FLIPPED CLASSROOM TO TEACH DIGITAL SKILLS DURING COVID-19

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Abstract

This paper deals with the implementation of flipped learning as a didactic method and its use through the Moodle platform. For this purpose, quantitative research was carried out with the intention of analyzing the perceptions of new teachers in the acquisition of digital competences that they acquire during their teaching and learning process. The sample is made up of three groups of students in the subject Didactics of Social Sciences in the third year of primary education. The results obtained show that active learning methodologies promote digital literacy in higher education and the improvement of good teaching practices. In this way, through this research, students updated their use of new educational platforms, given the lack of initial training in digital literacy. In short, we can conclude that flipped learning is a useful and innovative teaching method that combines face-to-face and online learning for the education and training of new teachers.

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1. Introduction

Nowadays, and especially during the COVID-19 pandemic, there has been a significant shift towards updating active learning methods (Karalis & Raikou, 2020). This situation, which has changed university teaching guidelines, has also led to the improvement of digital literacy in higher education. For example, the flipped classroom (FC) model has been a breakthrough in university teacher education. The FC facilitates problem-solving skills and self-management of critical thinking. As a result, students in the early stages of their training prefer direct, transmissive, and theoretical learning. This pedagogical approach reverses existing methods by alternating part of their study at home before class with the help of ICT resources, and in class by participating in solving problems with the help of the teacher (García-Gil & Cremades- Andreu, 2019).

The aim is to make students aware of their professional competences and to materialize their teaching and learning process with a formative perspective. This pedagogical model consolidates the training of teachers' digital competences (Engen, 2019). In this sense, its implementation develops the pedagogical curriculum and the acquisition of skills and strategies to work autonomously. This improvement allows

progress in solving challenges and pedagogical problems. To this end, reflection and the work of students and teachers are strengthened. In initial teacher training, the inverted classroom promotes interpersonal relationships. Likewise, the digital transformation is materialized in different educational environments, relying on flexible, motivating, and productive teaching. Similarly, student participation and feedback contribute to solving real-life situations to analyze problems of historical and geographical identity (Thai, De Wever & Valcke, 2017).

In fact, the implementation of the inverted classroom for the study of the didactics of social sciences improves the ability to work collaboratively and facilitates the attention to diversity. To achieve this, another factor that influences the development of FC is the coordination of the teaching teams. The involvement of the teaching staff and their teaching role in this methodology focuses on acting as a guide for the teaching process of the students (Marín, Vidal, Chacón & San Martín, 2019). Furthermore, in their training practices, FC is required to be a pedagogical complement to traditional learning. In this regard, Kim (2016) supports that flipping the teaching inside and outside the classroom provides greater autonomy to the learner, who takes responsibility for his or her learning. It is a fact that students are receptive to a change in teaching, with more active methods that allow them to acquire the content of the subject by encouraging creativity and reflective thinking. Nevertheless, research on the subject we are dealing with provides valuable information on teacher training, pedagogical motivation, problem solving and cooperative learning (Martínez & Ruiz, 2020).

2. Literature Review

In relation to the research lines of the last decade, flipped learning has generated many contributions in the scientific literature (Ferreras, Sales & Serradell, 2022; González, Meza & Castellón, 2019; Hinojo, Mingorance, Trujillo, Aznar & Cáceres, 2018; Loizou & Lee, 2020; Mañanes & García, 2022; Romero, de Paz, Buzón & Navarro, 2021; Sánchez, Solano & González, 2016), confirming the active participation of students in their teacher training process. Similarly, the didactic experiences and training methods of the Vice Rectorate of Pedagogical Innovation and New Technologies of the University of Porto (Veloso, 2020) were taken into account. As Díaz and Estévez (2021) point out, teachers should contribute to students' academic performance through the use of ICT resources and tools. At an educational level, the development of the metaverse is an important tool for acquiring the necessary skills and competences, including the application of theoretical knowledge to practice (López-Belmonte, Pozo-Sánchez, Carmona-Serrano & Moreno-Guerrero, 2022). In this way, the metaverse can be seen as the most advanced virtual environment in the field of education.

