

FLIPPING THE CLASSROOM TO STIMULATE ACTIVE LEARNING IN HIGHER EDUCATION STUDENTS

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ABSTRACT

The objective of this research is to implement the flipped classroom model as a teaching strategy for active learning. The approach here takes advantage information and communication technology potentials, as an essential factor in stimulating and improving significant learning undergraduate students in Industrial Economics. The analysis included a sample of 30 undergraduate students in Industrial Economics studying theory econometrics in their sixth semester during the academic year 2017-2018. The students are from the National School of Higher Studies Leon Unit of the Universidad Nacional Autonoma de Mexico. The results reveal significant improvements in the learning of the students that followed the flipped classroom methodology.

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KEYWORDS: Flipped Classroom, Active Learning, Higher Education

INTRODUCTION

This paper describes the results of an innovative teaching experience that introduces a flipped classroom model for the improvement of the active student learning. The model is applied to sixth semester students in the econometric theory course in 2017-2018. The course is part of the undergraduate in Industrial Economics program of the National School of Higher Studies Leon Unit of the Universidad Nacional Autonoma de Mexico. The university has head offices in the city of Leon, Guanajuato, Mexico. One problem that arises in classes is a lack of selflessness, low utilization, and a passive role that students take in their own learning. It is the professor's responsibility to foster student motivation to achieve active participation. At present, some students at the University are digital natives. They use different information and communication technologies including smartphone, tablets and computers. However, they regularly do so primarily for purposes of entertainment or social communication with friends or family. There is little educational use of technology with the purpose of improving learning. It is then up to professor, to adapt to these roles of participation and become a mediator-facilitator of the programming.

The flipped classroom model inverts the roles of traditional teaching. Class activities, usually taught by the teacher, are now carried out by the student from his/her home (study of the previous reading of indicated material), through the use of multimedia technologies (smartphone, tablet, laptop, others). The attending sessions involve activities that require a greater participation and interaction, where the teacher participates only as a facilitator (Lage, Platt and Treglia, 2000). This study proposes to use the model flipped classroom to promote a more active role among the students who study theory econometrics, with the purpose of motivating them to learn and find new knowledge in the use of digital devices or their applications. The goal is to do so in a way that, from their home or any site, they use the technologies for a didactic purpose. Guided by the teacher as facilitator, they can carry out work that make possible a more active, participative

role in the construction of their learning. Time in the classroom will be better used for activities that require a greater participation and interaction, in addition to the direct supervision on the part of the teacher.

The central objective of this work is to analyze the flipped classroom as a strategy for education that stimulates active learning of students. The research question is: To what extent does the Flipped Classroom model favor active learning among undergraduate Industrial Economics students? Through the use of a flipped classroom, we can form more autonomous, independent, self-constructive, participatory students with a high confidence in themselves. This in turn will develop other competencies that can facilitate the exercise of their profession. The structure of this document is organized as follows. First we present a review of the literature related to the various approaches that make up and theories that support the model of the flipped classroom. Next the paper presents the methodology that consists of an empirical study through the analysis of a sample of 30 students. The paper closes with conclusions obtained from the main results.

LITERATURE REVIEW

The inverted classroom was examined the first time by Lage, Platt and Treglia (2000) to detail the class strategy implemented in a specific economics subject (Tucker, 2012). Subsequently, Bergmann and Sams (2012) searching for a solution to prevent students from missing classes, began recording course lectures and distributed the videos among students for review. They developed and put into practice, what they called the Flipped Classroom model (Bergman and Sams, 2012; Talbert, 2014). The flipped classroom model developed by Bergmann and Sams (2012) brought a change in the dynamics of work in the classroom. It reverses the roles of traditional teaching, where the class activities, usually given by professor, are now performed by the student at home (study of the previous reading of indicated material), through the use of information and communication technologies (videos, forums, chat, email, social networking) and other tools and resources. These tools and resources are based on information and communication technologies, which allows a constant interaction of the student with the teacher and with their classmates. This process leaves open time for face-to-face sessions activities which require a greater participation and interaction, where the teacher participates only as a facilitator (Bergman and Sams, 2014).

Integration of emerging technologies in learning offers more content options and redefines class time as an environment focused on student (MacKinnon, 2015). In addition, to be considered items of technology, the theoretical framework of learning is related to the model constructivist (Davies, Dean and Ball, 2013), and specifically of Vigotsky (1980) with regard to the process of collaborative construction, questioning and problem resolution in a joint work program (Vigotsky, 1980). Implementation in a context of collaboration and exchange between students, stimulates and encourages the student teaching and learning, promoting the group participation discussions and the resolution of problems (Angelini, 2016). Experiential learning is based on a process of "student-centred continuous learning", in which the student experiences, reflects, contemplates and acts on what is learned (Coulal, 2014). In the flipped classroom, experiential learning allows student to practice in class, experiment, reflect, think and act in the construction of knowledge (Yeganeh and Kolb, 2009).

