Institut de Recerca en Economia Aplicada Regional i Pública
Research Institute of Applied Economics

Document de Treball 2016/09 1/25 pág.
Working Paper 2016/09 1/25 pág.

"Retaking a course in Economics: Innovative methodologies to simulate academic performance in large groups"

Abio G & Alcañiz M & Gómez-Puig M & Rubert G & Serrano M & Stoyanova A & Vilalta-Bufí M

Institut de Recerca en Economia Aplicada | *Research Institute of Applied Economics*

Institut de Recerca en Economia Aplicada Regional i Pública
Research Institute of Applied Economics
Universitat de Barcelona
Av. Diagonal, 690 • 08034 Barcelona

WEBSITE: www.ub.edu/irea/ • CONTACT: irea@ub.edu

The Research Institute of Applied Economics (IREA) in Barcelona was founded in 2005, as a research institute in applied economics. Three consolidated research groups make up the institute: AQR, RISK and GiM, and a large number of members are involved in the Institute. IREA focuses on four priority lines of investigation: (i) the quantitative study of regional and urban economic activity and analysis of regional and local economic policies, (ii) study of public economic activity in markets, particularly in the fields of empirical evaluation of privatization, the regulation and competition in the markets of public services using state of industrial economy, (iii) risk analysis in finance and insurance, and (iv) the development of micro and macro econometrics applied for the analysis of economic activity, particularly for quantitative evaluation of public policies.

Abstract

Students who have to retake courses at university are often not only low-achieving, but also unmotivated and lacking self-confidence. These problems may be accentuated in large groups of repeater students. In this context, the implementation of new teaching approaches to cater for their needs is a priority. This paper reports the experience of a teaching strategy based on the implementation of flipped classroom, team-based learning, and frequent testing methodologies in large groups of students retaking a subject. The study was carried out during the academic years 2013/14 and 2014/15 at the Faculty of Economy and Business, University of Barcelona (Spain). The results reflect a significant increase in the motivation and academic performance of these students, and validate the application of this strategy in large groups.

JEL classification: A20; A22

Keywords: Teaching innovation; flipped classroom; team based learning; frequent testing; large groups; retake subjects; economics.

Gemma Abió: Department of Economics, Faculty of Economics and Business, University of Barcelona ,Spain. E-mail: abio@ub.edu.

Manuela Alcáñiz: Risckcenter Research group–IREA. Av. Diagonal 696; 08034 Barcelona ,Spain. E-mail: malcañiz@ub.edu

Marta Gómez-Puig: Risckcenter Research group–IREA. Av. Diagonal 696; 08034 Barcelona ,Spain. E-mail: marta.gomezpuig@ub.edu

Glòria Rubert: Department of Economics, Faculty of Economics and Business, University of Barcelona ,Spain. E-mail: gloriarubert@ub.edu

Mónica Serrano: Department of Economics, Faculty of Economics and Business, University of Barcelona ,Spain. E-mail: monica.serrano@ub.edu

Alexandrina Stoyanova: Department of Economics, Faculty of Economics and Business, University of Barcelona ,Spain. E-mail: alexandrina.stoyanova@ub.edu

Montserrat Vilalta-Bufí: Department of Economics, Faculty of Economics and Business, University of Barcelona ,Spain. E-mail: montsevilalta@ub.edu

Acknowledgements

This paper is based upon work supported by the University of Barcelona under grant number 2014PID_UB/031.

1. Introduction

Since the adoption of innovative techniques which facilitate the engagement of students in active learning, university teaching has frequently diverged from the traditional master class schema. The introduction of these methodologies changes the focus of study and promotes students' active participation in the learning process. This is especially necessary in the case of students with a history of poor academic performance – for example, students retaking a subject on their degree.

Academic underperformance has significant costs. In addition to the monetary outlay required to reenroll, it may have a psychological impact in the form of disappointment and avoidable stress. There are social costs as well: public universities are partly financed by public resources, and students' achievements are the returns to this public investment. Therefore, developing strategies to avoid failure is a desirable step, as is any policy aiming to increase teaching quality.

Some low-achieving students have a poor knowledge background which hampers their learning process, while others lack the skills and learning habits required to perform successfully in education (Kruger and Dunning, 1999; Pennebaker *et al*., 2013). So it is especially important to design active learning techniques that also help low-achieving students to develop effective learning habits.

