

Una revisión sistemática de la metodología *flipped classroom* a nivel universitario en España

A systematic review of flipped classroom methodology at university level in Spain

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RESUMEN:

El aula invertida es una metodología que se ha venido aplicando principalmente a nivel universitario, posiblemente, debido a la capacidad que le proporciona al estudiante para ser protagonista en el proceso de aprendizaje. En este estudio se realiza una revisión sistemática de esta metodología a nivel universitario en España. Los resultados obtenidos del análisis de 109 investigaciones apuntan a un paulatino incremento en el número de publicaciones por año, tanto en español como en inglés; hecho que podría estar relacionado con un aumento en el uso de esta metodología en las clases universitarias. A pesar de haber pocas universidades que consideran esta metodología como parte común en sus prácticas, casi la mitad de las universidades españolas han tenido un primer contacto con ella. La gran mayoría de estas experiencias han tenido un gran peso en los diferentes campos de la rama de las ciencias sociales y jurídicas, así como en las ingenierías y arquitectura y han empleado principalmente diseños y técnicas cuantitativas. Los principales objetivos en esta temática fueron dos: medir el impacto del *flipped classroom* en el rendimiento académico de los estudiantes y conocer su percepción o satisfacción con la propia experiencia. A pesar de no existir un claro consenso sobre su efectividad en el rendimiento académico, un alto porcentaje de estudios manifestaron conclusiones generales positivas o positivas y neutras. Finalmente, en vista de estos resultados, se presentan diferentes recomendaciones y futuros temas de investigación.

PALABRAS CLAVE: FLIPPED CLASSROOM, UNIVERSIDAD, REVISIÓN, ESTRATEGIAS DE APRENDIZAJE, APRENDIZAJE SEMIPRESENCIAL.

ABSTRACT:

Flipped Classroom is a methodology that is being more common at university level, surely, due to the active role the students take on the learning process. In this research a systematic review of this methodology at university level in Spain is carried out. The analysis of 109 research studies point out the gradual increment of the number of publications about this topic both, in Spanish and English, as time goes by that could be related to an increment of the use of this methodology at university classes. Despite the fact there are few universities that consider this methodology as part of their common praxis, almost half of Spanish Universities have had a preliminary contact with it. The vast majority of these experiences have been applied to social sciences and law area, as well as engineering and architecture, using fundamentally quantitative designs and techniques. The main objectives of these type of research studies were measure the impact on the academic performance and discover the satisfaction of the experience. Although there is not a clear conclusion about the effectiveness of Flipped Classroom on the students' academic performance, a large amount of research studies points out positive or positive and neutral general conclusions. Finally, in view of this results, recommendations and future research topics are discussed.

KEYWORDS: FLIPPED CLASSROOM, UNIVERSITY, REVIEW, LEARNING STRATEGIES, BLENDED LEARNING

1 INTRODUCTION

Since a long time ago, the mainly used methodology in general, but more specifically at university level, has been the traditional methodology which is oriented towards the role of teachers and the way they transfer the knowledge to their passive students. This method considers the teacher as an indispensable base of the learning process as long as they have the key of the knowledge.

Despite this methodology, apparently, presents some advantages such as time and resources saving, especially when the number of students is significantly high, it has been widely criticized due to it is only centred on the knowledge transmission and developing other critical and autonomous skills is normally forgotten (Cerdán, Vilar, Méndez & Bruna, 2014).

Under these circumstances and in order to enhance the status of the educational system, approximately twenty years ago, Baker (2000) and Lage, Platt & Treglia (2000) with the help of the technology that was being developed at the moment started thriving in a new methodology at university level. This methodology, called Flipped Classroom, exchanged the roles of teachers and students so that what teachers could do in class, (such as the theory explanation) it was done at students' homes, and in class, with that free time, other kind of essential competences to cope with XXI century's challenges, such as critical thinking, creativity, communication or collaborative work, among others, were worked by projects, team-works, problem-solving... (Lai & Hwang, 2014; Sosa & Palau, 2018; Trilling & Fadel, 2009).

