



Flipped Classroom and Problem-based Learning in Higher Education. Latin-American Context

Wilson Guerrero¹

Abstract

Traditional teaching methods in higher education, among other causes, make students lose interest and efficiency in a subject. This causes repetition and student dropout. Although there is a lot of new teaching methods, educational institutions, teachers and even the students themselves have reluctance to implement them or to be part of the same by “comfort” or fear of change.

Among the main consequences of the repetition and dropout are economic losses for governments, institutions and families. In addition, students suffer frustration for not being able to move at the same rate of peers or not finishing their careers.

Higher education institutions (HEI) in Europe, Asia and North America have implemented new strategies and methodologies, between them the flipped classroom (FC), which consists in selecting internet readings or videos so they are read or seen by students in their homes and take advantage to the maximum the time in the classroom to perform practices, exercises, discussions, etc. However in the field of HEI in Latin America there are few studies on the application of this methodology and less active methods of learning such as problem-based learning (PBL).

This paper presents a research that applies a combined teaching method based on FC and PBL in the process of teaching and learning in higher education in the Latin American context, in a case study carried out for the “Office applications” subject and how readings, videos and questionnaires were generated for the process outside the classroom and the practices, exercises, problems and projects for processes within it.

The primary objective is to offer HEI’s teachers a guide for the use of the new methodological and technological tools for teaching of their subjects. In addition preliminary results of satisfaction and efficiency of students touch with this method are also presented.

With the implementation of this methodology (FC & PBL) is desired to obtain a high degree of satisfaction with the course to improve efficiency in the performance of students and therefore, to lower the percentage of repetition and dropout.

Keywords: Flipped Classroom, Problem Based Learning, Information and Communication Technologies, Education.

1. Introduction

The Technologies of Information and Communication Technologies (ICT) have had a great development in the last few years so it is necessary to include them in the educational system, leaving aside the traditional class and giving importance within the teaching-learning process to new emerging technologies. These new educational paradigms must contemplate five fundamental characteristics to be efficient according to UNESCO [1]:

Customization. Strengthen the programming of each student, recognizing their different contexts, interests, characteristics and tastes.

Focus on learning outcomes. Produce better learning outcomes for students, both in the curricular content, as in the broader skills development.

Enlargement of the times and spaces for learning. To contribute to overcoming the limits of space and time of the school year, information available at any time and place, through the creation of social knowledge networks.

¹ Universidad Tecnológica Equinoccial, Ecuador

New learning experiences. Incorporate new methods, new strategies and new educational resources such as: blended learning, project-based learning, and personalized learning environments. These will allow incorporation of educational games, social networking, online platforms, videos and other.

Collaborative construction of knowledge. Discover and develop new learning by working with others (collaborative learning).

The Horizon project of the New Media Consortium [2] in one of his reports tells us that one of the trends with greater short-term impact on higher education is the generalization of a type of blended learning. Because this provides a learning experience cohesive and flexible, in which the student has a constant support, in addition to with the ability to learn independently, but also to collaborate and to have more communication channels with their peers and teachers.

One of the methods used by the blended learning is flipped classroom (FC), characterized by being more flexible, active and motivating for students. The time is distributed in a different way, both inside and outside the classroom. Time is devoted to learning more cognitive, more dynamic, based on projects, so that they work together and face challenges that will allow a better understanding of the field of study. An educational process supported in digital texts, video lessons, podcasts, and online forums, to access before and after school. In this way, students manage the content to use, decide their own rhythm and style of their learning and choose how to put into practice the knowledge acquired [3].

In a study conducted in Mexico at the Autonomous University of Puebla in the areas of Engineering and Science mentions that, among others, the main factors for student dropouts are academic performance, with aspects such as the disapproval, the dedication and discipline, the difficulty of subjects and teaching methods [4]. In the same way in a similar study at the Universidad Central del Ecuador in the year 2012 it was concluded as the main causes for the repetition and dropout are the low performance, excessive load, the poor quality of the program, poor relationships with teachers and institutional problems [5]. Being then the academic subject a crucial factor for the student drop-out and repetition.

In addition, according to statistical records of student performance in the course Office, taken from the computer system of the Universidad Tecnológica Equinoccial (UTE) from the year 2012 up to 2015, it is clear that out of a total of 6385 students (the subject is transversal to all the schools), 62% approve of the subject in your first enrollment and a 9% between the second and third. These results are not efficient if we consider that this subject is not critical for the qualification of any of the schools of the UTE by their generic content, but can contribute to the dropout rate in each of them, because this is taught in the first level.

With the aim of improving the efficiency of the students in this course in the UTE, was implemented FC together to problem-based learning (PBL) in a unit of study (spreadsheets) of the subject Office supported in the LMS Moodle.

