

The pedagogy of an asynchronous online course: supporting students' engagement

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As part of the MA Mathematics Education programme at UCL Institute of Education, we offer an online module that focuses on the potential the digital technology could have in supporting the teaching and learning of school mathematics. In this short paper we will outline and reflect on the emergence of the online pedagogy of the tutors, as we embarked on the design, then teaching of this module.

The context

The *Digital Technologies for Mathematical Learning* module is the latest optional module added to the MA in Mathematics Education programme diet. First taught in 2014, this module has two e-learning aspects: its online delivery, and the e-focus of the course itself, consisting of i) familiarisation of the participants with a wide range of digital tools and resources (graph plotters, dynamic geometry environments, statistical software, fully interactive online packages) and ii) critical reflection on the implications of using such tools in the learning and teaching of mathematics at secondary school level (11-18 years old students). The main aim of this course is to encourage participants to reflect critically on the potential and limitations of digital technologies for the learning and teaching of mathematics by providing opportunities for participants to apply knowledge of relevant research and theory to their professional contexts.

The module is asynchronously delivered online, with that the learning resources that facilitate information sharing outside the constraints of time and place amongst the participants. Designing an online module was a new experience for us, the tutors (the author and one other colleague, both co-designers and co-leaders of this module). In doing so, we were encouraged by the research into effective online instruction (Maki & Maki, 2007) which offered three conclusions:

- 1) online instruction can be as effective as traditional instruction;
- 2) to do so, online courses need cooperative/collaborative active learning *and*
- 3) strong instructor presence.

We started from the premise that we would be able to fulfil the 'strong instructor presence' requirement (even if we were not quite sure what it meant when we started). Hence, in designing the module our main concern was how to facilitate and support students' cooperative and collaborative active learning, given the constraints & affordances of the asynchronous online module. We quickly realized that we needed to re-conceptualise what active learning meant in an asynchronous online environment and then find ways to promote and support it.

Our design principles: a framework

Our review of the literature provided us with a useful framework for implementation of active learning practices into an asynchronous online environment, referred to in literature as ‘A three-part approach: An Architecture of Engagement (Riggs & Linder, 2016) consisting of: Element 1: Syllabus Communication and Engagement Policy, Element 2: Course Orientation and Element 3: Modular Course Structure.

In the following, we will illustrate how we used this framework in the design of our course, describing the elements above in an order that makes is easier for the reader to follow, rather than describing our moving forwards and backwards between these elements.

Architectural Element 3: Modular Course Structure

A modular course structure helps to frame the architecture of engagement throughout the course. By modular course structure, we mean dividing the course chronologically with multiple units, with each module containing all of the course materials, learning activities, assignments, and assessments for that unit. (Riggs & Linder, p. 4)

In following this framework, we thus divided the curriculum for this module into three themed sections: Visualising, Generalising and Expressing, and Modelling, with each theme lasting for three weeks. During each of the themed sections, the course curriculum is arranged into a series of short tasks that culminate in the main task of designing and trialling a learning activity relevant to each theme. These short weekly tasks are signposted on the virtual learning environment of the course (Moodle) at the beginning of each week and include both offline and online tasks.

Each theme ends in an activity week for which participants are required to: choose a software tool relevant to the theme, design a learning activity using features of good practice identified from the literature, use it in the classroom or another learning environment and evaluate its use with reference to teaching and learning of mathematics and connections with the literature.

In each theme, at least one task will form the basis of an online group discussion, where such contributions include for example, written observations on views and perspectives of fellow participants. The tutors also contribute to these discussions, with the aim of encouraging informed reflection and raising critical awareness of research literature.

In our yearly end of themes and end of year surveys, the students are invited to share their experience of studying this online module. Their comments suggest that our modular course structure does helped them in a number of ways:

- in pacing the learning experience to prioritize activities and to help prevent participants from feeling overwhelmed: *At first, I was afraid I wouldn't get the proper guidance, but now I believe that the structure of the course is pretty clear and I know what I have to do every week* (ET, 2018).
- in discouraging procrastination by providing regular milestones and deliverables; *I find the module really interesting. I really like the fact that we have weekly tasks to complete. I find the timeframe given to complete the weekly tasks to be appropriate especially for a working student.* (TC, 2018)
- in provided space to provide opportunities for guidance and feedback on tasks set. *I think that these tasks [and the feedback received] help me improve my writing skills and how to critically reflect on the bibliography.* (BN, 2018).

