The Use of Technologies in Deep Learning: Example of the Flipped Classrooms

Pedagogiskt docenturarbete

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DATUM 2020-05-06
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Abstract
In the past decade, there has been a rise of pedagogical methods centered around technologies. Among them, flipped classrooms have gained popularity among teachers and students. As its name indicates, flipped classrooms invert the classical “in-class lecture” and “outside-class homework” format. Students watch lectures at home and explore a specific subject more in depth in the classroom. Although well liked, the efficacy of the flipped classroom in learning outcome has not been clearly demonstrated. In this essay, I will review the literature on the flipped classroom efficacy and discuss the main findings.

Introduction
One of the major concerns within the higher educational institutions lies on finding better teaching methods to improve student learning. In particular, a lot of focus has been made in improving deep learning which involves a cognitive approach of learning thought to result in better learning outcomes (Marton 1979). Literature shows that deep learning can be facilitated by increasing the student engagement (Barkley 2010). Based on a National survey, student engagement has two key components: “the first component depend on the student and refers to the time and effort students place in their studies and the second component depend on the teaching institutions and how they allocate resources and organizes learning opportunities and services to induce students to participate in and benefit from such activities” (Barkley 2010).

In the age of digital information, technology has become one of the major resources used by university to improve student engagement. High order thinking can be facilitated using technologies. Technologies are thought to be more engaging and entertaining than classical lectures. They also present the advantage of not being limited by the classroom, therefore facilitating learning. In consequence the number of technologies employed by student and teachers is rapidly increasing. Educational technologies include technical support such as computers, projectors and software, but also consist of digital technologies which can be either provided by the teachers and the universities or can be “freely” available through the internet.
(i.e., google, Wikipedia etc.). Blogs or websites that focus on pedagogy show that, while a
great number of teachers are enthusiastic towards the use of technology, some show more
reserves toward its benefits. Limited data are available on the efficacy of these technologies in
improving student learning. This pedagogical reflection aimed to better understand the impact
of technologies in learning efficiency. Given the high number of technologies used in education
I will focus on one teaching method that relies on digital technology: the flipped classrooms
which has shown an increasing rise these past years.

**Aim and research questions**

The aim of this pedagogical reflection is to get a better insight of the efficiency of the use of
technologies in cognitive learning. As stated in the introduction, numerous technologies are
used in higher education. I will therefore focus on one example: the flipped classrooms.

After defining flipped classrooms, I will address the following questions:

1. What are the advantages and drawbacks of the flipped classrooms?
2. Do flipped classrooms improve academic outcomes?

**Flipped classrooms: Definition**

The Flipped classroom is one of the blending teaching-learning method that combines
traditional learning with technology-based learning. This pedagogical method has been
popularized by the Kahn Academy founded by Salman Khan. Kahn started to record videos for
his cousin which felt that recorded lessons would allow her to learn at her own pace and let her
leave out parts that she already knew and repeating parts that she found difficult. As indicated
by its name, flipped classrooms is a teaching method where components of a course such as
lecture and homework are reversed. In opposite to the traditional model of teaching where
lectures are given in a classroom and homework are performed at home, students watch online
lectures at home while homework or other learning activities occur in the classroom. Time
during classroom is used to explore topics in greater depth and include activities such as
experiments in laboratory, analysis of documents, presentation of a given project, debates and
discussions (Missildine, Fountain et al. 2013, Schlairet, Green et al. 2014). This method is
believed to shift learning from a teacher-centered to a student-centered model as the students
are responsible for their own learning. There is a high diversity of technologies used in flipped
classroom (Jacqueline O'Flaherty 2015). During pre-class preparation, students have access to
pre-recorded lectures in the form of voiceover power point slides, clips, videos, tablet with writable function plus screencasts used by lecturer to deliver content, podcasts and vodcasts. Technologies are also used during in-class activities. For example, power point slides are used for student presentation whereas smartphone apps and tablets are used for quizzes.

**Advantages and limitations:**

There are several benefits/advantages attributed to the flipped classroom (Fulton 2012).

