

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

Boubker MOULINE

Enseignant-chercheur

ESLSCA Business School Paris - Campus Rabat, Maroc

Boubkrmouline@gmail.com

Mohamed BACHISSE

Enseignant-chercheur à la fsjes- Souissi

Université Mohammed 5 de Rabat

m.bachisse@um5r.ac.ma

Abstract

In light of a diverse and growing student population, both knowledge transmission and the evolution of pedagogical practices in higher education are currently at the heart of the debate. We are witnessing the development of a variety of pedagogical experiments within universities, thus questioning the relevance of the traditional lecture. In this article, we focus on a pedagogical model that is increasingly appealing to academics and practitioners: the flipped classroom. This mode of teaching leverages the design of intentional learning experiences to engage students outside the classroom. The learner is responsible for exploring the material outside the classroom in a self-directed way, trying to acquire basic knowledge before class and then actively applying it in class. The scope of this review analyses research conducted on flipped classrooms in higher education from various aspects, including implementation and effectiveness. The results show a successful implementation of the flipped classroom in most cases, as well as indicating that flipped classroom format increases students' engagement in the classroom and improves their performance.

Research Contribution: Our results provide clear evidence of a positive impact of the flipped classroom on student performance in the majority of studies. Based on the results of the study, we have made a number of recommendations to ensure optimal implementation of this pedagogical model, including working to counteract absenteeism, limiting technical and technological difficulties, and finally providing learners with good quality, consistent and limited online resources.

Keywords: Flipped classrooms, pedagogical innovation, higher education, technological advancement, learning

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

INTRODUCTION

The monopoly of information and knowledge held by the lecturer in the past has been overturned by the emergence of the internet with its widespread and unlimited access to information. In fact, nowadays, the vast majority of students, pupils and learners are maturing in a de-compartmentalised technological environment which opens up new perspectives in the relationship to knowledge, learning and the construction of oneself. As a result, educational establishments are faced with a major challenge of being overtaken and seeing their incontestability diluted over time. In line with this development, a variety of institutional measures and reports are emerging around the world, whether in developed or developing countries, such as the new Moroccan development model which has given pride of place to the digitalisation of education, thus encouraging teachers to use new technologies in their teaching practices. Within this impetus, the flipped classroom has taken center stage, with the aim of giving new meaning to a school whose mission of transmitting knowledge seems to be shared with the content of the web (Lebrun & Lecoq, 2015).

The flipped classroom was first popularised with the slogan "Lectures at home, home-work in class" by two physics and chemistry teachers from Colorado, J. Bergmann and A. Sams (2007), when they discovered that the potential of videos and how they could duplicate the teacher's voice, allowing the teacher to spend more time on the difficulties faced by learners. Since then, the flipped classroom has received strong political and media support, to the point where it is now considered a benchmark educational innovation. According to many observers, this fervour for the flipped classroom is due to its fulfilment of institutional expectations that have been painstakingly seeking, for more than 30 years, a way of transforming education, while integrating digital technology into teachers' practices (Moatti, 2010). This being said, the flipped classroom has already proved its worth, and numerous empirical and theoretical studies have echoed it.

The widespread communication on social networks by fervent advocates of the flipped classroom and those convinced of its benefits, along with the media coverage, have helped to spread the idea that the flipped classroom is the best in terms of pedagogical innovation, and is distinguished by its ease of implementation for teachers. In fact, at first glance, one might think that flipping is enough to innovate, while, the flipped classroom requires, on the one hand, the use of digital technology and, on the other hand, a meticulous and studied scripting of the

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

flipped classroom, in order to meet the requirements regarding the concordance of digital tools and pedagogical practices, as well as clarifying the contributions of this practice (Amadiou & Tricot, 2014).

In a flipped classroom, the "taught knowledge" traditionally disseminated by the teacher "on the platform" (Lebrun & Lecoq, 2015), is most often made available in the form of video clips that students consult outside of class time. These videos introduce a third element into the learning process that is characteristic of knowledge mediation. The so-called flipped classroom is therefore a form of inversion of learning activities in the classroom and at home: "lessons at home and homework in class". To put it another way, with traditional teaching, there is a lecture in the classroom and at home the pupils or students do exercises and problem solving. Reversal means studying the lecture at home, looking at the "capsules" and doing the exercises and problem solving in class.