The foregoing, flipped classroom model, considers the identification of competencies a goal to be developed in the student. The teacher must classify the content that need to be learned by direct instruction (video-conference) and those that are better in experimentation. To reach the goals we should proceed with a methodology centered on the student (Bishop and Verleger, 2013), which leads to the implementation of active tasks and collaboration involving the deployment of mental activities where the teacher participates as facilitator (Baepler, Walker and Driessen, 2014). The flipped classroom has been transformed in recent years in a didactic resource of great relevance, whose extension and dissemination demonstrates the benefits available in the development of some programming and inserts a culture of digital learning life long learning (Coulal, 2014).

Flipped Classroom Model Student-Centered

Experiential learning is based on a process of "continuous learning student-centered", in which the student experience, reflects, contemplates and acts on what is learned (Coufal, 2014). In the case of the flipped classroom, experiential learning allows the student practice in class, experiment, reflect, think and act in the construction of knowledge (Yeganeh and Kolb, 2009). The approach requires the help of the educator to reach its full potential, in addition to highlighting the importance of collaboration and interaction between student and teacher. Therefore, it involves implementation in a context of collaboration and exchange among the students, stimulating and promoting the teaching of students learning, promoting group participation, group discussions and resolution of problems (Findlay-Thompson and Mombourquette, 2014). The flipped classroom model, considers the identification of target competencies that must be developed in the student a critical activity. The teacher must classify the content that need to be learned by direct instruction (video-conference) and those that are better placed in the experimentation (Davies, Dean and Ball, 2013). To reach the goals professors proceed with a methodology centered on the student (Bishop and Verleger 2013) which leads to the implementation of active tasks and collaboration involving the deployment of mental activities within the classroom where the teacher participates as facilitator (Kong, 2014). The flipped classroom has been transformed in recent years into a didactic resource of great relevance, whose extension and dissemination demonstrates the advantages it can offer for the development of optimal learning and inserts a culture of digital learning throughout life (Galway, Corbett, Takaro, Tairyán and Frank, 2014).

Flipped Classroom Model that Favors Meaningful Learning

This section describes theories about how the Flipped Classroom model offers a series of study alternatives. Student participation, the environment and the professor mediation from multimedia technologies, are essential elements for the improvement of the significant learning. This approach allows for review and study of the task or activity access if it is inside or outside the classroom. To develop the classroom conversely Lage, Platt and Treglia (2000) discussed the need to improve learning in a group economy and levelling the different types of learning that existed in one area. This is especially important when there exists diversity of students gathered in a group and the traditional styles of teaching of professor. In this perspective, the authors developed an environment of media with different levels of learning so that students could access easily and to integrate the group (Mason, Shuman and Cook, 2013; Mattis, 2014).

The Flipped Classroom model, through the support of multimedia technologies, allows the student to choose the best method, time and space to acquire the knowledge at his/her own pace (Cheung, 2014). The material is found in the multimedia system at different levels, for which the student can easily access. It is the responsibility of both actors participants to review the materials. The student devotes space and study for the apprehension of knowledge, and the teacher as a coach and facilitator to guide the practical activity for the improvement of significant learning (Angelini, 2016; Enfield, 2013; Enfield, 2013, Estes, Ingram and Liu, 2014). To implement the Flipped Classroom model successfully in the classroom, from the beginning of the academic cycle, the teacher notifies students of the steps to follow on the use of the new innovative methodology. These include the objectives and planning to implement the new model, training in the use of the Flipped Classroom model. This structure provides the student of numerous opportunities to demonstrate, with the practice, the apprehension of the content (Blair, Maharaj y Primus, 2015).

The central investigation of this work is to analyze whether the Flipped Classroom model and the use of multimedia technologies favors the learning of students who study the course theory econometrics. Students in the sample were in the sixth semester of the school year 2018, of the undergraduate in Industrial Economics in the National School of Higher Studies Leon Unit. If strategies like the inverted classroom are used more in higher education schools, we may form more autonomous, independent, self-constructive,

participatory students with a high confidence in themselves. This in turn will develop other skills that will facilitate the tasks the exercise of their professions.