1- Flipped classrooms promote independent learning. In contradiction to traditional lectures where the teacher defines the speed of content delivery, the student can watch the online lecture at its own rhythm. The student can replay a part that pose problem or stop the video in order to take notes. In this sense, flipped classrooms make student masters of their own learning, therefore encouraging student engagement.

2- The flipped classroom model seems to be well liked by student, probably in part because it promotes student engagement (Bishop 2013).

3- Classroom time is utilized more effectively and creatively. In his study, Zappe stated that flipped classrooms save time for the students to learn actively (Zappe 2009). The “In-class” format promotes collaborative and interactive activities since it requires communication between students but also between students and teachers (Özdamlı 2016).

4- Doing “homework” in class allow the teacher to get a better insight on the students’ difficulties.

5- Both pre-class and in class work promote student-centered teaching though to be important to stimulate deep learning.

6- The online lectures are provided by the teacher which avoid learning wrong things due to unreliable sources.
Although flipped classrooms present several advantages and are generally well liked by educators and students, some rise concerns and present limitations (Missildine, Fountain et al. 2013, Schlairet, Green et al. 2014).

1- Flipped classroom model is timely and costly. Creating high quality videos require the teacher to spend a great amount of time working on the videos outside of regular teaching abilities. Furthermore, some teachers need training to master the technologies necessary for flipped classroom which add in time and cost.

2- Although more families have now access to technologies, not all can afford computers or technologies that allow the visualization of the lectures.

3- Watching the lectures at home requires an environment that favorize learning. This may be challenging if the students are sharing their home with family or roommates.

4- Some students may have difficulties to self-direct their learning and may therefore not learn as much as intended.

5- Some argue that flipped classroom lack the constructivist approach as it is still based on the classical lecture approach.

**Effect of flipped classrooms in student’s grades:**

To date, there are limited scientific data concerning the effectiveness of a flipped classroom. It is difficult to measure efficiency of an educational method as it can be reflected by several parameters. Here, I will focus on the studies that assess the effect of flipped classrooms on academical grades. Reviews based on meta-analysis show contradictories conclusions regarding the effectiveness of the flipped classrooms. Some reports a positive effect on grades. For instance, Karabut-Ilgu et al., summarized the results of 30 studies looking at effectiveness of flipped classroom in engineering education (Aliye Karabulut-Ilgu 2017). They found that out of the 30 studies, 13 reported that students in the flipped classroom showed increased average score compared to their counterparts in the traditional classroom. However, not all studies showed a positive outcome. Among them, four research papers showed mixed results as the students obtained higher scores the first year only and nine studies reported no differences
between flipped classrooms and traditional teaching methods. In a more negative note, Whillier and Lystad found no differences in grades when comparing flipped classroom and classical approach in a neuroanatomy course for undergraduates (Whillier and Lystad 2015). More recently, Evans performed a meta-analysis of 49 articles regarding the quantitative outcomes (quizzes, examination and grades) of students that were exposed to flipped classrooms (Evans, Vanden Bosch et al. 2019). Similar to Whillier and Lystad’s analysis, their systematic review suggested that there were little evidences for the effectiveness of this method in improving academic outcomes. Together, this suggest that flipped classroom have a mild effect if none on academical grades. However, academic grades are only one way to measure a pedagogical method efficiency. There are other parameters, which are not always quantifiable. For instance, numerous studies suggest that flipped classrooms improved student’s independence and communication’s skill (Farina Nozakiah Tazijan 2017) which might not be reflected by the academical grades but may be important qualities in a professional set-up.

Reflection
Overall, it seems that flipped classrooms are well liked by students and teachers. However, scientific studies failed to demonstrate a significant impact on the academic efficiency when grades are considered. Some studies do see a positive influence of the flipped classroom on both grades and student’s satisfaction which suggest that, under specific situations, it may be more beneficial that classical lectures. The potential profits may be affected by the way the flipped classrooms are conducted. Research studies on the different factors that could improve flipped classrooms would be helpful for the teachers that want to apply this method.

References