Architectural Element 2: Course Orientation

An orientation for an online asynchronous course should introduce students to the structure of the course. (Riggs & Linder, p.3)

Each week the tutors upload: LOs (learning objectives) and description of week's content; readings (essential and indicative); and the weekly tasks, which are tightly structured towards the course aims and learning objectives. This structure is followed every week and this proves very helpful to the students: *At first, I was afraid I wouldn't get the proper guidance, but now I believe that the structure of the course is pretty clear and I know what I have to do every week* (ET, 2018).

Architectural Element 1: Syllabus Communication and Engagement Policy

The asynchronous online course syllabus must do all the foundational things a face-to-face course syllabus does, but it must also: set communication policies and expectations for online engagement; and set a course schedule that outlines the frequent and meaningful engagement. (Riggs & Linder, p.2)

Indeed, our expectations of studying on an online module were made explicit to the participants, as exemplified below:

- How much time should be set aside weekly to spend on module?

When studying online, you should expect to log in for short periods several times each week. It is very important to keep to the timetable of each week or you risk falling behind and missing crucial discussions (which can easily happen!). (extract from module handbook) or *Given that this is a 30-credit module, it is expected that you will spend 15 hours per week studying for this module, and the level of work is designed to reflect this.* (extract from module handbook).

- What does attendance mean?

For the online modules, online presence and task completion are accounting for your attendance. You are expected to complete activities for and contribute to at least 70% of the required online activities. [...] Your attendance (online contributions and tasks completion) will be monitored by the module tutors on a weekly basis. (extract from module handbook)

Supporting the architecture of engagement

Research (Garrison, Anderson and Archer, 2001; Lewis and Abdul-Hamid, 2006; Russo and Campbell, 2004 cited in Dixson, 2010) indicated that it can be helpful for instructors of online asynchronous courses to create an architecture for their own engagement, too. As tutors, we made sure that we had social presence demonstrated on a weekly basis through: uploading materials, posting messages, guiding student learning, providing feedback according to set times, sending reminders, contributing to some online discussions.

While we strove to maintain a strong online presence, we tried to engage minimally in the discussions, as we did not want to deter the students from participating. However, the participants were keen on receiving individual feedback from the tutor: *It would be good if the tutors could provide more detailed and personalised feedback to the tasks we have handed in each week. At least each individual of us will be clear if we are on the right track of the task objective.* (SA, 2017)

In order to address our participants' need to communicate with tutors, we:

- offered personalised feedback on tasks at the end theme only;
- offered general comments on all the other tasks, raising common issues, etc;

as well as

- encouraging and prompting discussions; and
- providing a time frame for replies questions posted on discussion forums.

Re-conceptualising active learning in an asynchronous online environment

Since there was not direct teaching in our online course, we designed active learning to take place as the result of doing short, manageable tasks. For example, we included offline tasks such as designing and trialling maths activities involving the specific software that bridge learners' interactions with digital media and the mathematical concepts, followed by online contributions where they would reflect on the teaching or learning episodes they trialled.

How we supported cooperation and collaboration

As designers, we needed to create not just opportunities for participants to interact, but the requirement that they do so. Simply offering the opportunity to participate was not enough, as we realized after the first presentation of the course.

As a result, in our re-design of the course:

- one task formed the basis of an online group discussion;
- tutors allocated groups for collaborative tasks;
- we included Pick-a-Paper tasks, where participants choose one paper and its commentary from a participant in their group and post their comparative remarks and reflections.

While these strategies worked in that the participants contributed online once being nominated & directed on doing the task, their contributions were not always very insightful. While some researchers argue that asynchronous communication affords in-depth and thoughtful discussions, this has not always been our experience. Some participants tell us that: *I feel like I cannot effectively and efficiently discuss with other participant of this course. Although there is a forum to discuss, but I feel like it is better for me to discuss face to face with them. I am not comfortable with discussing online.* (IN, 2018) or *But, the truth is that the forum is impersonal and writing actually makes you feel anxious because it is formal.* (BN, 2018).

Some conclusions and next steps

We have become interested in why some participants are more engaged than others and for the future we would like to investigate further how to support all of our participants become active learners and seek active learning strategies in their asynchronous online experiences.

References:

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