The need to train new teachers in different learning contexts has been a challenge in recent years with COVID-19. It should be added that the changes brought about by the pandemic have meant that the profile of the teacher has influenced this training process (Flores & Swennen, 2020). In fact, the combination of face-to-face and virtual learning has led universities to implement training programs in digital didactic learning skills. These training courses lead to an increase in teachers' motivation to use methodological strategies that are based on more hands-on student activities. As Yildiz (2018) has shown, it is necessary for the teacher to adopt a methodological approach that reverses the traditional teaching role. From this perspective, the teaching vision confirms that transmissive practices hinder the integration of ICT as a teaching method. There is no doubt that with these didactic resources, access to theoretical content can be consulted both at home and in the classroom, according to the needs of the students. Thus, in an inclusive environment, the development of good teaching practices for students with learning difficulties is achieved (Delozier & Rhodes, 2016).

In addition, the need to transform distance learning benefits the work inside and outside the traditional classroom (Molina, 2021). The use of FC in a university setting is less common, although it facilitates inquiry-based learning and the development of different research questions. Moreover, in this inverted learning method, students consolidate their experiences and knowledge by promoting feedback and cooperative work. In this sense, updating curricula makes it easier to share experiences, doubts, and hypotheses, which lead to a final product of learning. The effectiveness of this methodology requires

innovative training practices and the active involvement of teachers and students. Therefore, one of the advantages of implementing flipped learning is the direct contact with online materials that offer a different way of working, the incorporation of ICT (Angelini & García-Carbonell, 2015). This aspect allows for an improvement in the level of performance, interaction between students and a more personalized orientation. Furthermore, the incorporation of technology in the classroom influences the evaluation of this formative experience and the attention to diversity (Hinojo, Aznar, Romero & Marín, 2019).

Thus, this study reveals some teachers' beliefs about the implementation of active learning methods. This question shows the potential of the FC in teacher training processes. This obviously reflects a training process in educational technologies that support virtual teaching (Espada, Rocu, Navia & Gómez-López, 2020). For this, it is necessary that educational institutions improve the training of future teachers in ICT and professional competences. In this way, by turning the classroom on its head, the role of the teacher becomes that of a guide to the educational process, while the students acquire an active attitude in the construction of their learning (Molina, 2022). Therefore, the inclusion of more creative tasks that can be combined with traditional teaching enriches the sessions with virtual forums, interactive activities, online maps, pedagogical workshops, wikis, video tutorials created on the online platform Moodle, and e-rubricas to evaluate learning (Cebrián, Serrano & Ruiz, 2014).

In this area, research by Arráez, Lorenzo, Gómez and Lorenzo (2018) showed that the use of inverted learning favours the solution of real classroom problems. Thus, constructivist thinking strategies embody a positive approach in students by achieving their goals (Matzumura, Gutiérrez, Zamudio & Zavala, 2018). Teachers use this active learning method as a function of their professional development in an educational context. University teaching is conducive to this methodological environment during group interactions of the student body, and suggestions for improvement are collected through constantly changing didactic situations. Therefore, in the training of novice teachers, it is desirable that the relationship between the university and the teaching centre is fluid (Tourón & Santiago, 2015). Also, it is recommended that teachers take every opportunity to highlight the progress of students in the application of FC (Zanuiddin & Perera, 2017).

Furthermore, a recent study by Urbina, Pérez-Garcias and Ramírez-Mera (2022) confirms that teaching skills and strategies in new pedagogical contexts promotes reflection to improve student demands. Within this methodological scenario, the aim of the work focused on analyzing the perceptions of teacher education students and their motivation to use FC. For all these reasons, several research questions were formulated to define the intervention of the study: (1) How do students perceive the implementation of FC? (2) What impact does the use of flipped learning have on their professional training? (3) What are the participants' impressions about the pedagogical benefits of traditional learning and the level of digital literacy used in flipped learning?

3. Methods
3.1. Research Context and Participants

The participants of the study took the subject Didactics of Social Sciences in the Bilingual English Program of the Primary Education Degree at the University of Cordoba, during the second semester of 2020 until the academic year 2021/2022. The sample (n=172) consisted of 111 females (64.5%) and 61 males (35.5%). The average age was between 21 and 23 years. The convenience sample was non-probabilistic, as the groups of students were assigned to the faculties involved in the research. The students selected for the study had previous theoretical knowledge of the inverted classroom, although they had not been taught using this methodology.