A broader definition of the flipped classroom would involve forms of question and answer in class, video lectures at home, and group problem-solving activities. For Bishop and Verleger (2013), the flipped classroom is a technique that is broken down into two parts: interactive group activities in the classroom and one-to-one computer-based instruction outside the classroom. To summarise and simplify, the flipped learning model is about enhancing the classroom experience with less lecture and more activities. Initially, the idea came from two high school teachers in Colorado: Jonathan Bergmann and Aaron Sams. In 2007, faced with a high absenteeism rate, they decided to film and post all their demonstrations and class presentations online so that they could be made available to absent students. They found that even students who were present in class viewed the videos online, leading to more dynamic classroom sessions, with more challenging assignments and teamwork, more time for individual interventions, etc. They then redesigned their teaching, with the aim of making it more accessible to students who were absent. They then recast their teaching, with videos consulted outside the classroom and class time allowing for exchanges, debates and experiments, and see better success for the majority of their pupils.

The flipped classroom is also associated with the work of Salman Khan, founder of the Khan Academy, where many educational videos are offered. As these videos are also used in classrooms, "commentators have begun to use the term 'flip' to refer to the simple integration of video capsules into teaching, independent of the viewing environment" (ASTOLFI, 2008).

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

Such a shift, interesting when trying to understand the trajectory of innovations, has led designers Jon Bergmann and Aaron Sams (2014), to distance themselves from the use of videos. In fact, these authors argue that the exclusive use of the term video was a mistake, as other resources could be used such as online simulations, books and periodicals. It would be more appropriate to use the term "learning object" (Bergmann and Sams, 2014). Thus, the flipped classroom first met and multiplied its followers as a technological innovation, but in trying to assert itself as a pedagogical innovation, it has erased the overly technological aspects.

The enthusiasm of educational actors for the flipped classroom raises many questions: Does such an approach produce the effects announced? Does it present unanticipated advantages or interests? What are the difficulties experienced by students who use it?

In an attempt to provide an element of answer to these questions, this research work proposes a review of the literature that aims to provide a current state of scientific knowledge on the flipped classroom in higher education, based on existing empirical studies. We also highlight some opinions and recommendations for an effective implementation of this technique.

1. METHOD

Numerous theoretical and empirical studies have been conducted on this subject, but no consensus has been reached on the effectiveness and scope of the flipped classroom. Especially since the latter is not presented as a general approach, but rather as one of many possible techniques. For this reason, the research cannot 'evaluate' the flipped classroom at all, but only certain variations.

For this research, we have adopted a pragmatic epistemological posture, in the sense of being interested primarily in "what works" in an already existing teaching context. The same importance was given to research carried out within a positivist or interpretive paradigm. Thus, from this perspective, in order to describe the current state of scientific knowledge about the flipped classroom in higher education, we have identified more than 120 articles using the following terms: flipped pedagogy, flipped classroom, flip classroom, flipped classroom. For the sake of relevance, we selected 40 peer-reviewed articles, mainly in English, from the last 20 years (2002 to 2022) on higher education. Research conducted at primary and secondary level was excluded. No distinction was made between the disciplines treated, as this had no

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

impact on the results obtained. In this way, the selected articles are deliberately broad and transversal in order to transcend disciplinary barriers and give an overview of the flipped classroom as it is implemented in higher education and as defined in the theoretical framework.

After a careful reading of all the articles selected, we carried out a thematic coding of all the articles selected. The results of this analysis were then translated into a narrative synthesis.

2. FINDINGS AND DISCUSSION

Many studies on flipped classroom have tried to measure the impact that this approach can have on student success. In the majority of these researches, regardless of the disciplines at both undergraduate and graduate levels, a positive impact on academic performance in terms of higher GPAs is reported when the flipped classroom is employed. We take as our starting point the work of Bishop and Verleger (2013), who identified twenty-four studies on the flipped classroom. Since then there has been a great deal of interest in the subject among theorists and practitioners, resulting in a large number of published studies, mostly in higher education.

Smith, (2013) measured student satisfaction when moving from the traditional to the flipped classroom. Their empirical results document a higher rate of student satisfaction than the previous session following the implementation of the flipped classroom. In a review on higher education, Guilbault and Viau-Guay (2017) also report a positive impact on student outcomes, increased satisfaction (with some counter-examples) and highlight the importance of the quality of a student's preparation for a course, since the activities proposed in class are designed on the basis that learning has taken place upstream.

Other authors have taken a close look at the level of intellectual skills attained by learners according to whether or not the flipped classroom was used (Mason et al., 2013; Bristol 2014; Lai & Hwang, 2016) . These empirical studies show that the lecture only allowed students to reach the first level of intellectual skills, i.e. remembering and understanding. In contrast, the flipped classroom would enable students to achieve the last levels of intellectual skills, namely creating, evaluating, analysing and applying. In fact, according to Bristol (2014), learning activities aimed at (e.g. listening to explanations in a video) would be carried out at home, freeing up time in the classroom for learning activities aimed at higher level objectives. Mason et al., (2013) and Lai & Hwang, (2016) also point to a significant increase in results in the flipped classroom, after analysis of exams requiring the mobilization of higher intellectual

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

skills. This, they argue, suggests that these skills may be more likely to be attained by students in a flipped classroom approach than with lecture.