Several accounts report larger gains in student learning when using more interactive class formats than when using the traditional lectures. For instance, Deslauriers *et al*. (2011) show that even when the master class was delivered by a highly regarded and expert professor, the students' benefits in terms of learning were lower than in a more interactive context, even when the latter was led by a post-doctoral student with far less teaching experience. Baepler (2014) showed that lecture time can be reduced with the introduction of active learning sessions without worsening student results. Furthermore, Park and Choi (2014) performed an experiment

to prove the existence of "golden" and "shadow" zones in the classroom that discriminate students' learning experiences depending on their seating positions. They found that, unlike the traditional classroom, the active learning classroom does not produce this positional discrimination. Indeed, students perceive the environment as more inspirational, especially in regard to active class participation, while students with higher academic achievement show a greater tendency to share information and to create new ideas in an interactive classroom format than in a traditional one.

In this context, Flipped Classroom (FC) and Team Based Learning (TBL) stand out as leading active learning methodologies. FC is a pedagogical strategy that focuses on the importance of the use of class time for the construction of knowledge rather than the transmission of information. In this way, it reverses the traditional educational arrangement: students prepare content and concepts before the class time, and the classroom is transformed into a dynamic space where the instructor guides the students through an interactive learning environment. The beginning of the FC can be traced to the 1990s (King, 1993; Mazur, 1997; Crouch and Mazur, 2001) and it became popular during the 2000s (Bergmann and Sams, 2012). Although many experiences support the success of the FC (McLaughlin, 2013; Missildine *et al*., 2013; Wilson, 2013), the empirical evidence of its effectiveness remains limited. In general, studies highlight the improved achievements of the students, their stronger participation, the improvement of attitudes toward learning and teaching, and a greater satisfaction of teachers involved in the model (Lage *et al*., 2000; Berrett, 2012; Strayer, 2012; Chung, 2014; and Prieto *et al*., 2014).

In the TBL methodology, master classes play a minor role and they are substituted by activities devoted to interactions between small groups of students, who reinforce not only their knowledge and learning processes (Nordberg, 2008; Shah, 2013; Opdecam *et al*., 2014), but their interpersonal communication skills as well (Michaelsen *et al*., 2004). A "cooperative learning" strategy, therefore, enhances the interconnection between students who, through their

involvement in a common project, achieve better academic performance (Yamarik, 2007), increase their self-esteem, and foster their spirit of teamwork (Millis *et al.* 1998).

Besides these two active learning methodologies, another instrument that helps students to develop their learning habits is Frequent Testing (FT). Roediger *et al*. (2011) discuss the benefits of testing, which go beyond mere assessment. Quizzes allow students to identify the gaps in their knowledge, provide professors with feedback on the learning progress and, most importantly, improve learning. Pennebaker *et al*. (2013) identified some of the benefits of frequent testing as their immediate feedback spillover to other concurrent and subsequent subjects and an improvement in students' learning habits. Moreover, within testing activities, teamwork has shown to increase the engagement of students and to enhance the productive learning behaviors of both low- and high-achieving students (Hong and Pham, 2013).

Although the idea to substitute lecture time by active learning activities was originally designed for small groups, Jackson and Prosser (1989) already advocated the implementation of new learning techniques in large groups. In fact, Knight and Wood (2005) found that introducing student participation and cooperative problem-solving during class time in large biology groups increases student performance. As yet, however, there is not much evidence of the benefits that a more interactive classroom format may produce in groups with a large number of students.

In an attempt to fill this gap, this paper presents the results of our experience of implementing these three methodologies – FC, TBL and FT – with students in the Groups of Intensive Study (GIS) at the University of Barcelona, Spain. The GIS are special groups designed by the university for students retaking a subject. These groups comprise more than 100 students who are not only low-achieving students with a weak knowledge of the subject but are often unmotivated and lacking self-confidence. In this context, the incorporation of the FC, TBL and FT methodologies to motivate and organize students' work at both individual and team level has represented a breakthrough and has achieved with significant student learning gains.

The study was carried out during the academic years 2013/14 and 2014/15 in four subjects in the Economics degree at the University of Barcelona (Spain): Microeconomics of the Business Administration Bachelor Degree (BA); and Introduction to Economics, Microeconomics I, and Microeconomics II of the Economics Bachelor Degree (ECO). The results show a significant increase in the motivation and academic performance of these students and suggest that this educational strategy may be helpful in the teaching of many other subjects.

The paper is organized as follows. In Section 2, we describe the context of the experience, providing some institutional background and a detailed explanation of the GIS. Section 3 presents the methodology proposed for improving the academic achievements of GIS students. Results are reported in section 4, which also includes the outcomes of a survey administered to the participating students. Finally, section 5 concludes.