But it was not until 2007 with Bergmann & Sams's (2012) support when the use of this methodology started to be spread worldwide. Since then, its use has grown and in spite of the fact it has been used in different educational level, it seems that it has gained specially strength in United States at university level where it has been mainly used along these years (Uzunboylu & Karagözlü, 2017).

Since the implementation of the Bologna process and the development of the European Higher Education Area (EHEA), changes in the teaching and learning process model have been done at university level in Spain, but maybe, the most significant one has been the swap done to teaching approaches, strengthening learner-centred models and weakening

teacher-centred models (Martín & Santiago, 2017). Surely, due to this institutional change an increase number of universities along Spain has started to remodel part of their own study programmes considering Flipped Classroom as part of it. What is more, based on some recent researches, this methodology could even fix properly in environments with poor technological resources (Froehlich, 2018).

In order to find some useful information about the current state of this methodology and bring further studies to light this work is presented.

2 METHODOLOGY

2.1 Objectives

The purpose of this work is to analyse the current state of publications about Flipped Classroom methodology at university level in Spain, in order to find some useful information, such as weaknesses and current direction about this topic, that could be helpful for future experiences and investigations.

The objectives of this systematic review will be very similar to other systematic reviews carried out in different countries such as Karabulut-Ilgu, Jaranillo & Janren (2017), Chen, Lui and Martinelli (2017) or Uzunboylu & Karagözlü (2017).

More specifically, our contribution is focused on the following objectives: 1) To know the quantity of publications on the topic per year and per language; 2) To know which universities are inquiring more about Flipped Classroom methodology at this level; 3) To know which is the most common source of publication, as well as to see which congresses and journals contribute more to this topic; 4) To know in which area and field of knowledge Flipped Classroom is more used at university level; 5) To know which types and techniques of research are more common used in the studies; 6) To know which are the most common objectives of this kind of research studies, and 7) To know the general assessment (Positive, neutral or negative conclusions) of the studies.

2.2 Procedure

First of all, in order to select the papers, a list of useful keywords was set. These keywords were classified in three different groups: The first group was related to the own methodology; the second group was related to the learning level and, lastly, the third group was related to the country we wanted to analyse. It is remarkable the fact that all these keywords were used both, in Spanish and in English, so as to increase the amount of publications.

In this sense, the first group of keywords was *Flipped*, *Flipped Classroom*, *Flipped Learning* and *Flipped Teaching*. The second group of keywords was *University* and *Higher Education*, and the third group of keywords was *Spain* and *Spanish*.

The next step was to delimit the search engines we were going to use. In this step, we decided to use Google Scholar, Oceano, ResearchGate, Microsoft Academic, Redalyc, WorldWideScience, SciELO, BASE and DOAJ, in this order.

Oceano is an academic search engine of the University of Deusto (Spain) used in order to find bibliographic sources. This engine contains a wide variety of national databases, such as Dialnet and CSIC, as well as international databases, such as Scopus, ACM, EBSCOHOST, IEEExplore, EmeraldInsight, ProQuest and Web of Science, among others.

Finally, advanced searches were carried out in all these search engines using all the keywords above described, till February 2018 (starting date was not set).

The criteria we set for the sake of delimiting the useful documents for this investigation was: 1) With regard to the language, only investigations written in Spanish or English were permitted. Studies written in another language, even if the abstract is in English or Spanish, were rejected; 2) With regard to the source, only investigations that came from journals, proceedings or academic institutional informs or dissertations were permitted. Investigations published in magazines, blogs, newspapers and non-specific sources were rejected. 3) With regard to the educational level, only investigations carried out with students at university level (Degrees, Master Degrees or PhD programmes) were accepted. Investigations conducted in other higher education levels, such as professional training, were rejected. 4) With regard to the type of research, only empirical investigations were accepted. Systematic reviews and meta-analyses were directly rejected; 5) With regard to the range, only accessible documents based on the search engines we used were permitted. Unreachable documents from used search engines were rejected.

Finally, according to the findings, 100 new documents were found with Google Scholar (91 new included / 9 excluded), 15 new documents with Oceano (14 new included / 1 excluded), 5 new documents with ResearchGate (3 new included / 2 excluded) and 2 new documents with Microsoft Academic (1 included and 1 excluded). No new documents were found in Redalyc, WorldWideScience, SciELO, BASE and DOAJ. In

total, the amount of included studies was 109 and the amount of excluded studies 13.

