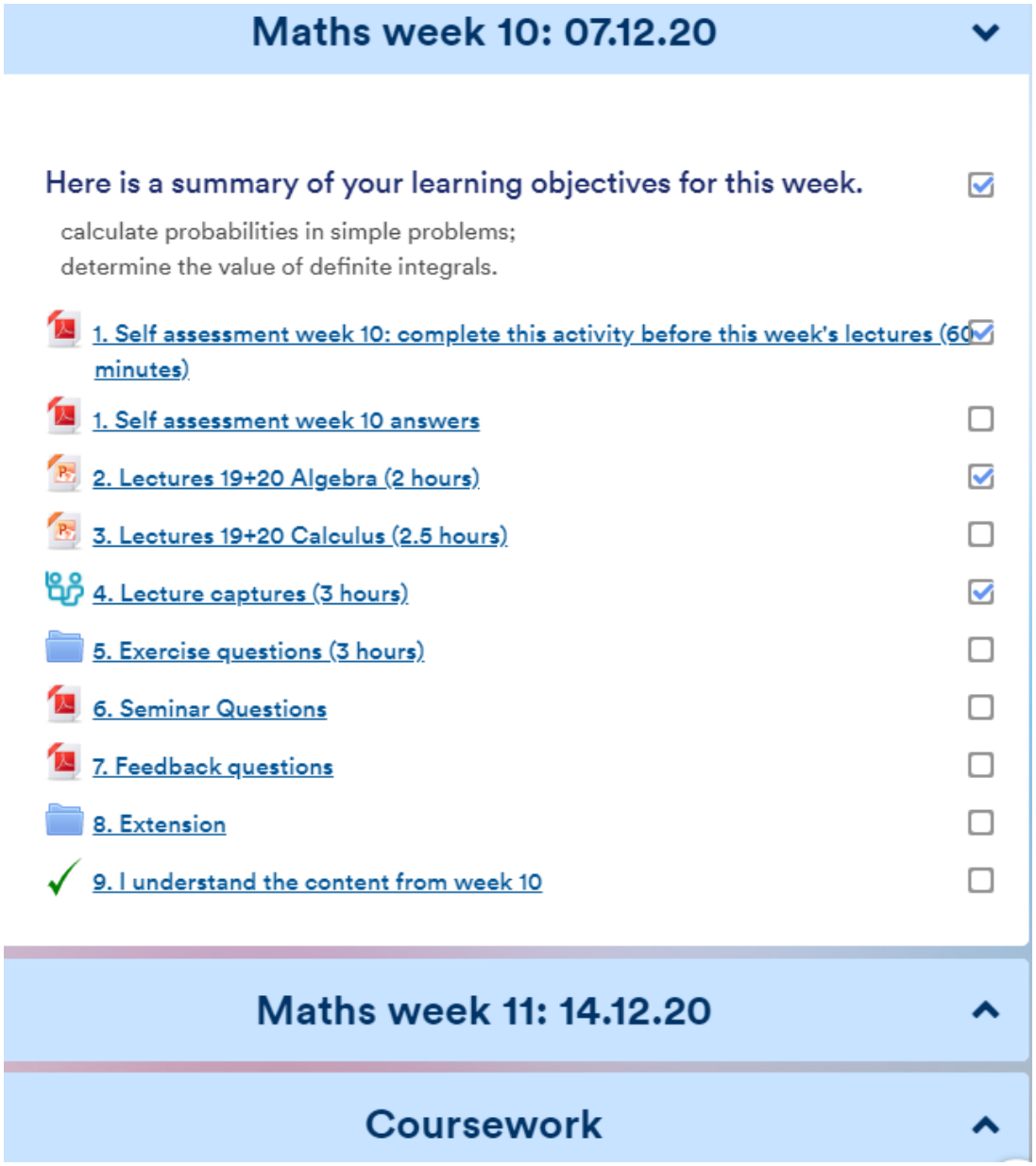

Figure 1: Example of standardised VLE page with structured activities and progress tracking.

Staff-student partnership

Virtual town hall meetings were organised so the school's leadership could disseminate information and respond to student questions, either verbally or through the chat function. The aims were, firstly, rapid communication between staff and students in response to a fast-changing situation and, secondly, to improve the sense of belonging by making senior staff more accessible. We also had a termly staff-student committee meeting where elected student reps reported areas of strength and concern. This feedback was used to identify successful approaches to student engagement which were shared at reflective staff seminars. Similarly, student reps could communicate with the wider student body through discussion forums and social media.