2. Background

2.1. The University of Barcelona

The University of Barcelona is one of Spain's oldest universities. It was founded in 1450, and today it is the largest university in the region of Catalonia (Spain), catering to the needs of more than 45,000 undergraduate students and delivering a comprehensive range of higher education courses. The Faculty of Economics and Business, the largest in Catalonia with around 10,000 students, offers undergraduate degrees in Economics, Business Administration, International Business, Sociology, and Statistics. All the subjects on these degrees are taught in semesters corresponding to 15 academic weeks. In all degrees, the learning load of each subject equates to 6 European Credit Transfer System (ECTS) credits, a standard measure adopted by the universities in the European Higher Education Area (for the student, one ECTS credit equates to 25 hours of work). Regular groups are scheduled in the morning (from 8:30 to 13:30) or afternoon/evening (from 16:30 to 21:00). For a regular subject of 150 hours, 60 hours are

devoted to face-to-face activities, 40 hours to supervised work, and 50 hours to independent learning. Although the standard assessment system is based on continuous supervision of learning progress, students always have the option of sitting only the final exam.

2.2. The Groups of Intensive Study (GIS)

As students retaking a subject already followed lectures the previous year, they usually attend fewer classes than new enrolments. They are usually low-achieving students with poor study habits and frustrating academic experiences. All these conditions may have a considerable effect on their motivation and self-confidence, and thus have a negative impact on their educational attainment.

In the 2011/12 academic year, the University of Barcelona introduced the GIS in order to respond to these students' needs. The main purposes were to encourage class attendance and to improve learning performance. Like the regular groups, the GIS bear six ECTS credits. However, there are fewer face-to-face educational activities: two hours per week instead of four. This structure represents an increase in both the work supervised by the lecturer, who has to prepare further materials for these groups, and in the autonomous learning required of the student. GIS are scheduled in the midday slot (one day a week from 14:00 to 16:00) so that retaking students can attend both GIS classes and those of the other subjects in the current academic year that they take in a regular group. GIS were also designed to contain fewer on-site activities in order to reduce the absenteeism rate.

At the beginning of the GIS program, the methodologies applied were similar to those of the regular groups, but the lectures were given faster or the teacher explained only a part of the subject's contents. The assessment system was also similar to that of the other groups: that is, students could choose between continuous or single assessments.

Despite the efforts, during the 2011/12 and 2012/13 academic years results were disappointing: the attendance at face-to-face activities, the percentage of students who sat the exam and the proportion of students who passed the course was usually lower than in the regular groups. There were several possible reasons. First, the lecturer could hardly incentivize and evaluate the autonomous learning if students did not participate in the face-to-face activities or decided not to follow the continuous assessment system. Second, the GIS required the retaking students to carry out large amounts of autonomous work. Another possible reason might also be related to the characteristics of the students who enroll in the GIS. As these students had not passed the course in the previous academic year, they are not a representative sample of the general population of students and are more likely to have difficulties with their studies.

Our experience with these students showed that they might have a lower capacity for analysis and synthesis, a lesser ability to organize their work and to manage time, and less motivation to pass the subject. This led us to implement a new teaching strategy to better address these students' needs and to help them move ahead successfully.

3. Teaching strategy

To improve the learning performance of students in the GIS, we proposed a strategy based on the joint implementation of the FC, TBL and FT methodologies. During the second semester of 2013/14 and throughout the 2014/15 academic year, we carried out a trial experiment in four subjects – Microeconomics (BA), Introduction to Economics (ECO), Microeconomics I (ECO), and Microeconomics II (ECO) – to test the results of these methodologies and to improve the strategy design for future implementations.

The main goals of this methodology are, on the one hand, to stimulate students' autonomous work before each session; and, on the other, to invigorate the sessions, creating an interactive working environment in the classroom. As a result, a continuous and more efficient learning of

the subject and a better acquisition of competences are expected. Teamwork and interaction between students is one of the core elements of the strategy. By working together, students develop a large number of skills: the capacity of analysis and synthesis, time management, oral communication, the ability to negotiate, leadership, knowledge transfer or achievement motivation, among others. This methodology also increases students' awareness of the progress in their aptitudes and knowledge, because they receive feedback on their performance in each session and get into a learning routine. Therefore, this method improves students' academic skills and may well have a knock-on effect on their performance in the rest of subjects in their degree.

3.1. Description of the methodology

Before the first session, students received an e-mail explaining the new methodology that will be followed during the course. The method and the grading system was also described in detail during the first day of classes and students were encouraged to ask questions. Any doubts they had were resolved by the lecturer. Students were allowed to choose between the two options of the single assessment system, i.e., sitting only a final exam, or continuous assessment following the new methodology based on FC, TBL and FT. Students who chose continuous assessment were grouped into teams of three or four, which were maintained until the end of the course. Class attendance was mandatory for the students who chose the new methodology. Depending on the number of topics or units in each subject and the length of the semester (usually 15 weeks per semester), a number of two-hour weekly sessions were devoted to each topic or unit, including theoretical and practical classes. This schedule was made available to all students via the subject's digital platform, and they were also informed in advance of the material they were expected to prepare for each session.