3.2. Analysis Tool and Data Collection

A non-experimental quantitative survey design was used as the research instrument, which allowed us to identify the perceptions of Primary Education students on an active learning methodology and the

pedagogical strategies they considered most appropriate for their teacher education. For the application and development of this quantitative tool, the work of Tashakkori, Johnson and Teddlie (2021) was used as an example. Data were collected through an ad hoc questionnaire was entitled "Trainee teachers' opinions about the inverted classroom in social sciences" (Table 1). A closed Likert-type rating scale (1-5), ranging from 1 (strongly disagree) to 5 (strongly agree), was used to collect information. The research design was divided into two categories: eight items related to traditional teaching and eight items grouped for inverted learning.

On the other hand, five experts in learning methodologies and teaching digital literacy from three universities were involved in the validation of the content. The questionnaire used different questions focused on analyzing the opinions of the participants to work on their professional competences (Mills & Gay, 2022). For this purpose, considerations about the ICT resources available in Moodle and the use of Blackboard Collaborate or Cisco Webex to create a video repository with COVID-19 were taken into account (Fatani, 2020). The information was collected in the classroom during the practical sessions of the course. The responses were anonymous so that students could answer without feeling identified and on a voluntary basis. In order to validate the results of the questionnaire and to achieve the proposed objectives, an Excel spreadsheet was used for the analysis of percentages, frequencies and means.

Implementation of the traditional method
1.- Expository lessons allow me to memorise.
2.- I do not feel motivated to dictate notes.
3.- This method allows me to learn conceptual content.
4.- The didactic means used are not innovative.
5.- The working environment created in the classroom is individual.
6.- The memorisation of contents does not allow me to reflect on social sciences.
7.- The master class is the method used in all the subjects of primary education.
8.- I am satisfied with the results obtained with this method.
Active learning method
9.- This active method increases my interest in the subject.
10.- Inverted learning promotes student motivation.
11.- This method is suitable for my professional development.
12.- My methodological training has improved with the implementation of FC.
13.- With this method I learn content in a meaningful way.
14.- The didactic means used in the inverted classroom are explanatory, creative, and motivating.
15.- Working by competences is part of my teaching and learning process.
16.- Evaluation with FC has an investigative approach.

Table 1. Questionnaire "Trainee teachers' opinions about the inverted classroom in Social Sciences"

4. Results

To answer the first question, which focused on analysing how students perceived the implementation of flipped learning, items 9, 13 and 15 were selected. The values obtained in Table 2 show that for item 9, 64% of the students agree that FC improves their interest in the didactics of social sciences, while for item 13, around 84% of the students think that this methodology allows them to learn the content in a meaningful way. Regarding point 15, 62% of the participants think that working by competences favours their teaching and learning process. Thus, students are convinced that FC allows them to achieve the conceptual, procedural, and attitudinal content of the subject.

For the second question, which focused on analysing the impact of the use of FC on students' professional development, items 11 and 12 were selected. As shown in Table 3, the results for item 11 indicate that 67% of students agree with the benefits of invested learning for their professional development as teachers. At the same time, we found that item 12 indicated that 77% of the students believed that their methodological training would improve with the use of FC. These results are related to

the need to change teaching methods, especially during the COVID-19 pandemic, which has favoured the training possibilities in digital competences of university students.

Finally, in order to answer the third question, relating to the participants' impressions of the didactic advantages of the traditional method and the level of competence in new technologies acquired with flipped learning, we selected items 1, 8 and 14. On this occasion, and as we can see in Table 4, items 1 and 8 reach excellent percentages of 87% and 92% respectively, which indicates the confidence that the students have in the lectures by memorising the contents of the subject and, consequently, the high grades obtained with this teaching method. For item 14, 94% of the students agree with the teaching materials used in FC. The results show that the students recognise the evaluative advantages and the ease with which the expository method helps them to memorise. They also think that the resources of the inverted classroom motivate them to be creative and to explain their knowledge in a more innovative way.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Totally agree	M	Sd.
9. This active method increases my interest in the subject.								
%	100	1.2	11	24.4	12.2	51.2	4,012	1,144
Frq	172	2	19	42	21	88		
13. With this method I learn content in a meaningful way.								
%	100	5.2	4.7	6.4	15.1	68.6	4,372	1,130
Frq	172	9	8	11	26	118		
15. Working by competences is part of my teaching and learning process.								
%	100	2.3	1.2	34.9	25.6	36	3,919	0,982
Frq	172	4	2	60	44	62		

Table 2. Implementation of FC.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Totally agree	M	Sd.
11.- This method is suitable for my professional development.								
%	100	5.8	12.2	15.1	19.2	47.7	3,907	1,281
Frq	172	10	21	26	33	82		
12.- My methodological training has improved with the implementation of FC.								
%	100	7	4	11.7	24.4	52.9	4,122	1,196
Frq	172	12	7	20	42	91		

Table 3. Student training with the inverted classroom.

