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IMPACT OF THE FLIPPED CLASSROOM MODEL AND COLLABORATIVE LEARNING IN CHILDHOOD TEACHING UNIVERSITY DEGREE

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This study presents the applications of the flipped classroom model (JITT) as an emergent didactic strategy with two groups of students in Childhood Teaching Degree, using the methodology of collaborative learning, where the professor implemented the flipped classroom model in one of the groups. From a quasi-experimental design, a total of 152 students participated on it. After applying the model to one of the groups, the student presented positive scores in the flipped classroom group. The students from the experimental group completed an open survey –online- before the implementation of the flipped classroom model and another one at the end of it to organise and follow the on-site sessions. The conclusions of the study based on the designed instruments showed progress regarding the use of collaborative learning in both groups, appearing particularly more valued in the flipped classroom group. In reference to the implementation of the model teachers´ amount of work and students´ effort are highlighted, underlining

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the increase of students' competence in the obtained average score.

1 Introduction

The European Higher Education Area has encouraged the implementation of new technologies in Higher Education in the university context, representing one of the most innovative changes in university teaching. In the frame of the *Europa 2020* strategy, we consider the introduction of the flipped classroom model in university teaching to identify the impact of its application in the classroom under the topic of school organisation, times, spaces, means and resources in preschool education degrees, in line with the flexible models centred on student learning.

The importance of this study lies in the last edition of the Horizon Report (Johnson *et al.*, 2014), focusing on the short and medium term among the tendencies. On the one hand, the *Flipped Classroom and Learning Analytics* (short term) connected to the growing omnipresence of social media and integration of online learning hybrids, and on the other hand, the collaborative aspect involving 3D printing, games and gamification (medium term).

Apart from this, the ICT Tendencies Report of CRUE (Conference of Rectors of Spanish Universities), identifies 16 tendencies supporting university teaching (Llorens, 2012), focusing on learning and the importance of the pedagogical model before the technological model. It proposes a clear view to learning throughout life, in which the importance of teaching methodologies is manifested. Additionally, it emphasises good practice for the improvement of university teaching, which reinforces in this way student participation throughout the learning process.

Regarding the OECD (2009), it focuses on the necessity of supporting learning methods that promote relationships among students, the development of interpersonal skills and strategies for problem solving. These are believed to teach them how to share responsibilities and divisions of tasks, to facilitate correction and the addressing of ideas, while promoting respect, tolerance and open-mindedness towards others. These approaches follow the principles and core of a collaborative work methodology, which encourages complete and balanced education of students (Hernández & Martín de Arriba, 2017).

Flipped classroom is a didactic model that compares the learning processes developed until now in the classroom and during class time, using this time for processes of acquisition and knowledge practice in the classroom. Authors such as Bergmann & Sams (2012) found improvements in the students within five years, both on an individual level as well as concerning global progress in their studies.

The flipped classroom model uses technology as a way to turn around the

traditional structure of the teaching/learning process, setting the students' learning process as a priority. The basis of "flipped classroom" are: a flexible atmosphere, which favours the space and time to adjust the subject to the students; a learning culture, based on the implication of the student in building knowledge; intentional content, by adapting methods of active learning focused on the student and on the professional educator –with less visibility in this model and being the main engine of the object of learning, some similarities to blended learning can be found (Chocarro *et al.*, 2015).

The development of the flipped classroom requires active methodologies, problem-based learning, projects and learning by discovering (Santiago, 2014) which promote its implementation in the class period. We face a complete and integral focus (Bloom *et al.*, 1956) that combines direct instruction with constructivist methods, the students' implication with the content of the course and the improvement of conceptual comprehension (Touron & Santiago, 2015). The studies from Mazur (1996) come from this approach, completing it with what he calls just-in-time, which allows the teacher to retrieve information from students the day before class, to adjust and prepare strategies and activities adapted to their necessities.

We can find the possibilities of the Flipped Classroom model in teaching, among others, in Hamdan *et al.* (2013) who interviewed 403000 students, parents, teachers, and administrative staff about the use of the model. Yarbro, Mcknight & Mcknight (2014) gather studies of cases that reflect how classes with different educational levels experience an increase in performance and satisfaction regarding students and teachers in the use of the model. The studies developed by Finkel (2012) in a secondary school in Michigan show how the failure rate of maths students decreased from 44% to 13% after applying the inverted methodology.

The study made by Al-Zahrani, (2015) had the objective of researching the impact of the flipped classroom in the encouragement of creative thinking by students. The results suggest that the flipped classroom can promote creativity in students, various other problems were found. Furthermore, the studies developed by Yungwei (2016) revealed the level of preparation for the implementation of this model from the point of view of the students, finding ways of improving the future application of the model in a beneficial way for the students.