9 of this excluded studies were removed from our analysis due to they were unreachable using the tools we used. The rest, 4, was excluded due to they were repeated investigations from the same authors published in different platforms.

3 RESULTS

According to our objectives, in this section all the results are shown. They have been classified in five different categories to make the reading easier. These categories are: Year of publication, Source of publication, Area of publication, methodological design of publication and results of publication. All these categories are straight away discussed with interpretations and future recommendations and suggestions.

3.1 Results about the year of publication on which Flipped Classroom is applied

In this section the results about the year of publication of the different studies are exposed. These results were analysed per year based on the language they were written as well as the total of both, Spanish and English, contributions.

Results about the year of publication, as Graphic 1 shows, point out the increase of publications year by year, independently of the language (English or Spanish). In fact, the first publications regarding this topic were found on 2013, with just 1 research. Since then, the number has raised up quickly, publishing 5 research studies on 2014 (5 in Spanish; 0 in English), 20 on 2015 (19 in Spanish; 1 in English), 32 on 2016 (25 in Spanish; 7 in English) and 51 on 2017 (40 in Spanish; 11 in English). In addition, 2 more publications were found till February 2018 (both in Spanish).

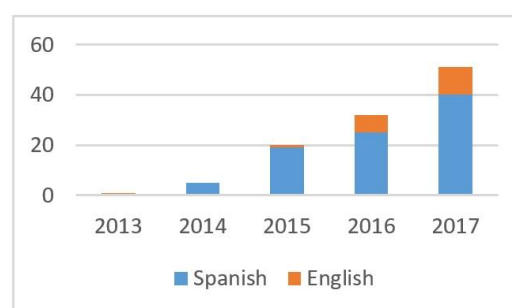


Figure 1. Studies about Flipped Classroom at university level classified by publication year.

This exponential growth could be related to an increase of the interest in this recent methodology that

could come from first time attempts or from faithful teachers to Flipped Classroom that are still investigating about this topic.

Either the first or the second case, both are positive news for the higher education system due to if this kind of active methodologies are becoming more known among university teachers, it could be a sign that traditional teaching methods are gradually decreasing their use and consequently attempting to modify their teaching praxis.

About this topic, it is also remarkable that English written studies are being more common among Spanish university teachers, fact that could be related to the tendency towards the necessity to share and impact on the greatest number of researchers. Despite the fact the amount of English written studies is still far from Spanish written studies, it would be highly recommended to boost the number of future English written studies in order to compare the results obtained and look for significant differences among countries.

3.2 Results about the source of publication on which Flipped Classroom is applied

In this section the results about the source of publication are presented. Specifically, the quantity of contributions done per university and the source type of these contributions are described.

In Spain, publications about Flipped Classroom at university level come from 38 (46.3% of Spanish Universities) different universities. In spite the fact the vast majority of them have published few studies about Flipped Classroom which could be related to just a descriptive experience, there are others that are usually using it as part of their teaching process and method.

The obtained results point out that about this topic, Technical University of Valencia published 21 studies, European University of Madrid 10 studies; University of Zaragoza and Technical University of Madrid 8 studies; Complutense University of Madrid, University of León and University of Extremadura 6 studies; Catholic University of Valencia 'San Vicente Martir' 5 studies; University of Barcelona 4 studies; University of Alcalá de Henares and University of Valencia 3 studies; University of Alicante, University of La Rioja, University of Murcia, University of Granada, University of Salamanca, University of Valladolid and Carlos III University 2 articles and finally, University of Castilla La Mancha, University of The Balearic Islands, National Distance Education University, University of Lleida, University of Oviedo, University of Vigo, Technical University of Catalonia, University of Sevilla, University of

Huelva, University of Las Palmas de Gran Canaria, Camilo José Cela University, University of Jaen, King Juan Carlos University, University of Malaga, Pablo de Olavide University, University of Cordoba, University of Cantabria, Technical University of Cartagena, Ramón Llull University and Rovira I Virgili University, 1 study.