Staff co-ordination

It was recognised that many teaching staff had no experience of teaching online and student engagement would suffer if staff were not confident and supported. The School's Digital Learning Lead, supported by colleagues, created 40 training videos and 20 written guides which demonstrated how to use different digital tools. In particular, they focussed on tools which enabled student engagement such as polling software, interactive whiteboards and hosting virtual classes. Several digital workshops were organised so staff could share ideas and teaching practices which had received positive student feedback.

In open forums and in direct communications to School leadership, staff reported they were feeling isolated working from home. Dedicated staff channels within Microsoft Teams were used to share important information, post questions, share tips, and socialise informally in a virtual cafe. The aim was to reduce workload (by avoiding duplication of effort) and reduce stress (by fostering staff community). The Teams site also hosted the training resources and recordings of the digital workshops for future reference (see Figure 2).

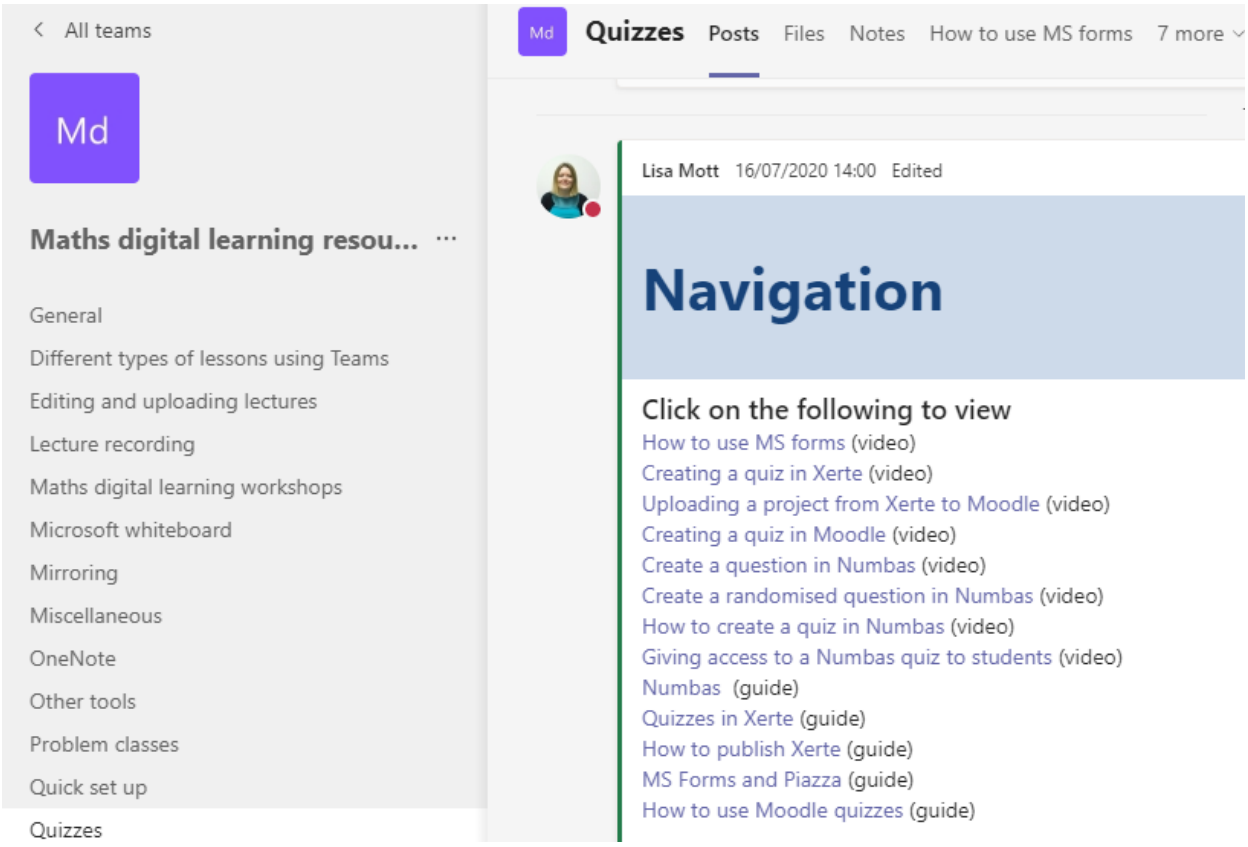

Figure 2: Example menus showing the range of resources created for staff training.

Methods of evaluation

Student engagement was monitored through tracking usage of the different digital platforms employed (e.g. Discord, Piazza, Moodle). Students were also invited to give qualitative feedback through online surveys, emails asking for feedback and through student elected representatives on the regular staff-student Learning Community Forum.

The staff training was evaluated via an online survey of staff that asked for responses on a Likert scale of very helpful to not useful and free-text responses that asked for comments on how the training had changed their teaching or the student experience. Individuals were then approached for consent to report their comments.