Theoretical sessions always started with a FC activity: students had to answer an individual multiple-choice quiz of 10 questions based on the material that they had prepared in advance for the session. This lasted for around 15-25 minutes. The lecturer collected individual answers for evaluation. Immediately afterwards, the TBL activity started: students formed their teams and together they solved the same 10 multiple-choice questions. This exercise obliged students to discuss the questions and to reach a consensus with their colleagues on the right answer. Each team had to deliver a single solution to the quiz to the lecturer after another 15-25 minutes. Then, the lecturer wrote the answers on the board and responded to all the doubts and questions that might arise. The remaining time of the session (around 30-40 minutes) was devoted to an explanation of the topic's more complex theoretical concepts. Practical sessions consisted of the resolution in teams of applied exercises in the classroom. Together, each team had to solve numerical and graphical problems related to the topic. In order to encourage participation in the team work and further increase students' motivation, we developed the "extra points" strategy, which consisted of giving an additional point in the grades of the students belonging to the first team that resolved a proposed problem and presented and explained the solution on the board to the rest of the class (see Table 1 below). Although this was not the primary objective of our strategy, the presentation of the solutions on the board can also be considered as an important part of developing and improving students' presentation skills.

The flexibility of the methodology allowed the structure of the sessions to be adapted to the specific characteristics of each subject. Thus, in some GIS the theoretical and practical classes were combined in a two-hour session, devoting one hour to each part; while in others, a single theoretical or practical class is developed in a two-hour session, with the same structure described above. In both cases, students devoted the same total number of hours to both activities. Besides these two variants, the structure of the theoretical sessions was also applied to solve exercises; in this case, students had to solve an exercise first individually and then in

teams. After each session, students received feedback on their performance (both individual and team). Finally, during the last week of the course students were asked to fill in self-assessment and co-assessment questionnaires in which they evaluated their own work and that of their teammates. Students were informed about these questionnaires at the beginning of the course and the importance of commitment to the team with regard to their own individual performance was stressed in order to encourage active participation in teamwork and to prevent free-riding behaviors.

3.2. Grading system

The assessment and learning activities in GIS are designed to help students to successfully follow the subject, meet the learning objectives, and demonstrate their progress. Each grading activity is directly related to one or more learning objectives and reflects the novel elements introduced with the FC, TBL and FT methodologies. Table 1 provides a breakdown of all components included in the grading system.

Table 1. Summary of assessment policy according to type of group of enrollment

Assessment in GIS		**Assessment in regular groups**	
Grading Activities	**% of the Final Grade***	**Grading Activities**	**% of the Final Grade***
Final exam	60%	Final exam	60%
Average of all individual tests	15%	Test 1 of continuous assessment	15%
Average of all team tests	15%	Test 2 of continuous assessment	15%
Self- and co-assessment questionnaire	10%	Homework assignments and class participation	10%
Team problem solving and presentation*	0-10%		

* The 10% of the final grade corresponding to this category is an extra-credit option. It is obtained only by students who actively participate in team problem solving and who present the solutions on the board to the rest of the teams.

The format, content and weighting of the total grade of the final exam is the same for all students on the same course – that is, those in the GIS and those in the regular groups. What differs

between students enrolled in GIS and in regular groups is the format and type of the continuous assessment activities but not their overall weighting in the final grade (40%). The weighting of the final exam is 100% for students who chose the single assessment, i.e. sitting only for a final exam.

A closer look at the two continuous assessment schemes reveals that the activities in the GIS aim to stimulate autonomous learning before class and to foster active participation during the two-hour weekly sessions, whereas the two tests of the continuous assessment in regular groups are performed after the explanation of the corresponding topics or units.