Davies et al (2013) and Sales (2013) point out how in a flipped classroom approach, students are not set a pace of learning as they are when they attend a lecture. The pace, feedback and breaks are not dictated by the group, but by the individual, during the out-of-class portion. These authors also assert that students integrate learning better when they go at their own pace, rather than when they have to follow the pace imposed by the more restrictive framework of a lecture. In this sense, the flipped classroom is an approach that can help teachers to better respect the learning rhythm of students, which would positively impact their productivity (Forsey et al., 2013).

Akçayır and Akçayır (2018) research the benefits and challenges it presents to students and teachers (among 71 research articles). The most frequently cited benefit is the improvement of students' learning performance. The challenges identified were mainly related to inadequate preparation of students prior to lessons. The meta-analysis by Cheng et al. (2019) also highlights the structuring of learning experiences with the flipped classroom, leading to improved student outcomes, and the fact that the design influences students' level of satisfaction and engagement in classroom activities.

Strelan et al (2020) report "the first comprehensive meta-analysis of its effects on student performance, compared to traditional teaching models, across all disciplines and levels of education": 198 studies, of which 174 were conducted at the higher education level, 21 at the secondary level and three at the primary level. They find a moderate positive effect on student performance across all subjects, with effects ranging from weak (for computer science) to strong (for social studies). The main factor contributing to the flipped classroom effect is the opportunity it provides for structured, active learning and problem solving," they say.

While the vast majority of studies indicate that flipped classrooms offer many positive educational outcomes, other studies draw attention to the limitations associated with the flipped classroom. For example, challenges may include the additional time required to redesign the course as a flipped classroom (Schlairet, Green, & Benton, 2014), poorly self-regulated behaviours of some students (Sun, Wu, & Lee, 2017), and the resulting inability of some students to properly plan their time to understand the out-of-class learning content (Lai &

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

Hwang, 2016). The literature also points to an increase in high absenteeism (Stoner & Fincham, 2012; Zainuddin & Halili, 2016). In higher education, absenteeism is an important indicator of student satisfaction and motivation in general (Stoner & Fincham, 2012). Several authors who have documented the motivation of undergraduate students have found that, for the least motivated students, access to online course notes makes it easier to miss a class. If class attendance is influenced by virtual access to different teaching resources, this can only be seen as a certain argument against the flipped classroom (Stoner & Fincham, 2012; Vincent Faillet 2014).

Additionally, the flipped classroom involves the use of information and communication technologies. It is important to remember, however, that access to these technologies is not the same for everyone, that not everyone has the same level of related skills and that, finally, the technology is not infallible (Haight, Quan-Haase & Corbett, 2014). Many regions or countries do not have access to sufficient bandwidth to adequately transmit a large video stream. Haight et al (2014) refer to this gap as the 'digital divide'. For these authors, simply having access to a connection that supports video streaming and having sufficient computer skills would divide the population. Several articles on the subject note differences in skills and general use of ICT, depending on the socio-economic or socio-demographic background of the population (Haight et al., 2014).

CONCLUSION

The results of our research work show that the majority of research conducted on the flipped classroom, regardless of the subject area at both undergraduate and graduate level, reports a positive impact on academic performance in terms of higher grade point averages when the flipped classroom is employed. However, it is important to note here that in several other articles no statistically significant positive impact on achievement was recorded. This being said, we have identified some potential difficulties, which should be taken into consideration to ensure a good implementation of this pedagogical model. We can mention first of all absenteeism. In order to prevent the flipped classroom from increasing the existing absenteeism, it would be wise to assign a grade to certain activities or quizzes carried out during the course, ensuring a more marked presence of the students. The use of surprise summative

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

evaluations would contribute to a greater presence in class than during the lectures, which did not include them.

Secondly, the existence of technological prerequisites. Since technological competence has emerged as a key element of the flipped classroom, instructors must examine the availability of technology for each student, as well as their competence, before implementing the flipped model. Otherwise, the implementation of this model would not achieve the desired result. Finally, offering learners good quality, coherent and limited online resources. In fact, since the quality of videos has an impact on flipped learning, special attention should be paid to the quality of instructional videos when designing the flipped classroom. Research is needed to explore strategies and technologies for producing high quality videos, especially when technical capacity and time are limited.