Evidence of effectiveness and impacts

There is evidence that new students responded positively to initiatives to boost early engagement. For example, the Discord server has a membership of 621 out of a population of approximately 900 students, with 499 active members using the server nearly a year later. The dedicated Moodle welcome page was evaluated by an online feedback form hosted on the welcome page. Although the response rate to the survey was poor (around 7%), the page had over 6600 views and students commented that the activities were invaluable in easing their transition to university and online learning. A staff member commented that asking students to write about themselves was "priceless to understand what's going on with the people enrolling in my class. And made the whole thing a bit more human."

The standardised Moodle pages for each module were described by staff as "brilliant", "very useful" and "well received by students". Having a structure to follow meant staff felt "more confident" and "enabled me to see how I could manage" when they were struggling to get started. The number of student engagements via the Piazza discussion forum was much higher than previous years using Moodle discussion forums. For example, on a first-year module there were 201 student posts and 6839 views from a class of 231 students and a fourth-year module had 72 posts and 1012 views from a class of 41 students. This compares to a maximum of 1 post each year on Moodle in the previous two years for both modules. In particular, all 15 elected student representatives at the Learning Community Forum favoured Piazza. Their comments[1] indicated they valued the ability to post anonymously, removing any embarrassment associated with asking questions or answering each other's queries. It was also a convenient way for students to pose questions to their lecturers at any time and reduced email traffic for everyone.

Nearly 200 students were paired with each other through the study-buddy scheme. Approximately 20% of them responded to an email asking for feedback. One participant reported that the scheme held them more accountable for their work which helped counteract problems with motivation and time management that many isolated students reported. Another student appreciated that lecturers and staff members were

[1] We do not include direct quotes of students in this paper because we wanted students to express themselves freely, without concern for the precise wording, at a time of heightened stress due to the pandemic. Instead, we report the sentiments that were expressed to give insight into the general patterns of student engagement observed.

not too involved which enabled informal conversations about the subject at a time when many were not living with mathematicians during lockdown. Students also reported that it gave them someone to talk to about university and helped them to socialise, which is evidence that it enhanced a sense of community and belonging and bridged the gap to the social sphere. The study-buddy and student-mentoring scheme also brought well-being benefits with other students reporting they enjoy studying more and feel less anxious.

We surveyed staff (16 responses out of 72 staff) about the impact of their practice on student engagement. They gave an average rating of 4.63 on a five-point scale to the training videos and written guides we provided. Staff commented that "the interactive things I've offered students have been heavily based on the resources" and "the resources and training have had a huge impact on my teaching – and hence the student experience". Staff also noted that including interactive elements via, for example, breakout rooms or quizzes led to better student engagement (see also Tice et al., 2021). Outside the formal training sessions, the volume of posts on staff discussion forums indicates that much of the training takes place informally, "One of my colleagues just showed me how to do something. Sometimes, I showed other people as well!" Out of 70 staff who voluntarily signed up to access the resources, training videos were viewed 662 times and attendance at workshops ranged from 18 to 40, with additional staff members watching the recordings of the workshops afterwards. This strong collegiate spirit, with staff voluntarily attending training sessions and contributing to online discussion forums, contributed to greater consistency and higher quality teaching.

Reflections on the project

Maintaining student engagement during a quick transition from in-person to online delivery was always going to be challenging. A large outbreak of coronavirus in the student population during Autumn 2020 followed by lockdown in Spring 2021 forced a greater proportion of teaching online than had been initially planned. Without a physical timetable to follow, students reported a lack of motivation and difficulty managing their time effectively (see also Finnegan-Kessie et al., 2020). Some of the initiatives discussed, such as the study-buddy scheme, directly addressed this but could have been introduced earlier if the scale and duration of the online learning could have been known in advance. Study skills training, specifically for online learning, during induction weeks may also have helped. Giving students the ability to track the completion of tasks through the VLE was useful to some students while for other students it induced anxiety if they fell behind schedule. In hindsight, an automated system to alert staff to disengaged students may have permitted earlier intervention, but this was not available. Despite attempts to engage them early, new students seemed to struggle most, perhaps due to the awkwardness of online meetings with strangers or unfamiliarity with learning strategies at degree level. It is noted that older students were already familiar with the university and the course, and often have friends on their course, which may have given them an advantage in adapting to online learning.