2. Methods

Prior to the implementation of FC and PBL are conducted two surveys to 14 teachers that dictate the course Office, to define the methods and strategies used by these in the teaching-learning process and a satisfaction survey to 4727 students of all schools that have completed the course, to determine the degree of satisfaction and performance of these with respect to the subject matter of spreadsheets and found the following: (a) All teachers use traditional classes (presentation of the item, definition of concepts and examples, guided exercises and tasks), (b) the 74% of students consider that they have had problems in the topic spreadsheets, (c) the 44% of the lecturers considered that the solved exercises in class and of the tasks Do not relate to the professional skills of their schools and that do not solve the real problems.

Once the above analysis, the following activities for the implementation of the two methodologies (FC and PBL) were performed:

- The multimedia content was generated: lectures, videos, quizzes, practices, problems to be solved and projects.
- The "Class Moodle" was designed with the methodology FC and PBL for the spreadsheets.
- The course was implemented in six groups of the Semester April - August 2016, with a total of 138 students of the specialties: Hospitality and services, Architecture and Urbanism, Health Sciences and Administrative Sciences.
- Satisfaction surveys were answered by the students. These include four aspects (pedagogical tools, LMS, PBL and FC) with 27 questions. Of these two question are analyzed to measure satisfaction with PBL and two questions to measure satisfaction with FC.
- And the analysis of the approval of the course.

3. Results

In the first place, was generated the course structure taking into account: the contents (micro curriculum), the area where you will carry out the activities (the house and the class) and resources for each one of them (readings, videos, quizzes, practices, problems to be solved and projects) according to figure 1.

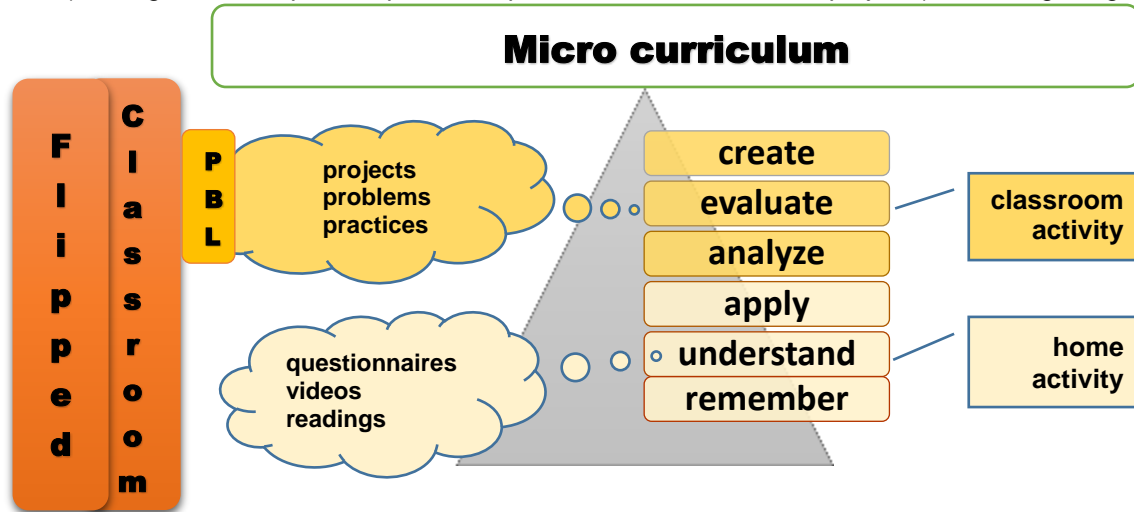


Figure 1. Relationship between Bloom's taxonomy, flipped classroom and problem-based learning

Readings. It was decided to generate readings only with the conceptual part of each topic because the exercises-examples of application is performed in the videos. For this: (a) the existing information in the guide that was used was analyzed and synthesized with the most important information, (b) new illustrations were designed and (c) files in Portable Document Format (PDF) were created.

Videos. The videos were made as a complement to the readings. They present the resolution of exercises step by step with his explanation and were recorded and edited with the software Camtasia. Each video has a duration between 10 and 12 minutes. The videos have the following scheme: (a) Subject and greeting, where a brief introduction of the topic and explains the exercise; (b) content, where it develops step by step the same and (c) conclusion and data, which explains the solutions found and the results obtained.[6].

Questionnaires. After students read the readings and watch the videos, is to ensure that students have made answering a test that has been created with the activity "questionnaire" of Moodle. These were prepared with questions of type: multiple choice, true or false, fill in blanks, matching and drag and drop on the text. Each test consists of several questions, between 5 and 10, depending on the subject and a value of 10 points to each one.

Practices, problems to be solved and projects. Students must solve various types of real problems using "Microsoft Excel" and "Free Office Calc". These problems were defined by Level of difficulty: (a) practices are basic problems (simples) that allow students learn the use of the tool and these can be resolved individually, b) the problems to solve that have a medium level of difficulty, they require a greater degree of analysis by the students and can be solved in groups of two or three students and c) the projects which cover all the topics of spreadsheets and its complexity is defined to be resolved by groups of up to 5 students.