4. Results and discussion

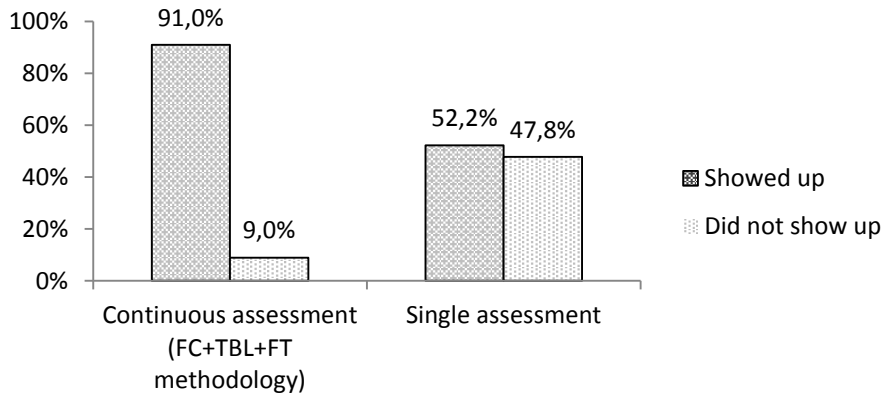
A total number of 610 students enrolled in one of the selected GIS in the different subjects on the ECO and BA degrees during the 2013/14 and 2014/15 academic years. All had attended regular classes in the subject over the past 1 to 3 years, and all had failed. Of the 610 students, 476 (78%) decided to follow the new methodology; this percentage ranging from 63.6% to 92.2% depending on the group. The remaining 22% of all enrolled students chose the alternative assessment option of sitting only for a final exam. Although they were also encouraged to attend classes and to take the weekly multiple-choice quizzes, most of them did not. Results for the 610 students are presented below.

4.1. Overall student performance in the GIS with the new methodology

There were major differences in performance between the students in the GIS following the new methodology, i.e., the continuous assessment based on FC, TBL and FT, and those who chose to sit only the final exam, i.e., the single assessment. Figure 1 shows the percentage of students who attended the final exam according to type of assessment methodology. The average no-show rate in GIS was 17.5%. However, this rate was more than five times higher

among students who had opted for the single assessment (47.8%) than among those who followed the new methodology (9.0%).

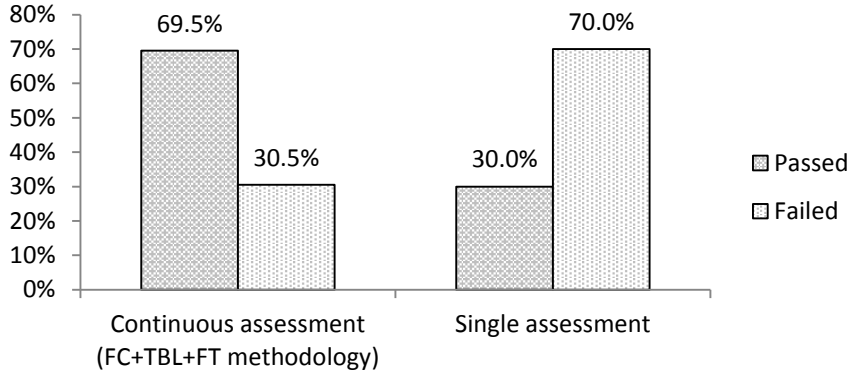
Figure 1. Percentages* of GIS students who showed up/did not show up for the final exam, by type of assessment.



* Over the total number of students enrolled in GIS by type of assessment. GIS=Groups of Intensive Study.

Among GIS students who attended the final exam, academic performance also differed depending on the type of assessment system followed. Figure 2 shows that the ratio of students who successfully passed the final exam was 2.3 times higher among those students who chose continuous assessment and, hence, the new teaching methodology.

Figure 2. Percentages* of GIS students who passed or failed the final exam, by type of assessment.

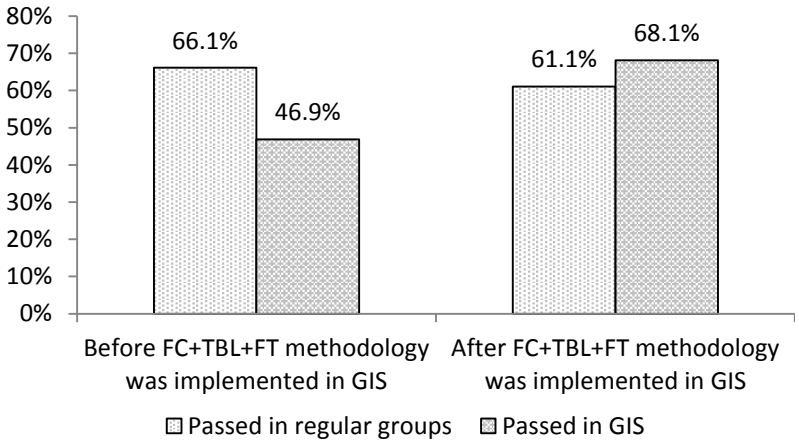


* Over the total number of students enrolled in GIS who took the final exam by type of assessment. GIS=Groups of Intensive Study.