The move to online teaching presented equivalent challenges for staff. Prior to training, many staff informally admitted through forums that they didn't know how they

would cope with online delivery. Although workshops and forums were organised to meet this need, an unintended consequence was some staff reporting being overwhelmed by the number of software options and pedagogies. In response, a "quick set-up" tutorial focussing on fundamental tools was created for staff who were nervous about technology. Online delivery led many staff to re-evaluate their practice and, consequently, they adopted elements of flipped learning (e.g. using synchronous teaching time for discussion and problem solving) to boost engagement (Fisher et al., 2018). As was typically observed with traditional pedagogies in previous years, student engagement dropped during the term and less-structured drop-in support sessions were poorly attended. However, students responded positively to interactive elements such as polling software and posting questions in the chat during live sessions. Not all students had the equipment needed to hand-write mathematical notation using interactive whiteboard software and, consequently, delivery was sometimes more teacher-focussed than ideal with students only able to contribute verbally.

It is important to recognise that different spheres of student engagement are interconnected (Thomas, 2012), which suggests a coordinated response is needed. In our context, for example, the widespread use of standardised Moodle pages and Piazza discussion forums was a result of positive feedback through staff-student channels and sharing of practice through the staff community. In turn, they had a positive impact on the academic sphere which shows the different initiatives to promote engagement did not work in isolation.

Our primary aim was to foster student engagement through 2020/21 such that the rapid transition to the online environment had minimal impact on student retention and attainment. With regards to attainment, the proportion of "good" degrees (first and upper second classes) increased to 85.3% (up from 74%-80% in the previous four years) and the proportion of first-class degrees increased to 54.8% (up from 40%-45% in the previous four years). This apparent increase in attainment, however, should be seen in the context of different assessment types (closed book exams were replaced with open book exams) and different assessment policies (for example, regarding extenuating circumstances) and therefore not directly attributable to the student engagement initiatives. Regarding retention, there was a small drop in students progressing from year 1 to year 2 in summer 2021 (88% progressed down from 95% in 2019 and 93% in 2020) and year 2 to year 3 (90% progressed in 2021 compared to 95% in 2019 and 97% in 2020). Despite the student engagement initiatives receiving positive feedback from students who participated, this reduction in retention is perhaps attributable to students who disengaged or didn't adapt to the online environment. For example, an audit of Moodle logs during term time showed around 5% of first year students had not engaged during the previous two weeks. While this level of disengagement with online resources is commensurate to other years, the impact on retention was amplified when delivery was almost entirely online. Further research is needed to identify alternative or additional initiatives to increase overall student engagement and reconnect with those who are disengaged.

It is acknowledged that response rates to surveys were low which, in itself, is an indication that students and staff struggled to engage with everything happening online. Nevertheless, they give useful qualitative insight into potential reasons for the engagement statistics measured using digital logs. In summary, the digital logs

indicated that the majority of students did voluntarily engage with the initiatives and the qualitative feedback is very positive indicating that they were of benefit to the students who chose to participate. Nonetheless, the long term effect of the pandemic on student engagement is an area that warrants further research, particularly its impact on the small number of students who did not engage.

Follow up and future plans

Many of the changes adopted for the pandemic will likely remain in the long term as delivery transitions back to in-person. Students spend an increasing proportion of their lives online (e.g. through social media) and, consequently, their university experience needs to engage them online to some extent to create a sense of belonging. While students are keen to return to the physical classroom, perhaps for the timetabled structure and peer-support it provides, their expectation of on-demand content and online discussion forums is likely to remain.

The new early engagement strategy will largely be repeated, including the use of Discord server and induction tasks to foster community pre-arrival. In the future this will be complemented by in-person activities such as mathematical problem-solving sessions or targeted support for students without Further Maths A-Level. The study-buddy scheme may continue although in-person tutorials make it more likely students will form their own friendship groups to study with. Similarly, the resumption of student society activities and the opening of off-campus venues will reduce the need for School-organised social events. However, initiatives such as the weekly student newsletter may become more important in keeping everyone connected and engaged with the university community.

We should recognise that technology is constantly evolving and approaches to engagement will need to update as new functionality is added to software or pricing models change. Learning technology specialists will need to keep abreast of advanced tools and train colleagues appropriately. While, during the pandemic, we have rapidly piloted different software and pedagogies, some form of rationalisation may naturally occur as student feedback encourages certain approaches. In particular, better integration of email, discussion forums, videoconferencing and VLE software would reduce the need for students to monitor multiple platforms in order to stay connected. New legislation will also require teaching materials to support screen readers and videos to have closed captions which may lead to a more inclusive community.

The School started online degree apprenticeship programmes in autumn 2021 and further distance learning programmes are planned for 2022. Although targeted at different demographics from the undergraduate course, many of the lessons learned from building engagement during the pandemic will be translated to these new cohorts. The School recognises there will be greater variety in students' surroundings (e.g. accommodation and culture) and other aspects of their lives (e.g. family or employment) and this diversity may make building successful online communities harder, and place greater demands on the tools we do have available to encourage student engagement.

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