Satisfaction Surveys. These allow you to check the degree of satisfaction of the students with the two methods implemented. For questions related to FC:

- a) Q1. ABP and FC are more effective than traditional methodologies?
- b) Q2. Would you recommend this methodology (FC) for other subjects?

The answers to the two questions have the same tendency of approval, since, among the options "always" and "almost always" in the first question 78% was obtained and in the second 81%. See figure 2.

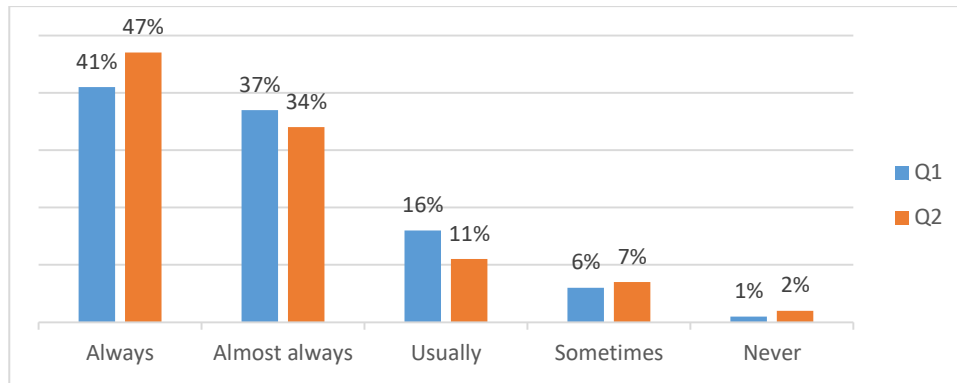


Figure 2. Survey of satisfaction on FC

For questions related to PBL:

a) Q3. With the solution of real problems, you relate better to the subject with the professional area that studies?

b) Q4. Have you been able to you satisfactorily resolve the problems - projects?

The trend of the two answers are also equal. The 63% approve of the relation of the subject to the career and the 62% has satisfactorily resolved the problems projects. However, the percentage of approval is less than the previous two questions, because the class groups are formed by students who belong to different schools and the problems - projects were created with general topics. See figure 3.

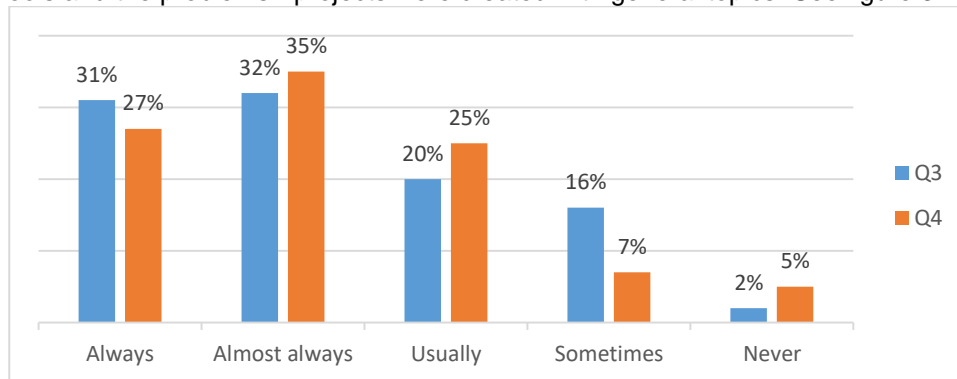


Figure 3. Survey of satisfaction on PBL.

Efficiency. The rate of approval after having implemented FC and PBL was 89%, while in the previous semesters between the years 2012 and 2015 was 71%.

4. Discussion

This first implementation of methods FC and PBL for the “Office applications” subject in the UTE has made it possible to find positive and negative aspects:

Create readings and videos took a long time and was a hard work, however having been made by experts in the field of computer science but not experts in recording and editing videos or graphics design [7]. Therefore, it is suggested to train teachers in these areas to be more efficient and that the products are of quality. However once you have all these resources these can be replicated in the following groups in the future.

Some students resolved the practices at home, however could resolve them in class the next day with some help from the teacher, this indicates that FC allows students to progress at their own pace. The problems to be solved in groups of two or three people allowed their members to share their knowledge between them and with other groups when they were stuck in a complex situation, but also counted with the support of the teacher to face this kind of situations when no group found solution [8].

The projects, resolved in larger groups allowed the students to divide a large problem into smaller problems and to propose their own possible solutions [10]. A basic problem at this point is that groups of students belong to different schools so that it is strengthened in its entirety the link between these and the subject.

FC and PBL allowed the student to be the center of the teaching-learning process because it seeks knowledge through technological and pedagogical tools provided by the teacher. The latter happens to be a guide and tutor who goes by identifying and correcting the way that they must follow.

The number of students approved was increased by 18% in the office, but it is necessary to continue implementing FC with methods such as: PBL, case studies, gamification, mobile learning (m-learning), among others methods, in order to continue to improve the efficiency of the students with this and other subjects of stockholders the repetition rates and dropout therefore both in the UTE as in Latin American and Ecuadorian universities.

5. References

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