METHODOLOGY

The methodology here is qualitative descriptive. The method is of observation and semi structured interviews, with the intention of obtaining information about the perception and experience of the students regarding implementation of the Flipped Classroom model. We examine if students achieve more active learning and improve the learning processes learning in higher education. We examine the method by observation and semi structured interviews with the goal of thinking about how to understand the perspective of the participants. We wish to learn how to study in depth the experiences, perspectives, opinions and meanings of the Flipped Classroom model (Cohen, Manion and Morrison, 2007). Since the method is qualitative, the research is non-probabilistic, and its results cannot be generalized to a population greater than that corresponding to the study object. However, the results obtained through interviews are of great importance, as it gathers information about the student's perception and experiences in the natural way of the classroom reality (Cohen, Manion and Morrison, 2007). The obtained results allow analysis and evaluation of the Flipped Classroom model. We examine if it stimulates and favors active learning among the students taking part of the undergraduate in Industrial Economics of the National School of Higher Studies Leon Unit, during the school year 2018.

Population Object of Study

The study population is composed of a group of 30 students who study the course of econometric theory, during the school year 2017-2018. Semi-structured interviews were applied to a sample of 30 students, who voluntarily participated in interviews with the purpose of investigating the process of implementation of the Flipped Classroom model. Participating students were willing to use part of their time to review classroom contents in your home, and subsequently presenting the results in class.

Instrument

One way to acquire data is simply to ask questions. Interviews and questionnaires apply this method. They gather information about facts, beliefs, feelings and intentions. Instruments as a data collection technique should take into account elements such as the approach raised in the research, the information to be collected, the characteristics of the source of information and the time for the process (Cohen, Manion and Morrison, 2007). Given the nature of the study under the qualitative paradigm, the instrument to be used is that of observation and semi-structured interviews. The semi-structured instrument contains selected questions with the purpose of gathering information about the perception and experiences of students about the process of implementing the Flipped Classroom model.

RESULTS AND DISCUSSION

This section presents an instrument with semi-structured interviews. The semi structured interview obtained information on content and issues that emerge and that can shed light on important aspects of the study subjects (Cohen, Manion and Morrison, 2007). The questions of the semi structured questionnaire gathered information and respond to the research question. This information enables and displays new perspectives experienced by a student in the Flipped Classroom model. The questions that give response to these reflections are: Has the Inverted Classroom model helped understand the main concepts of each topic? Has the use of digital technologies or multimedia in the course helped your understanding? What is your degree of satisfaction with the Flipped Classroom model in the course? What importance does the Flipped Classroom model have in knowledge and its learning?

These questions allow students to reflect and discuss implementation of the model Flipped Classroom. The perspective obtained from the results help identify the potential benefits, opportunities and improvement elements of active learning.

Interpretation of Results

Table 1 shows the findings derived from the opinions expressed by a sample of 30 students when using the Flipped Classroom methodology in the econometric theory course in the undergraduate in Industrial Economics of the National School of Higher Studies Leon Unit, in the period 2017-2018.

Panel A of Table 1 shows the results of the question 1 " Has the Inverted Classroom model helped understand the main concepts of each topic?" That answer expresses the expectation that students have when using the Flipped Classroom methodology for understanding knowledge and improving active learning. The answer is largely positive with 53.8% of the students expressing their agreement and 61.5% of responses expressing fully agreement. Only 7.7% of students were in disagreement and the remaining 30.77% were indifferent. We conclude from the interviews that 38.5 per cent of students are still find it difficult to apply the flipped classroom for all topics in the course.

Panel A shows that self-employment and collaboration of the students are of great importance for the success of the flipped classroom model. This is accompanied by the guidance of the teacher in the classroom and outside of the class. The Flipped Classroom model gives students more autonomy and responsibility in their active learning process. The teacher is a facilitator who should devote more time because they must continuously follow up the tasks that the student develops both from home and when presenting activities in the classroom.

Panel B of Table 1 shows the results of Question 2 "Has the use of digital technologies or multimedia in the course helped your understanding?" Answers indicate that the majority of students interviewed, 38%, fully agreed, in addition to 69.3% indicating agreement. Only 7.7% of students commented that they disagree and 23% of students were indifferent. We conclude from the interviews that students find it useful to implement digital technologies to improve active and meaningful learning in the classroom. The essential element of the Flipped Classroom model is the appropriate use of multimedia technologies to improve the learning processes in education. Digital technologies play a key role by through advantages that it offers for the review of tasks and practices available on a web platform through videos and readings. We conclude that media resource technology is relevant in education as a means to improve learning in the classroom.

Panel C of Table 1 present the results of the question 3 "What is your degree of satisfaction with the Flipped Classroom model in the course?" The results show that a high percentage, 46.1%, expressed agreement joined with 61.5% of respondents who fully agree. Students interviewed claim that the Flipped Classroom model is a major factor that motivates the work done inside and outside of class. It can significantly influence performance and is always under the accompaniment and guidance of the teacher. In contrast, 38.4% of students did not believe the Flipped Classroom generates greater satisfaction or greater performance in active learning compared to a traditional type class. Panel C shows in a positive manner that fundamental characteristics of the Flipped Classroom model, the motivation and the degree of satisfaction, are essential elements for a better development of the knowledge and a greater understanding of active learning.

