Online Education and the Flipped Classroom – Principles, Ideas and Tips

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INTRODUCTION

At the time of writing, the coronavirus pandemic has over the course of a few days changed teaching practices worldwide. History will show if this, in modern times unprecedented response, will mark a fundamental shift in higher education teaching, or if we will slowly regress to our normal practices. While the current situation surely has sped up the move to distance learning, the process of doing so was not nonexistent prior to the pandemic. A fundamental change in population lifestyle, partially attributed to millennials [1], has meant that distance learning has not only been a natural development for some university programs, it has also been a lifeline.

Teaching paradigms are plentiful, as are their proponents, even Plato and Aristotle disagreed. There are many tipping scales involved in defining paradigms, and they balance different dimensions of teaching: from course content (theoretical knowledge versus practical experience) to responsibility (teacher versus student). As in all contexts, when dimensions are taken to the extreme they become ludicrous: we would not be very happy having students be responsible for their own practical experience when learning how to drive a car or perform surgery. While we may theorize about which paradigms are optimal in different situations, and even run experiments to confirm or deny our views, it is often external constraints that act like weights on the scales. The implications of the coronavirus are now the heavyweights among our constraints, and we have decided to place (or perhaps throw) them all on the distance side of the locality scale. Yet, we do have freedom in other dimensions.

This short reflection will focus on the flipped classroom approach in a distance learning context, in particular in an online distance learning context. I will briefly describe the flipped classroom from a general point of view, and then gradually shift focus to the online context. I present a few principles, ideas and tips which may support the online flipped classroom approach.

FLIPPED CLASSROOM

When discussing the flipped classroom learning model, the traditional classroom is defined as one where teachers are responsible for passively transferring knowledge to students through lectures, and students are responsible for using this knowledge in problem solving, applications, simulations, demonstrations, active discussion, etc. The flip happens when students are independently responsible for consuming teaching material, such as books, papers, online videos, etc. and the active tasks such as problem solving, demonstrations, and discussions take place in the classroom with teachers [1,2]. This is a quite drastic reweighting of the scales.

The use of classroom time to deliver lectures has been the focal point in building a rational and theoretical foundation for the flip. Student-centred learning, with its roots in constructivism and cooperative learning, is not believed to be supported by spending time passively passing on knowledge by the traditional lecture [3]. Focusing on group activities in the classroom is instead believed to be inductive of learning, in combination with
students being afforded the possibility to consume course material at their own pace. For a thorough treatment on the theoretical foundations and different learning styles, please see Bishop and Verleger 2013 [3].

Evaluating the effects of a teaching paradigm is fraught with difficulties. This is especially true for student-centred paradigms, which aim to teach students long-term intangible constructs such as group thinking and problem identification skills, and prepare them for a lifetime of learning. One study found that the flipped classroom was on par with the traditional classroom with respect to time spent on studies and exam performance [4], however the goal of flipping the classroom is not necessarily to reduce time spent by students on a course or having more students passing a standardized exam. Similar on par findings have been reported in systematic reviews of flipped versus traditional classrooms [2,5]. A marked difference to this general evidence can be found in mathematical education, as a meta-analysis of flipped versus traditional classroom found in favour of the flipped-classroom on exam outcomes [6] (including 21 studies). Thus, heterogeneity of measurable effects of using a flipped classroom may be expected among educational topics, possibly confounded by educational culture and tradition, ease of measuring outcomes, and personal characteristic variation among students.

PRINCIPLES, IDEAS AND TIPS

The rest of this reflection will summarise principles, ideas and tips on how the flipped classroom paradigm can be operationalized, with some extra focus on the online setting. This summary is based on literature found in peer-reviewed Journals, reports, blog posts, and from personal experience of student-centred teaching [6–12].

PRE-CLASS ACTIVITIES

Video is the prototypical way of making course content available to students prior to classroom activities. Students can watch when it suits them, pause, rewind, come back later, and focus on parts which are new to them and skip parts which they already know. Mixing up videos with other pre-class activities can be helpful for students: ask them to read interesting papers, use an interactive web-app, interview other students or colleagues, etc. As distance learning becomes the norm, students will be taking more than one course adopting the flipped classroom approach, so having only video may mean that students are asked to watch several hours of video each week, which may become demotivating. We also want to avoid exacerbating issues of personal screen-time, which is a growing concern.