The better performance of those students following continuous assessment may simply be the result of the decision of the most diligent students to opt for this type of evaluation. A comparison between GIS groups before and after the implementation of the new teaching methodology would be a better way to analyze the effect of this methodology on students'

performance. Figure 3 shows the percentage of students who passed the subject, distinguishing between standard groups and GIS, as well as the academic years. The first two columns refer to the 2011/12 and 2012/13 academic years, before the introduction of the new methodology, and the last two columns correspond to 2013/14 and 2014/15, when the new strategy was in place. The results show that the introduction of the new methodology raised pass rates among GIS students by nearly 50% (from 46.9 to 68.1%) while in the standard groups the pass rate actually fell slightly. These findings suggest that it is the new methodology in the GIS that is behind the improvement.

Figure 3. Percentages* of students who passed the subject, by type of enrollment.



* Over the total number of students who took the final exam. GIS=Groups of Intensive Study

All these results suggest that the combined learning strategy based on FC, TBL and FT with students who have previously failed the subject has great potential: it stimulates autonomous learning and increases students' abilities for collaborative learning, which consequently leads to better academic performance.

4.2. Results from the self-administered survey

In order to assess the students' opinions about the new teaching strategy, we asked them to take an online survey as part of the coursework. The completion of the survey questionnaire was not mandatory, but if completed it accounted for up to 10% of the final grade (see Table 1). The

survey contained self-assessment questions as well as joint assessment questions related to the involvement of other members of the student's team. A limited space for a short evaluation of the new methodology was also provided. Three out of four students of those who followed the new methodology (357 out of 476) completed the questionnaire.

Firstly, the students were asked whether they had regularly attended classes during the previous year, when they had failed the subject. The answers to this question are presented in Table 2 (upper panel). Almost 70% attended more than half of the classes or they had attended classes quite regularly.

Secondly, students were asked to think about why they had failed the subject the previous year. Multiple responses were allowed (see Table 2, lower panel). More than half of students reported not studying regularly and 35% reported that they did not sufficiently prepare for the exam. Around one fifth of students considered that they could have done better had they chosen continuous assessment. A few did not take the final exam. Below 30% of students mentioned other reasons such as being in poor health for a significant part of the term, lack of motivation, learning difficulties, and so on. The results show that, for a significant proportion of students, these negative factors can be addressed to a certain extent with the new teaching strategy implemented in the GIS. In particular, the new methodology helps students to study regularly, encouraging them to review the material before each class and to prepare better for the final exam.

Table 2. Results from the self-administered survey

Questions and responses	% over all students who completed the questionnaire
"Had you attended classes during the previous year?"	
Attended classes quite regularly	45.9
Attended more than half of the classes	23.5
Attended less than half of the classes	20.5
Never attended classes	10.1
"Why did you fail the subject last year?"	
I did not study enough for the exam	35.3
I did not regularly study and review the material	51.3
I did not choose the continuous assessment option	20.4
I did not show up to take the final exam	5.6
Other reasons	27.7

The students were also asked which of the teaching methodologies they preferred, i.e., the one applied in other GIS groups or the new one implemented in the study. In their answers, the students outlined the reasons for their choices. Around 68% stated they would choose the new methodology over the standard one, and 12% said that they would like to follow a combination of the two methodologies or a modified version of the new one. The remaining 20% declared they would prefer the standard methodology because of the mandatory class attendance and the autonomous learning before the weekly multiple-choice tests. However, all students (regardless of their preferences) declared that the most positive feature of the teaching strategy was the teamwork during sessions and also during the time they devoted to preparing for the exams. The main findings from the self-assessment survey are summarized in Table 3.

Table 3. Results from the self-assessment questionnaire

Questions	Mean value*	Std. dev.
I actively participated in the team work	5.2	0.96
I had a good relationship with the other members of my team	5.7	0.75
I spent enough time studying the subject	4.1	1.03
I worked autonomously in order to achieve the objectives of the course (reviewing the material, reading the manual, solving problems, etc.)	4.2	1.17
I actively participated in classroom activities and discussions	3.4	1.50
I used to pay attention in class	4.8	1.01
I had the right attitude during classes (paid attention, do not disturb classmates, etc.)	5.3	0.87
I am satisfied with my progress in the subject	4.2	1.23
I found the new methodology very helpful to learn the subject and it helped me to successfully complete the course	4.3	1.49
I prefer the new methodology to the standard one used in other GIS courses	4.3	1.81
I think that the new methodology has made me study regularly and work harder during the term compared to other GIS courses	4.4	1.71
The new methodology has made me attend classes on a regular bases compared to other GIS courses	5.0	1.48

Note: * A six-point scale ranging from "totally disagree" (1) to "totally agree" (6) was used to collect the data from the self-assessment survey.