64 (58.7%) of this research studies were presented in conferences, whilst 44 (40.3%) of them were presented in journals. Only 1 (0.9%) study was out of this categories, being a doctoral thesis from the University of Malaga.

On the one hand, the most common congresses where this topic was presented were the *Congreso Nacional de Innovación Educativa y Docencia en Red. In-Red* (National Congress of Educational Innovation and Network Teaching) with 22 contributions; *Congreso Internacional sobre Aprendizaje, Innovación y Competitividad* (International Congress on innovation and competitiveness learning) with 13 contributions; *Jornadas Intenacionales de Innovación Universitaria* (The International Conferences on university innovation) with 8 contributions; and the Innovative and Creative Education and Teaching International Conference; *Jornadas de MOOCs en Español* (MOOCs conference in Spanish); *Jornadas Virtuales de colaboración y formación virtual* (Virtual conference of collaboration and virtual training); Technology, Education and Development conference and International conference on Education and New Learning technologies with 2 contributions in each one.

On the other hand, the most common journals that published about this topic were *Infancia, Educación y Aprendizaje* (Childhood, Education and Learning) with 5 contributions, and *@tic: Revista de Innovación Educativa* (@Tic: Educational Innovation Journal); *Didáctica, Innovación y Multimedia* (Didactics, Innovation and Multimedia) and *Educatio Siglo XXI* with 2 contributions in each one. The rest of undefined congresses and journals had 1 contribution about this topic.

All this wide variety of universities applying new methodologies, as in this case Flipped Classroom methodology, is rewarding for the Spanish Higher Education System due to it could a sign of innovation attempt in order to enhance the dissatisfaction of a large number of students towards the University System, as some reports confirmed (Ariño & Llopis, 2011).

Despite the fact there are 44 (53.6% of the total) universities in Spain that have not published about this theme yet, these are not bad news. Not all

universities must be forced to apply and research about this methodology if teachers presuppose it will not benefit to his or her students at all or are not familiar with its application, but it could be favourable for university teachers, at least, to know about its usefulness.

3.3 Results about the area of publication on which Flipped Classroom is applied

In this section, the most common area of knowledge where Flipped Classroom is applied at university level is analysed. For this purpose, 5 different areas

of knowledge were set (Social Sciences and Law; Health Sciences; Arts and Humanities; Sciences and Engineering and Architecture) with their respective field of knowledge. In the same way, the usage of Flipped classroom in Degrees (D), Master's Degrees (M) and PhD programmes (P) was analysed, as well as the Total of that field (T) and the relative (R%) and total (T%) percentages. Some studies applied this methodology to different fields.

Areas with the same values were grouped in the same row and separated by a ';'. All this information is shown in the table 1.

Table 1. Studies about Flipped Classroom at university level classified by areas of knowledge.

	D	M	P	T	R%	T%
Social Sciences and Law Area	56	11	1	68	100%	41,4%
Field of Education	27	10	1	38	55,8%	23,1%
Field of Business	14	1	0	15	22,0%	9,1%
Field of Economy	4	0	0	4	5,8%	2,4%
Field of Law; Field of Tourism	3	0	0	3	4,4%	1,8%
Field of Physical Activity and Sports Sciences; Field of Trade and Marketing	2	0	0	2	2,9%	1,2%
Field of Labour Sciences	1	0	0	1	1,4%	0,6%
Health Sciences Area	13	0	0	13	100%	7,9%
Field of Medicine	3	0	0	3	23,0%	1,8%
Field of Odontology; Field of Nursing; Field of Physiotherapy	2	0	0	2	15,3%	1,2%
Field of Pharmacy; Field of Podiatry; Field of Optic; Field of Psychology	1	0	0	1	7,6%	0,6%
Arts and Humanities Area	2	0	0	2	100%	1,2%
Field of Modern languages and literatures; Field of Translation	1	0	0	1	50%	0,6%
Sciences Area	14	0	0	14	100%	8,5%
Field of Biotechnology	9	0	0	9	64,2%	5,4%
Field of Physics	3	0	0	3	21,4%	1,8%
Field of Food Science and Technology; Field of Biology	1	0	0	1	7,1%	0,6%
Engineering and Architecture Area	57	7	0	64	100%	39,0%
Field of Industrial Engineering	15	1	0	16	25,0%	9,7%
Field of Telecommunications Engineering	12	0	0	12	18,7%	7,3%
Field of Energy Engineering	5	4	0	9	14,0%	5,4%
Field of Computer Engineering	8	0	0	8	12,5%	4,8%
Field of Agricultural Engineering	4	2	0	6	9,3%	3,6%
Field of Environment and Chemical Engineering	5	0	0	5	7,8%	3,0%
Field of Naval Architecture and Maritime Engineering; Field of Aerospace Engineering; Field of Materials Engineering; Field of Civil Engineering	2	0	0	2	3,1%	1,2%
Not defined	-	-	-	3	100%	1,8%
TOTAL	142	18	1	164	-	100%