Studies have shown that students prefer recordings made by the teacher, familiarity and a shared vocabulary have been quoted as reasons. However, you do not have to record everything yourself, sparing use of videos already available can supplement core material. Also, be inventive of how the content best can be delivered. Go out in the field and show a real situation, Interview people, record a demonstration etc. Also, swap the wall-of-text with animations or mind mapping of concepts.

An analysis of engagement including 6.9 million online course videos showed that the median engagement time was six minutes (and was the strongest predictor of engagement). Short videos are therefore preferred, and a total length of no more than 20-25 minutes is recommended prior to the classroom activities. In videos that are for some reason longer, add an item list to the left of the video with the agenda and timings, so students know to which point in time they can rewind or fast-forward to get to different topics.

Add captions to your videos. This helps those who have hearing impairments, those whose primary language is not that of the speaker’s, and also those who need to turn off the audio for various reasons. Also, for some topics, students may benefit from video lectures which are recorded while writing on a blackboard. In mathematics for instance, reasoning is strongly coupled with notation, it helps the students to digest (and learn from) the teachers reasoning. This may be true for other subjects as well.
Add quizzes to your videos so that students can check that they have understood the material before they move on to the next section or video. This adds confidence in students to move on, and not re-watch unnecessarily.

IN-CLASS ACTIVITIES

Begin in-class activities with some basic problems or demonstrations, and then ask students to engage with more advanced problems. Make students work in groups to solve problems so that the in-class activities do not rely only on individual problem solving skills. Studies have shown that only doing individual tasks demotivates students from attending, they may feel like they might as well could have done it at home (and leads to the belief that the course is entirely self-taught).

Engage students in real-world problems. This increases motivation and prepares students for the future. For instance, when teaching biostatistics it is entirely possible for students to work with data from real research projects. Prepare more difficult problems for students who finish problems quickly, and offer simpler problems for students who have a hard time grasping the basics.

Help individual students understand concepts that they have not understood. Circulate the classroom to address issues that come up in the group discussions, and give impromptu brief lectures on topics which seem difficult to grasp. Also, ask individual students to explain concepts to others. Studies have shown that having peer students explain can sometimes help understanding, partially since they are closer to each other in the proximal zone of development.

Finally, ask students to hand in work on a problem or a summary of an important paper, and use peer-review to give students feedback. In-class activities can then be spent by asking students to discuss problems and findings they encountered.

OTHER ACTIVITIES

After students have consumed all the pre-class material, but before in-class activities, ask them to complete online exercises with computer feedback which counts towards the final grade. Several studies report low rates of student engagement in pre-class activities, thus adding mandatory exercises adds motivation to do so. Having a mandatory exercises prior to in-class activities also helps to identify gaps in the group’s knowledge, which can be used to adapt the in-class activities.

Create a Twitter hashtag for your course, which both instructors and students can use to share material which they find throughout the course. This is also a fantastic way of making students who have already passed the course stay up-to-date with the topic, add relevant material and experiences, and support those currently taking the course.

Ask students to discuss a question or topic online, and make them record it and send to the teacher for review. The teacher can then post back to the group on issues which they seemed to struggle with or got wrong. This could be an activity that replaces an in-class activity when the course is done entirely online.

Finally, to take the online group discussions to the next level, mix students from different courses, and mix students from different programs. Speaking from personal experience, mixing students from the medical and technical faculty in group discussions about eHealth have created eye-opening moments for the students (and teachers!).
While several studies indicate that students are positive to the flipped classroom [7,13–15], there are certainly challenges to make it satisfactory for all students. Students may feel that they have been robbed of tuition; they might as well have been finding content on their own and not pay tuition fees [4,8]. Also, students have reported that in-class activities are not useful for them, and they might as well have stayed at home and solved problems on their own [4]. If such negative perceptions prevail despite explaining the paradigm, teachers should reconsider the planned activities, as they may not be living up to students' expectations and may not be challenging. Students will always be, at least to some extent, motivated by the exam, thus making sure that students feel more prepared for the exam if they participate in in-class activities will also motivate engagement in pre-class activities.

REFERENCES


8. EDUCAUSE. 7 things you should now about flipped classrooms. 2012.