BIBLIOGRAPHIE

- [1] A. EYRIES, “Daniel Moatti, le numérique éducatif (1977-2009). 30 ans d’un imaginaire pédagogique officiel (dijon, éditions universitaires de dijon),” *Recherches en Communication*, vol. 34, 2012.
- [2] C. Bélanger, “Bergmann, J. Et Aaron S. (2014). la classe inversée. Repentigny, Québec : éditions Raynald Goulet,” *Revue des sciences de l’éducation*, vol. 42, no. 3, p. 217, 2016.
- [3] C. GARDIES, “Lecture et appropriation de l’information: Enjeux d’un Dispositif Pédagogique de Médiation des savoirs,” *PontodeAcesso*, vol. 8, no. 2, p. 124, 2014. .
- [4] C.-L. Lai and G.-J. Hwang, “A self-regulated flipped classroom approach to improving students’ learning performance in a mathematics course,” *Computers & Education*, vol. 100, pp. 126–140, 2016.
- [5] SF. Granier, “Daniel Moatti, Le Numérique éducatif (1977-2009). 30 ans d’un Imaginaire Pédagogique officiel,” *Lectures*, 2011.
- [6] G. Akçayır and M. Akçayır, “The flipped classroom: A review of its advantages and challenges,” *Computers & Education*, vol. 126, pp. 334–345, 2018.
- [7] G. S. Mason, T. R. Shuman, and K. E. Cook, “Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course,” *IEEE Transactions on Education*, vol. 56, no. 4, pp. 430–435, 2013.

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

- [8] J. Bishop and M. Verleger, "The flipped classroom: A survey of the research," 2013 ASEE Annual Conference & Exposition Proceedings.
- [9] J. C.-Y. Sun, Y.-T. Wu, and W.-I. Lee, "The effect of the flipped classroom approach to opencourseware instruction on students' self-regulation," *British Journal of Educational Technology*, vol. 48, no. 3, pp. 713–729, 2016
- [10] J. D. Smith, "Student attitudes toward flipping the general chemistry classroom," *Chem. Educ. Res. Pract.*, vol. 14, no. 4, pp. 607–614, 2013.
- [11] J.-P. Astolfi, "La Saveur des Savoirs," 2008.
- [12] L. Cheng, A. D. Ritzhaupt, and P. Antonenko, "Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis," *Educational Technology Research and Development*, vol. 67, no. 4, pp. 793–824, 2018.
- [13] M. C. Schlairet, R. Green, and M. J. Benton, "The flipped classroom," *Nurse Educator*, vol. 39, no. 6, pp. 321–325, 2014.
- [14] M. Forsey, M. Low, and D. Glance, "Flipping the sociology classroom: Towards a practice of online pedagogy," *Journal of Sociology*, vol. 49, no. 4, pp. 471–485, 2013.
- [15] M. Guilbault and A. Viau-Guay, "La classe inversée comme approche pédagogique en enseignement supérieur : état des connaissances scientifiques et recommandations," *Revue internationale de pédagogie de l'enseignement supérieur*, vol. 33, no. 1, 2017.
- [16] M. Haight, A. Quan-Haase, and B. A. Corbett, "Revisiting the digital divide in Canada: The impact of demographic factors on access to the internet, level of online activity, and social networking site usage," *Information, Communication & Society*, vol. 17, no. 4, pp. 503–519, 2014.
- [17] N. Sales, "Flipping the classroom: Revolutionising legal research training," *Legal Information Management*, vol. 13, no. 4, pp. 231–235, 2013.
- [18] P. Strelan, A. Osborn, and E. Palmer, "Student satisfaction with courses and instructors in a flipped classroom: A meta-analysis," *Journal of Computer Assisted Learning*, vol. 36, no. 3, pp. 295–314, 2020.
- [19] R. S. Davies, D. L. Dean, and N. Ball, "Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course," *Educational Technology Research and Development*, vol. 61, no. 4, pp. 563–580, 2013.

The effectiveness of flipped classroom learning in higher education: findings and future research recommendations

- [20] R. S. Davies, D. L. Dean, and N. Ball, “Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course,” *Educational Technology Research and Development*, vol. 61, no. 4, pp. 563–580, 2013.
- [21] S. C. Stoner and J. E. Fincham, “Faculty role in classroom engagement and attendance,” *American Journal of Pharmaceutical Education*, vol. 76, no. 5, p. 75, 2012.
- [22] T. Bristol, “Flipping the classroom,” *Teaching and Learning in Nursing*, vol. 9, no. 1, pp. 43–46, 2014.
- [23] V. Faillet, “La Pédagogie Inversée : Recherche sur la pratique de la classe inversée,” *Sciences et Technologies de l'Information et de la Communication pour l'Éducation et la Formation*, vol. 21, no. 1, pp. 651–665, 2014.
- [24] Z. Zainuddin and S. H. Halili, “Flipped classroom research and trends from different fields of study,” *The International Review of Research in Open and Distributed Learning*, vol. 17, no. 3, 2016.