Panel D of Table 1 presents the results of the question 4 "What importance does the Flipped Classroom model have in knowledge and its learning?" The results show a high percentage, 76.9%, responded with full agreement and agree. This indicates that the Flipped Classroom model is a fundamental factor for the acquisition of knowledge and promotes the active learning in the classroom. Only 7.69% of students

interviewed did not find the model generates greater performance in the learning than the traditional method. Finally, 15.3% of those interviewed were in disagreement with the prospect that the Flipped Classroom model influences the acquisition of a greater knowledge relative to traditional teaching. In summary, Panel D shows the importance the Flipped Classroom model has in knowledge. It allows greater learning by students.

Table 1: Results on the Implementation of the Model Flipped Classroom in the Course Econometric Theory, Period 2017-2018

Panels: Results of Semi-Structured Questions	Percentage on the Implementation of the Flipped Classroom				
	Totally Agree	Agree	Indifferent	Disagreement	Total
					30
Panel A: Semi-structured questions 1 Do you has proved useful to the methodology of the Classroom inverted to understand the main concepts of each topic?	7.7	53.8	30.8	7.7	100.0
Panel B: Semi-structured questions 2 Do you has proved useful the use of digital technologies or multimedia in the course?	38.5	30.8	23.0	7.7	100.0
Panel C: Semi-structured questions 3 What is your degree of satisfaction with the Flipped Classroom model in the course?	15.4	46.1	38.5	0.0	100.0
Panel D: Semi-structured questions 4 What importance does the model Flipped Classroom have in the knowledge and its learning?	46.2	30.8	7.7	15.3	100.0

Table 1 presents the percentages answered a sample of 30 students on the use of the model Flipped Classroom in the course Econometric Theory in the undergraduate in Industrial Economics of the National School of Higher Studies unit Leon, in the period 2017-2018. Panel A presents the results concerning the expectations of students regarding the understanding of knowledge and improve the active learning in the theory of econometrics course.. Panel B show the importance that students place on the use of technological resources and multimedia in education and the use of the model Flipped Classroom to improve the active learning in the classroom. Panel C shows the degree of satisfaction and the role that the student expects with the implementation of the Flipped Classroom model. Panel D presents evidence on the importance that the Flipped Classroom model has in allowing greater learning of the student.

CONCLUDING COMMENTS

The objective of this work was to analyze the model Flipped Classroom as a strategy for education that stimulates active learning of the students that studying theory of econometrics in the undergraduate in Industrial Economics of the National School of Higher Studies Leon Unit of the Universidad Nacional Autonoma de Mexico, in the period 2017-2018. The method consists of the application of an instrument with semi-structured questions to a sample of 30 students, with the purpose of gathering information about the perception and experience of the students regarding the Flipped Classroom model.

Results show that use of the Flipped Classroom model is a didactic form that generates greater autonomy and collaboration among students for the fulfillment of their tasks and practices from home and when presenting the activity in the classroom. In addition, it generates a prepositive and critical thinking that facilitates understanding and promotes active learning as it encourages and stimulates greater active participation of students. The appropriate use of multimedia technologies play a fundamental role in the implementation of the model flipping Classroom, by the advantages it offers for improving the learning processes in education. Use of these digital technologies facilitates the review of tasks and practices. One of the fundamental characteristics of the flipped classroom model, the motivation and the degree of satisfaction of the customers, are essential elements for better knowledge development a greater understanding of student’s active learning. The flipped classroom generates critical thinking that facilitates understanding and promotes active learning. Students indicated the Flipped Classroom model promotes

collaboration and responsibility. It facilitates communication through the use of digital technologies. The support of multimedia technologies greatly enhances the flipped classroom experience.

There are many teachers who use the traditional teaching in the delivery of their subjects. This may occur because of a lack of teacher training or a lack of awareness of these new innovative methodologies. So there exists a challenge to implement the flipped classroom model in certain subjects and careers. Another limitation that could involve the use of the strategy of the classroom reversed is the difficulty of students to adapt to this strategy. On the other hand, to implement this methodology, it requires an extra effort, both the students and the teacher.

The results here reveal challenges to implementing the Flipped Classroom model. Teachers should be trained and prepared to implement the Flipped classroom model. It is also important to prepare students for an obvious change in the processes of acquiring knowledge and active learning in the classroom. Future research might provide a better understanding of the processes of teaching and learning and to improve the active learning among students. Future research might also extend the implementation of the Flipped classroom model to other courses. Finally, it is necessary to evaluate and analyze the academic level of active learning of students after the implementation of the Flipped Classroom model.

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