This information revealed that Flipped Classroom at university is mainly used in Social Sciences and Law Area and Engineering and Architecture Area. But Flipped Classroom is not equally used in the same fields of knowledge. Indeed, regarding Social

Sciences and Law Area it is especially frequent to find it applied to educational and business field, whereas regarding Engineering and Architecture Area it is commonly used in Industrial engineering and Telecommunications engineering.

Nonetheless, in Arts and Humanities Area Flipped Classroom is almost not applied. Future studies could try to develop new pilot schemes within this area and reflect whether the poor usage in this area is due to the its incompatibility with the Flipped Classroom.

Maybe the field of Education is one of the most valuable field for Flipped Classroom, as long as this methodology is not only being used as part of students learning process at the university, but also they are learning new ways to teach that could find attractive for their future jobs.

Other remarkable piece of information arisen from this analysis is that Flipped Classroom is mainly applied to degrees (86.5% of the cases), far from master’s degrees (10.9% of the cases) and PhD programmes (0.6% of the cases).

This could be related to some factors. First of all, we have to consider that probably the amount of students enrolled in a degree will be greater than students enrolled in a master or a PhD. Secondly, probably the amount of students per class in each case will be totally different, being more students in a degree class than in a master’s degree class. Finally, some master’s degree and PhD programmes are being taught in a distance learning way, therefore, Flipped Classroom is not required as you do not need to attend to class.

3.4 Results about the methodological design of publication on which Flipped Classroom is applied

In this section the most common research type and techniques used, as well as the most common aims of the contributions were analysed.

With regard to the type of publication, 68.6% of the publications just applied quantitative techniques, far from the 24.5% of publications that applied mixed techniques and the 6.9% of the publications that just applied qualitative techniques.

The most common quantitative technique were the surveys and the questionnaires, that were used almost in one of each two studies and, the most common qualitative technique was the interview, despite being less used than all other quantitative techniques, as we see in table 2.

Techniques with the same values were grouped in the same row and separated by a ‘;’.

Table 2. Studies about Flipped Classroom at university level classified by used techniques.

	n	R%	T%
<i>Quantitative Techniques</i>	137	100%	77.8%
Survey / Questionnaire	83	60.5%	47.1%
Exam / Test	38	27.7%	21.5%
Pre/Post Test	16	11.6%	9.0%
<i>Qualitative Techniques</i>	39	100%	22.2%
Interview	15	38.4%	8.5%
Register (notes, diary, pictures, videos, portfolio...)	7	17.9%	3.9%
Observation; Discussion / Focus group	6	15.3%	3.4%
Open-Ended survey	4	10.2%	2.2%
Debate	1	2.5%	0.5%

Another analysed variable was the number of students that took part into the research. Regarding the number of groups, on the one hand 70 studies used only one group with a mean of 98.52 ±87.68 students. On the other hand, 16 studies used two groups, a control group of 75.43±33.10 students and an experimental group of 69.70±21.78 students. Finally, 23 studies did not provide information about the quantity of the sample or it was provided in a different unit of measure (class, course...).

As we can see, Flipped Classroom methodology is mainly being used in classes with a large amount of students’. As a result, and surely due to its facility to gather and analyse students’ data, quantitative techniques are mainly being used (77.8%).

Eventually, the aim of the different studies was analysed. These results showed that there are clearly 2 common objectives: The most common aim is to know the perception, satisfaction or assessment of the experience teachers or students have about Flipped Classroom. In fact, 51.8% (57) of the studies try to measure it. Close from it, in 34.7% (57) of the cases, the impact of Flipped Classroom on students’ academic performance is measured.