In addition, we share the basis of collaborative learning as a work methodology with ICT (Hernández & Martín de Arriba, 2017), from a socio-cultural perspective of cognition, in line with Johnson & Johnson (1987) works and Johnson & Smith (1998), in relation with the effort between individual learning and group learning, seeking motivation and student learning in the group exchanges. Furthermore, the works of Pierce & Fox (2012), revealed

how the impact of student performance was improved by the methodological change.

2 Method

The investigation has followed a quasi-experimental design with two groups. One group attended the traditional class (CG) and the second group applied the flipped classroom model (EG), following the methodology of collaborative learning in both groups. The experimental group followed the experimentation of the model through ICT tools of collaborative work: a blog created for the occasion and *Ilias*, the platform of the University of Jaén. Meanwhile, the control group only used the university's *Ilias* platform. For this, an online survey *just-in-time* (JITT) was applied, whose results allowed work organisation in the classroom –planning the work in a small group for the debate and following exhibition. In this way, the exchange of information and cooperation in problem solving is encouraged (Al-Zahrani, 2015, 1139:1140). Once the classes finished, the students fill in an online survey to know their progress in the theme of study and analyse the obtained results. The data analysis in the open surveys is made with the support of the Aquad7 programme (Huber & Gürtler, 2013), for the creation of categories and the quantification of the results, making the categories' analysis of frequencies and percentages the object of the study.

The survey (JITT) consists of eight open questions based on the benefits of the flipped classroom strategy that allows us to know the perceptions of the students in relation to the model. As a base to the analysed studies, we have considered the following questions of investigation, attempting to answer two issues:

- Are there significant differences in the academic results between the two groups of students?
- What is the opinion of the students in respect to the implementation of the flipped classroom model?

2.1 Participants

The research has been performed with two groups of students studying for an early childhood education degree at the University of Jaén in order to know the impact of the model on topic of "virtual teaching/learning environments". The choice of the topic responds to conceptual and temporal variations, as methodologies of collaborative work and project work have been applied to the groups. Additionally, we understood that content wouldn't present a problem, thanks to online resources which have already been designed, consequently adapting well to the intended innovation.

The length of the project has been four weeks, coinciding with the assigned course by the university curriculum. The students were offered to participate voluntarily in this modality or to continue in that of the university's subject guide. We were thus able to know if there were significant differences between the groups and the final results obtained in the evaluation of the subject. In both groups, the question was to answer to competences 7 and 11 and to train as a pre-school (*educación infantíl*) teacher (Orden ECI/3854/2007) accordingly: *knowing the educational implications of information and media technology and, (...) in early childhood, as well as considering classroom practice to innovate and improve educational work, acquire habits and skills for autonomous and cooperative learning and encourage it in the students*.

The application of the flipped classroom was supported by the creation of a specific blog, in which the basic information of the project was presented to the students: online surveys and specific materials for the topic (video clips, documents and presentations) which they were required to work with outside the classroom. They had one week to decide whether to join the project or continue with the subject's common methodology in a parallel group class. In total, the distribution of students participating in group A was of 49 students, 22 being the number of students who decided to continue with the methodology of the subject. In group B, 70 students participated, 11 being the ones who did not join in the project. Therefore, a group C was formed with the 33 students who followed the traditional classes (CG) and a group A&B with 119 students who implemented the flipped classroom model (EG), summing up to a total of 152 students participating in the project (Table 1). On both groups A&B and C the ANOVA test was performed to know if they belonged or not to a same population with different samples, confirming new groups from the obtained results.

Table 1
PARTECIPANTS IN THE STUDY

Groups	Flipped Classroom	No Flipped Classroom
GROUP A	49	22
GROUP B	70	11
Group A&B (FC)	119 (EG)	
Group C (NFC)		33 (CG)
TOTAL	152	

2.2 Procedures

The objectives of the project are ultimately focused on knowing the

application of the flipped classroom model with two groups of students in early childhood education at the University of Jaén (Spain). This is done while verifying if there are differences in the results from learning following this model in one of the groups, bearing in mind the students' perception of the model's application in the context of collaborative learning (Fig. 1). For that, we designed a scale on collaborative learning in which students were asked for their perception of this work methodology, in order to compare the results with the data obtained in both groups – the EG that followed the flipped classroom strategy and the CG that followed the conventional class.