Tables 2 and 3 show that the new teaching strategy helped students to fulfill the learning objectives of the subject and to pass the exam. They were also more motivated to attend classes, study regularly, and review the course material. The weakest point was participation in the class, with an average evaluation of 3.4.

4.3. Evaluation of teamwork and of team members' involvement

The online survey also included a section on team performance assessment, in which students had the opportunity to evaluate their teammates' efforts. They were asked several questions concerning commitment, interest, understanding and contributions to the teamwork of each member, ranking each partner's skills. Table 4 shows the results for each question.

Table 4. Results from the co-assessment questionnaire

Questions	Mean value*	Std. dev.
He/She has shown knowledge of the topics	4.77	1.16
He/She has been committed to the teamwork	5.00	1.22
He/She has been punctual and concerned about the teamwork	5.07	1.26
He/She has spent enough time preparing the sessions	4.62	1.26
He/She has shown leadership	4.53	1.34
He/She has shown the capacity to explain economic concepts to the other members of the team	4.70	1.31
He/She has shown the capacity to solve problems	4.73	1.28
He/She has shown the capacity to defend his/her own opinion	4.80	1.29
He/She has contributed significantly in the teamwork's performance	4.86	1.32
I would like him/her to be a member of my team in the future	4.83	1.40

Note: * A four-point scale ranging from "totally disagree" (1) to "totally agree" (6) was used to collect the data from the co-assessment survey.

The results are in concordance with the ones presented in Table 3, in which students stressed that they had not only participated actively in the team work but that they had a good relationship with the other members of the team. Thus, the students' feedback showed that teamwork proved particularly successful, since in general they were satisfied with their team-mates' involvement and performance.

Table 5 summarizes the results of Table 4 and reflects the overall satisfaction with the team members. Again, the figures suggest that a majority of the students were clearly satisfied with their team members, while only 9.5% seemed to be disappointed with them.

Table 5. Overall assessment of the partners in the team.

Responses	% of all responses
Clearly satisfied	62.8
Satisfied	27.7
Not satisfied	9.5

5. Conclusions

This educational innovation study combines three methodologies for improving the learning experience in large groups of retake students: the FC, the TBL and the FT. The results suggest that students benefit from the guided autonomous study, the continuous feedback they receive, and the teamwork, which combined to allow a better understanding of the concepts involved. The gains are reflected in the increase in the percentage of students who sat the final exam and in the higher pass rate in GIS, thus changing the earlier tendency found in GIS and regular groups. As in Bryson and Hand (2007), the subjects' higher engagement and sense of responsibility increased their motivation to learn. Moreover, the new methodology was widely accepted by students. This point is especially significant if we take into account that the large size of the groups might have been seen as a hindrance. Although in general students seemed not to welcome the autonomous work, they valued the teamwork and the collaborative learning very highly.

In addition, the strategy was shown to help students improve their attitudes towards studying and their academic performance. The introduction of active learning techniques helps students not just to succeed in a particular subject but to develop a set of skills that enhance their preparation both for further education and for future employment. Moreover, group discussions and active learning facilitate the development of teamwork, communication, leadership and social skills – all of them attributes that are highly valued in the labor market (Kuhn and Weinberger 2005, Heckman et al 2006, Borghans et al 2014).

This study describes a scenario in which an innovative methodology based on a combination of FC, TBL and FT produced rewarding, enriching results. The method is particularly useful when students come to the course with an adverse academic experience and have to study in large groups with only very reduced face-to-face contact with the lecturer. In line with Yamarik (2007) and Roach (2014), the improvements in their academic performance reflected in their

test grades, and the satisfaction they report, argue in favor of the use of these learning techniques in economics education.

Although the study was carried out with groups of economics students repeating subjects, its success suggests that it may be beneficial in other subject areas and also in groups of students taking a subject for the first time.

References

Baepler, P. 2014. It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. *Computers and Education* 78, 227-236.

Bergmann, J., and Sams, A. 2012. *Flip your classroom: Reach every student in every class every day.* Washington, D.C.: International Society for Technology in Education.

Berrett, D. 2012. How 'flipping' the classroom can improve the traditional lecture. The Chronicle of Higher Education. http://chronicle.com/article/How-Flipping-the-Classroom/130857/

Borghans, L., Ter Weel, B., and Weinberg, B.A. 2014. People skills and the labor-market outcomes of underrepresented groups. *Industrial & Labor Relations Review* 67 (2), 287-334.