Apart of them, other objectives are considered. For instance, in 3.6% (6) of studies the effect of Flipped Classroom on students’ feelings and emotions are studied, as well as studies that only described the development of the experience (3.6%; 6 cases). In addition, 0.6% (1) of the studies validated an instrument on a flipped classroom and 5.4% (9) of the studies measured other aspects, such as time usage, class attendance or students’ participation.

This results suggest that, possibly, a very useful objective such as the impact on students’ emotions and feelings, that is an essential condition for keeping their motivation and their positive attitude is not being investigated too often. In this sense, future studies could go in depth about the effectiveness of

flipped classroom in different students' feelings, emotions and attitudes as well as in the development of generic competences, such as creativity, time management, autonomy, self-motivation, or self-regulation perception in the presence of stressful situations, among others.

3.5 Results about the results of publication on which Flipped Classroom is applied

In this section the general results of the publications are analysed. Specifically, academic performance with other methodologies are compared and general conclusions about Flipped Classroom are shown.

To analyse the academic performance of the studies, 16 studies with control and experimental group were considered. Nonetheless, some of them did not permit us to contrast the effect size of both groups due to qualitative information is just provided or mean and standard deviation are not provided. Finally, 8 studies were accepted for this objective. Results are displayed in table 3.

In all cases, Flipped Classroom was applied to the experimental group and traditional teaching to the control group. Nevertheless, in Sein-Echaluce's et al (2017) study, control group received the same Flipped Classroom methodology. The difference was that while experimental group received students' and teacher's videos, control group only received teacher's videos; and in Sabater-Mateu's et al (2017) study, the methodology followed by the control group was not defined.

Considering these results, we can see that the effect size of each study differs quite from another one. What we can probably confirm is that Flipped Classroom has positive impact on students' academic performance or, at least, is equally effective than the traditional methodology, as some other studies carried out in Spain at university level declared (Mendaña, Poy, González, Arana & López, 2017; Miragall & García-Soriano, 2017; Poy, Mendaña, González, Arana & López, 2017). It seems that there are not studies that declared negative impact on the academic performance after using Flipped Classroom methodology yet. Regarding this topic and due to its limited number of studies on this group, it could be interesting to carry out more pre-tests and post-tests studies (Flores, Del-Arco & Silva, 2016), as well as contrast the impact of Flipped Classroom with other active methodologies applicable at university level, such as Project-Based Learning, Problem-Based Learning, Cooperative Learning or Gamification, among others, in order to measure its real effectiveness, not only based on the academic

performance, but also on other topics (emotions, feelings, attitudes, generic competences, ...) as Hernández-Nanclares & Pérez-Rodríguez (2016) indicate. In addition, Flores et al (2016) claim that the effectiveness of different kind of materials and resources could be another interesting future research line.

Finally, it's remarkable that, concerning the general results obtained in the studies, 55.9% (61) of the studies just pointed out positive results, 12.8% (14) positive and neutral results, 8.25% (9) neutral results and 22.9% (25) positive and negative results. According to some analysed studies, negative results come mainly by students' work overload and burnout (Iborra, Ramírez, Badia, Bringué & Tejero, 2017; Rodríguez, Fernández & Vega, 2015; Sabater-Mateu et al, 2017), students insecurity and anxiety facing new methodologies (Platero, Tejeiro & Reis, 2015; Vidal, Boigues & Estruch 2017), dissatisfaction when on-site classes must be prepared autonomously (Abio, Alcañiz, Gómez-Puig, Rubert, Serrano, Stoyanova & Vilalta-Bufi, 2017; Castedo, López, Ortega, Cabrera, García-Martínez, Sanchidrián, Segarra & Paredes, 2017) and difficulty to ensure a personalised support to students (Giménez-Ibáñez & Barelles-Vicente, 2016).

As in general, negative results were not found and more than the half of the studies indicated positive results, this fact permits us to suppose that Flipped Classroom methodology could be suitable for a meaningful number of teachers and students at University level. Notwithstanding, deepen studies are needed to be carried out focused on the recommendations we have given along these lines.