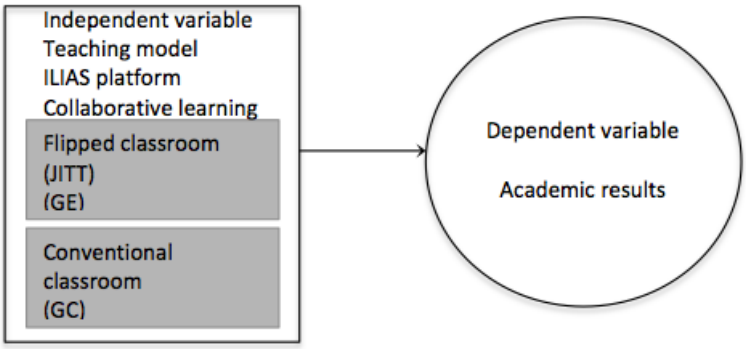


Fig. 1 - Research model

With the objective of knowing these perceptions, the students who participated in the project had to grade the level of identification with the items of collaborative learning, establishing a comparative between the results of those who followed the flipped classroom (EG) and those who followed the traditional class (CG), thus confirming if they were differences between both groups.

The scale gathered 28 indicators of the collaborative learning methodology intended to work in class. The scale was validated by six experts (three in education investigation methodology of and three in information and media technology) with the intention of checking that the items were really representative of the dimensions they intended to measure. For this, the experts received a template in which they had value from 1 to 5 the clarity, coherence and relevance of each item. The final instrument would collect the items with a 100% agreement between the experts. Those items that didn't achieve 100% were eliminated. Once the validity of the scale established, the reliability of the instrument was calculated by Cronbach's alpha coefficient, which reaches a value of.83 in the total scale.

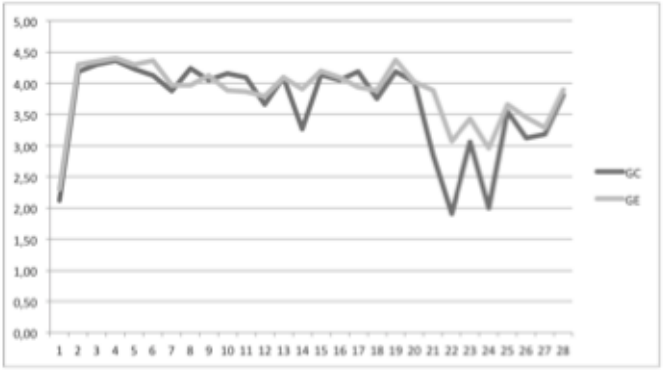
The organisation of the face-to-face sessions derived from the previous survey that had been incorporated to the flipped classroom model (JITT), which students accessed from the blog created for this use. They were supposed to complete the survey before beginning the topic, with the purpose of knowing some aspects referred to in the experience as well as the content of the topic, in order to adapt the face-to-face sessions and their completion (Prieto & Díaz, 2014). The sessions tried to suit as much individual work outside of the classroom as collaborative work in the classroom, problem solving and student learning through activities that benefit solving doubts about the topic studied. The work was supported by the use of the ICT: conceptual maps (*Cmaptools, googleDocx*), audiovisual presentations (*Prezi*), shared folders (*Dropbox*), video clip compilations (*Youtube*) and blogs (*Blogger* and *Wordpress*) as well as the *Ilias* platform. All of these facilitated the development of student learning and the methodological approach of teachers in terms of both the ICT tools and those designed in the blog and the virtual platform of the University of Jaén.

The results of the project are carried out from the instruments designed and adapted to this effect (*Ibidem*), for this research as well as for the average score obtained by students after performing the same evaluation test in both groups.

3 Results

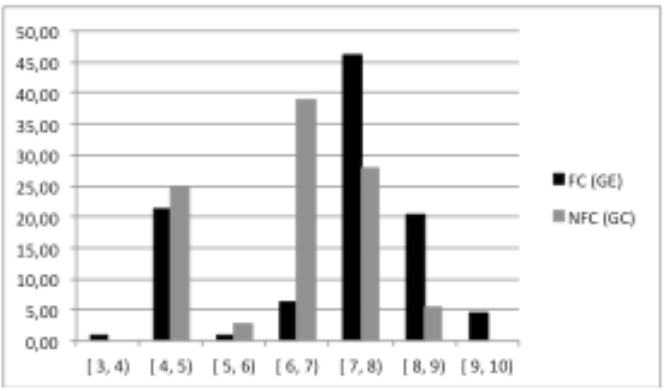
We have observed that flipped classroom increases the motivation of students in their performance of the addressed topic, not only in the previous activity, but also in the context of the classroom (Hernández & Martín de Arriba, 2017). The obtained results are presented based on on-line surveys (JITT), perceptions of the learning methodology scale, and students' academic results. It has been possible to determine as well that the designed material for the purpose of the blog has been suitable to work on the topic, despite the project's short time of implementation from student's perceptions.