Bryson, C., and Hand, L. 2007. The role of engagement in inspiring teaching and learning, *Innovations in Education and Teaching International* 44, 349–362.

Chung, K. 2014. Professors 'flip' classrooms, enhance learning. Daily Tar Heel. Retrieved. http://www.dailytarheel.com/article/2014/01/flipped-classrooms-0108

Crouch, C., and Mazur, E. 2001. Peer Instruction: Ten Years of Experience and Results, *American Journal of Physics* 69, 970-977.

Deslauriers, L., Schelew, E., and Wieman, C. 2011. Improved Learning in a Large-Enrollment Physics Class. *Science* 332, 862-864.

Heckman, J.J., Stixrud, J., and Urzua, S. 2006. The effects of cognitive and noncognitive abilitites on labor market outcomes and social behavior. *Journal of Labor Economics* 24(3), 411-482.

Hong, T., and Pham, T. 2013. Using group projects as a strategy to increase cooperation among low- and high-achieving students. *Higher Education Research and Development* 32, 993-1006.

Jackson, M.W., and Prosser, M.T. 1989. Less lecturing, more learning. *Studies in Higher Education* 14, 55-68.

King, A. 1993. From sage on the stage to guide on the side. *College teaching* 41, 30-35.

Knight, J. K., and Wood, W. B. 2005. Teaching More by Lecturing Less. *Cell Biology Education* 4, 298-310.

Kruger, J., and Dunning, D. 1999. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. *Journal of Personality & Social Psycology* 77, 1121–1134.

Kuhn, P., and Weinberger, C. 2005. Leadership skills and wages. *Journal of Labor Economics* 23(3), 395-436.

Lage, M.J., Platt, G.J., and Treglia, M. 2000. Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education* 31, 30-43.

Mazur, E. 1997. *Peer Instruction: A User's Manual Series in Educational Innovation*. Prentice Hall, Upper Saddle River, NJ.

McLaughlin, J.C. 2013. Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education* 77, 1-8.

Michaelsen, L.K., Knight, A.B., and Fink, L.D. 2004. *Team-Based Learning: A Transformative Use of Small Groups in College Teaching*. Sterling, Va. Stylus.

Millis, B.J., and Cottell, P.G. 1998. *Cooperative Learning for Higher Education Faculty*. Phoenix, Ariz. Oryx Press.

Missildine, K., Fountain, R., Summers, L., and Gosselin, K. 2013. Flipping the classroom to improve student performance and satisfaction. *Journal of Nursing Education* 52, 597- 599.

Nordberg, D. 2008. Group projects: More learning? Less fair? A conundrum in assessing postgraduate business education. *Assessment & Evaluation in Higher Education* 33, 481–492.

Opdecam, E., Everaert, P., and Van Keer, H. 2014. Preferences for Team Learning and Lecture-Based Learning Among First-Year Undergraduate Accounting Students. *Research in Higher Education* 55, 400-432.

Park, E.L., and Choi, B.K. 2014. Transformation of classroom spaces: traditional versus active learning classroom in colleges. *Higher Education* 68, 749-771.

Pennebaker, J.W., Gosling, S.D., Ferrell, J.D. 2013. Daily Online Testing in Large Classes: Boosting College Performance while Reducing Achievement Gaps. *PloS ONE* 8, 11, e79774.

Prieto, A.;, Díaz, D., Montserrat, J., Reyes, E. 2014. Experiencias de aplicación de estrategias de gamificación a entornos de aprendizaje universitario. *ReVisión*, 7.

Roach, T. 2014. Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education* 17, 74–84.

Roediger, H.L. III, Putnam, A.L., Smith, M.A. 2011. *Ten benefits of testing and their applications to educational practice*. Edited by: Mestre, J.P., Ross, B.H. Psychology of Learning and Motivation: Cognition in Education Book Series: Psychology of Learning and Motivation, Volume: 55 Pages: 1-36.

Shah, S.Z.A. 2013. The use of group activities in developing personal transferable skills. *Innovations in Education and Teaching International* 50, 297-307.

Strayer, J. 2012. How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments* 15, 171-193.

Wilson, S.G. 2013. The flipped classroom: A method to address the challenges of an undergraduate statistics course. *Teaching of Psychology* 40, 193-199.

Yamarik, S. 2007. Does cooperative learning improve student learning outcomes? *Journal of Economic Education* 38, 259-277.

UB IREA
Institut de Recerca en Economia Aplicada Regional i Pública
Research Institute of Applied Economics
Universitat de Barcelona
Av. Diagonal, 690 • 08034 Barcelona

WEBSITE: www.ub.edu/irea/ • **CONTACT:** irea@ub.edu