Table 3. Cohen's D on academic performance by different Studies

Source	Control group		Experimental group		Cohen's D	
	n	Type	Mean/SD	n		Mean/SD
González-Gómez, Jeong, Airado & Cañada-Cañada (2016)	51	Trad.	3.52±2.22	52	6.23±1.81	1.33
Sein-Echaluze, Fidalgo-Blanco & García-Peñalvo (2015)	48	Trad.	5.92±3.28	54	8.14±1.84	0.83
Sánchez, Cegarra & Rodríguez (2017)	118	Trad.	5.39±1.51	43	6.58±1.36	0.82
Trenor, Prats-Boluda & Ye (2017)	70	Trad.	5.29±1.75	81	6.36±1.37	0.68
Sein-Echaluze Fidalgo-Blanco & García-Peñalvo (2017)	104	FC	4.2±1.4	104	4.5±1.09	0.23
Ortiz, Muñoz & Colmenero-Ruiz (2017)	33	Trad.	6.40±1.50	119	6.74±1.61	0.20
Castedo, López, Ortega, Cabrera, García-Martínez, Sanchidrián, Segarra & Paredes (2017)	≈ 73	Trad.	4.53±2.92	≈ 92	5.02±2.66	0.17
Sabater-Mateu, Curto-García, Rourera-Roca, Olivé-Ferrer, Costa-Abós, Castillo-Ibáñez & Del-Pino-Gutierrez (2017)	98	N/D	6.02±1.16	78	5.89±1.26	0.10

4 DISCUSSION AND CONCLUSION

The aim of this work has been to do a systematic review of the publications about Flipped Classroom at university level in Spain with the purpose of discover what is known about this topic and find some useful information for future studies. Hence, based on the 109 documents analysed some conclusions are expounded.

First of all, Flipped Classroom is a methodology that is being more commonly applied at university level in Spain as time goes by. This is shown in the gradual increase of publications in Spanish and in English of the last years, that are fundamentally presented on two different congresses (Congreso Nacional de Innovación Educativa y Docencia en Red; and Congreso Internacional sobre aprendizaje, innovación y competitividad) and one journal (Infancia, Educación y Aprendizaje).

In addition, there are some universities that are continuously applying this methodology to their classes and researching about their praxis. In the same way, Flipped Classroom is mainly being used in the degrees of Social Sciences and Law area (mostly in the field of education and in the field of business); and in the degrees of engineering and architecture area (mostly in the field of industrial engineering and in the field of telecommunications engineering).

From all of these fields, maybe one of the most remarkable one is the educational field, in which students not only learn a subject using Flipped

Classroom but also embrace a new tool that could be useful for their future job.

With regard to the way of collecting the data, mainly quantitative techniques are highlighted, with a high usage of the survey and the questionnaire, maybe due to its ease to gather a lot of data in little time, as consequence of the amount of students each university class has. However, due to the implementation of the Bologna process in Europe, the number of students per class will be reduced, thus, maybe qualitative techniques will be more used in a near future.

The most common aim of the studies concerning this topic are to analyse the perception or satisfaction of the students with the development of the experience, and to analyse the impact of Flipped Classroom on students' academic performance. Nevertheless, further research is required regarding some other matters that could be helpful for the world of knowledge, such as the effect of Flipped Classroom on the students' feelings, emotions, attitudes and XXI century competences, among others.

Regarding the academic performance and in view of the wide variety of results obtained, there is not a clear evidence of Flipped Classroom's effectivity. Despite the fact some studies pointed out that Flipped Classroom did not improve the academic performance, it seems that in some other cases Flipped Classroom could improve it, from small to high differences in comparison with the traditional methodology. Moreover, negative results related to academic performance against traditional methodology were not found. In this sense, it could

be interesting to analyse the effectiveness of Flipped Classroom in different areas (cognitive, emotional, social...) in contrast to other active methodologies and not only in contrast to traditional methodology.

Finally, the analysis of general conclusion of each reviewed study shows that in half of the cases was positive, and not a single general negative conclusions research about Flipped Classroom was found, which it could be a sign of its future possibility to be applied at more universities and more fields of knowledge such as arts and humanities.

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