The obtained results on the collaborative learning scale (Graph 1) indicate that there are few differences between groups and inside the groups: in the experimental group, observing advantages referring to the items 1,4,7 and 20 with respect to the CG, *in relation to the reluctance to work in group* (2.30/2.12); *ideas are discussed and exchanged when you work in a group* (4.35/4.30); *the interaction with peers increases the level of learning* (4.36/4.12) and finally *acquired knowledge is shared* (4.38/4.18), as is shown in the graph attached.



Graph 1- Average Collaborative Learning Scale CG and EG

In relation to the analysis of the academic results in the students who followed the flipped classroom model (EG) and the ones who chose the established methodology in the academic guide (CG), the average score in the flipped classroom group (EG) is: $\bar{X}$= 6,74 and in the group who didn't follow the flipped classroom (CG): $\bar{X}$= 6,40. We can observe significant differences between groups, relative to 0.34, in the average score obtained between the students who followed the flipped classroom model and the ones who chose the traditional class. The deviation has been 1,61 in the EG and 1,50 in the CG as shown in the attached graphs. Results are presented in percentages, as the groups are not homogeneous, and the largest variability appears in the experimental group, the control group being more uniform and consisting of students who did not follow the experiment.



Graph 2 - Score Intervals. Experimental and Control Group

In the graph (Graph 2), we can observe that the number of students with low marks coincides in both groups, but it is noticeable that in the interval [7,8) scores increase in the experimental group, while declining considerably in the control group.

The obtained results of the data analysis from the JITT survey questions expressed by students make reference to the certain categories: knowing other work methodology (n=60), ability to use ICT (n=28) and lack of experience in the new strategy (n=25), being the categories with the highest frequency.

4 Discussion and Conclusions

The flipped classroom may effectively promote skills of higher-order thinking (Bergman & Sams, 2012) through the integration of technology. It has been key to promote suitable activities in the classroom focussed on debates, problem solving, cooperation and effective communication in line with the proposal raised by Kuo *et al.* (2014).

Collaborative learning has formed a valid methodology to implement the flipped classroom model, obtaining related results –motivation- in students' perception of both groups of study, in line with the nearest methodologies to the flipped classroom model (Bishop & Verleger, 2013).

As an answer to the question raised in the research, in reference to the existence of significant differences in the academic results between the two groups of students, we have indeed found significant differences: these are visible among students in the obtained score of topic evaluation, in accordance with Borao & Palau's work (2016), where satisfactory results were obtained, raising the academic results and following the tendency of other flipped classroom studies (Strayer, 2007; Ali *et al.*, 2010; Bergmann & Sams, 2011). We can confirm more precisely that the results match the studies made by other authors, in which the students in the experimental group obtained a better academic performance (Bishop & Verleger, 2013). Along this line of thought, the impact of the flipped classroom model is confirmed in the discrete advantages obtained in the academic results of the students belonging to the group where the model was implemented.

In reference to the second question considered about students' opinions with respect to the implementation of the flipped classroom model, the opinions confirm once again the findings of Leis *et al.* (2015), in relation to the increase in workload for both students and teachers, the importance of ICT tools (video clips and media presentations) in their learning and surpassing their own abilities.

Students' opinion of the flipped classroom revealed that in general, they were satisfied with the approach (Turan & Goktas, 2016). These results agree

with the ones taken by Butt (2014), Davies *et al.* (2013), De Grazia *et al.* (2012); Mason *et al.* (2013); McLaughlin *et al.* (2013) and Wagner *et al.* (2013) who found that the flipped classroom could be a more satisfactory approach for student learning, independently of its level of execution. Other researches were closer to Strayer's thinking (2012), who found that students in the flipped classroom were less satisfied with this approach in respect to the structure and learning tasks. However, it can be argued that the application of flipped classroom creates a new atmosphere to support learning and creativity based on students' answers.

The integration of "just-in-time" (JITT) as a complementary element to the flipped classroom model has been considered very valuable thanks to survey input, which has given teachers data of interest for adapting activities to the sessions, essentially in relation to students' experience and knowledge.

As far as limitations are concerned, we can observe the necessity of widening the length of the study – although, this limitation has also proven to be an advantage in helping to focus and deepen our study. On the other hand, it is necessary to decrease the number of students per group in the University in order to foster student learning personalisation. Finally, it is essential to continue advancing in research that considers the flipped classroom model from other angles and approaches.

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