		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Totally agree	M	Sd.
1.- Expository lessons allow me to memorise.								
%	100	1.7	1.2	10.5	12.2	74.4	4,564	0,859
Frq	172	3	2	18	21	128		
8.- I am satisfied with the results obtained with this method.								
%	100	0.6	0.6	6.4	2.9	89.5	4,802	0,627
Frq	172	1	1	11	5	154		
14.- The didactic means used in the inverted classroom are explanatory, creative, and motivating.								
%	100	0	1.7	4.7	30.8	62.8	4,547	0,669
Frq	172	0	3	8	53	108		

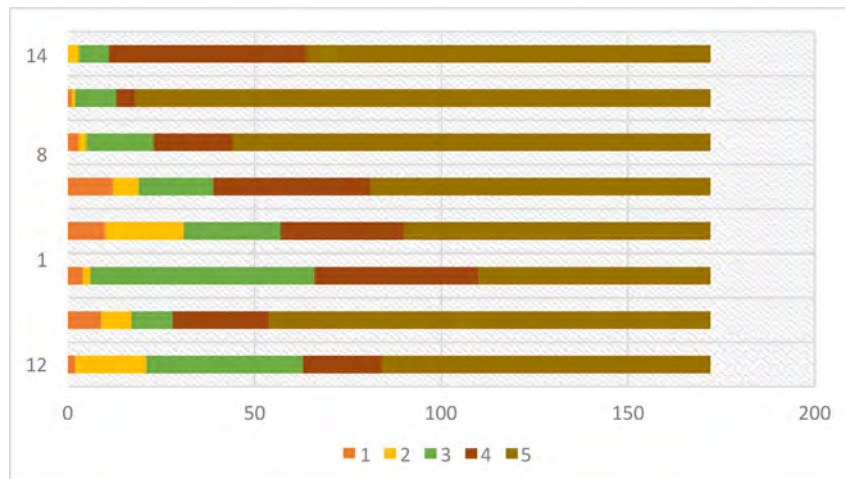Table 4. Advantages of the traditional method and digital literacy with flipped learning.

Figure 1. Quantitative comparison of research questions.

The data shows a significant relationship in all the questions. Figure 1 provides an overview of the incorporation of active learning methods at university level and their coexistence with the traditional teaching method that is so deeply rooted in the training of future teachers. Students are aware of how easy it is for them to memorise and achieve good assessment results. However, this study allowed them to reflect on the advantages of working with an active methodology. Through the implementation of the inverted classroom, they feel motivated, eager to explore and aware of their responsibility in the learning process. Therefore, although the permanence of an expository methodology in the teaching of social sciences is a reality in university classrooms, the opinions of the students show that participatory teaching methods make a subject interesting, dynamic, and innovative (Domínguez & Palomares, 2020).

5. Discussions

Main findings of the present study show the constant updating and improvement of methodological processes, with a pedagogical approach, highlights a significant advance in the initial training of teachers. To this end, it has been studied those students of the Primary Education Degree at the University of Cordoba value virtual teaching methods and the implementation of the inverted classroom for the acquisition of pedagogical competences during their university training. The results of this study provide useful didactics for researchers and teachers in other similar contexts. Chou, Hung, Tsai and Chang (2019) analysed the effectiveness of FC in different schools in Taiwan based on four factors: technological self-efficacy, institutional support, instructional strategies, and teachers' beliefs. A similar study by Østerlie and Mehus (2020) investigated the implementation of flipped learning and its relationship with ICT, showing that this method motivated Norwegian students to learn cognitive knowledge. Thus, this pedagogical model highlights student satisfaction and achievement in terms of creativity, participation, and innovation in their academic progress. In this way, the implementation of flipped learning in the field of music favours aspects of musical creativity and practical learning (Pozo-Sánchez, Moreno-Guerrero, López-Núñez & López-Belmonte, 2023).

In this study, it was found that 87% and 92% of the sample considered that rote and expository teaching leads to excellent results in the final assessment. This unmotivated learning is appreciated by the students because it is part of their classroom routine (Jovanovi, Gaševi, Dawson, Pardo & Mirriahi, 2017), although it causes lack of attention and disinterest in the subject of social science didactics. It is a matter of approaching a student who, despite being receptive to learning in a different way through active learning methods, shows a certain degree of familiarity with expository teaching focused on dictating notes and conceptual cutting. Similarly, the data suggest that participants had a good impression of the use of innovative, explanatory, creative and motivational resources. This is consistent with the high percentage of 84% of students who say that they learn content in a meaningful way in the inverted classroom. However,

some authors perceive these methodological and formative changes as an obstacle to achieving a quality educational process (Akçayir & Akçayir, 2018).

As Maloy, Fries, Laski and Ramírez (2019) add, students who are motivated and involved in learning with the FC approach the construction of their knowledge without memorising content. Student participation encourages decision making, discussion, resolution of doubts and meaningful learning. Therefore, teachers' digital literacy should be acquired during their university training so that their ability to teach using ICT didactic resources improves their teaching skills (Colás, Conde & Reyes de Cózar, 2019). In this sense, the study by Colomo, Colomo, Guillén and Cívico (2022) analyzed the perceptions of future teachers about the FC as an active methodology. New teachers' perceptions of digital literacy have contributed to the development of students' digital and communication skills. Thus, the training invested in the teaching skills of new teachers includes the ability to analyse, compare, reflect, and evaluate (He, Holton, Farkas & Warschauer, 2016) the historical and geographical content of the subject of social science didactics in primary education.

6. Conclusions

With this research, we can conclude that the university environment is a suitable educational context to implement inverted teaching. One of the peculiarities of this method lies in the change of roles, where the teacher acquires a guiding role in the didactic process and the student a main role as an active agent (Sola, Aznar, Romero & Rodríguez, 2019). Furthermore, it is observed that a more participatory and less conceptual intervention contributes to the specialisation of university teachers in digital competences. Thus, good teaching practices and the training of future primary teachers are an essential element to stimulate in university students the motivation to face real teaching situations in different pedagogical contexts (Sáez, Cózar, González & Gómez, 2020). For all these reasons, it is advisable to offer training activities in ICT to educational centres. This initiative represents a curricular advance and the promotion of collaborative work. However, not all students are receptive and willing to develop experiential learning with the inverted classroom. For this reason, a future line of action should be aimed at renewing the educational materials used, strengthening autonomy, and improving teachers' professional skills (Contreras, Arias, Melo & Martín, 2017).

In short, this study presents a set of the limitations which focused on the lack of training of students in relation to the repository of digital resources to be studied in the Moodle platform. This hinders the development of didactic activities that would improve the educational process. In this line, studies such as Sergis, Sampson and Pelliccione (2018) confirm that, despite the works dedicated to FC, we do not know the needs of students to maintain their motivation with this teaching method. From an assessment point of view, although students used rubrics and online co-assessment and self-assessment questionnaires, the pandemic of COVID-19 has accentuated the use of this completely online assessment, which had no reference in universities (García-Peñalvo, Corell, Abella-García & Grande, 2020). Nevertheless, Romero, Buzón, Sacristán and Navarro (2020) conclude that although active methods improve academic performance, it is necessary to continue deepening assessment resources for the development of students' technological competences.

Among these strengths, it was noted that collaborative working encouraged pupils' receptiveness, involvement, and participation. This aspect was supported by the management of educational resources included in the Moodle platform, which strengthened the active support of future teachers. In this sense, this interaction between students allowed for continuous feedback of knowledge in a virtual space linked to active teaching. From a pedagogical point of view, as shown by López, León and Pérez (2018), working by competences has clear implications for teaching practice and university education. Another of the main aspects of this research was the challenge of analysing the possibilities that online teaching and its relationship with FC have on the formative activities of the student body. In fact, the specific training they received in the theoretical-practical sessions of the subject provided a real effectiveness of the work done both in the classroom and at home.

Declaration of Conflicting Interests

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