Article

University Students' Perception of the Usefulness of the Flipped Classroom Methodology

Ernesto Colomo-Magaña [1] **, Roberto Soto-Varela** [2] **, Julio Ruiz-Palmero** [1,*] **and Melchor Gómez-García** [3]

1   Faculty of Education Sciences, University of Málaga, 29071 Málaga, Spain; ecolomo@uma.es
2   Department of Applied Languages and Education, Faculty of Languages and Education,
    Nebrija University, 28015 Madrid, Spain; rsoto@nebrija.es
3   Department of Pedagogy, Autonomous University of Madrid, 28049 Madrid, Spain; melchor.gomez@uam.es
*   Correspondence: julio@uma.es

Abstract: In a digital and interconnected context, where educational processes are in constant change, active methodologies take on a relevant role by making students the protagonists of their learning. Among the different possibilities, the flipped classroom stands out for its time optimization, the incorporation of technological resources, and the personalization of the processes. The aim of this research is to analyze the perception of higher education students about the usefulness of the flipped classroom as a methodology. The information was collected with a validated instrument, which was applied to a sample of 123 students from the Faculty of Educational Sciences of the University of Málaga (Spain). A positive evaluation of the usefulness of the flipped classroom as a learning methodology was reflected in the results, highlighting its instrumental dimension. Significant differences were perceived regarding the usefulness of the flipped classroom for the promotion of autonomous learning, which had a superior valuation according to women. In conclusion, the flipped classroom stands as a methodological alternative to promote learning that has a positive evaluation from the students that made up the sample.

Keywords: flipped classroom; active methodology; learning; higher education; university students

1. Introduction

In a hyperconnected reality characterized by immediacy, where we live with technologies and enjoy their possibilities, education is in a continuous process of transformation and adaptation. Not only are contents modified, but different skills are also proposed or digital resources are incorporated, so we are facing a real revolution in the way of understanding and implementing teaching–learning processes. In this context, exclusive traditional class formats, such as the master class, representing passive training methods and strategies, are incomplete in the light of the current challenge. The reality is that we are in a situation characterized by over-information, where the students have difficulty in maintaining their attention due to the many stimuli. Because of this, it is necessary to arouse, as never before, the interest and curiosity of the students, providing them with motivating formative experiences that go beyond the exclusive memorization and reproduction of the contents.

Pedagogical strategies must respond to the new needs and demands of the students, making feasible the hybridization of the classic models (magisterial sessions, conferences) and the incorporation of innovations linked to active methodologies (flipped classroom, gamification, etc.). These strategies foster curiosity, creativity, and motivation [1,2], making students active protagonists of their learning. Among all the possibilities within the active methodologies, we will focus our interest on the flipped classroom. Besides emphasizing aspects such as motivation and interest [3–6], like other

didactic methods, the key factor of flipping is the reorganization and optimization of time in the teaching–learning process [7–9]. By inverting the usual class structure, a new context is generated in which the distribution of tasks inside and outside the classroom is modified, thus favoring an adaptation of the students' rhythms and interests. Additionally, it is necessary to have the commitment, responsibility, and effort of the students regarding the leading role they acquire during the learning process. These are factors that can be assumed by university students, since they are in a stage of education that is not compulsory and in which they develop in an autonomous way.

Therefore, with this research, we intend to know how higher education students value the usefulness of the flipped classroom as a methodological strategy for their teaching–learning process.

Flipped Classroom

As an active methodology, the innovative factor of the flipped model is based on the organization, sequencing, and use of educational periods. Traditionally, class time was used to expose the theoretical contents by the teacher, who plays an active role and, at best, worked on activities about the contents, leaving the problems and doubts, in many cases, to be solved at home. In this approach, students play a passive role in the learning process. On the contrary, with the flipped classroom, the organization and the time management are inverted [10,11]. The idea is to differentiate between the time before the class—where material and information are provided about the contents that students must work on asynchronously before the session, externalizing part of the elements of the training process—and the class time, in which doubts are resolved and practical work is done on the subject and on the development of professional skills, including problem solving or questionnaires [8,12–18]. It is a methodological proposal focused on constructivism and the theory of social learning, aimed at making the student the protagonist of their learning [19]. We confront a model that allows the personalization of the formative process by being able to consider the needs, difficulties, interests, or motivations of the students. Knowing these factors, teachers can adjust the content, resources provided, learning styles, and practical activities that are developed, attending in this way to the peculiarities and features of each student [20].

In the current digital context, the interactive factor takes on great relevance. External training elements (time before class) can be enriched with multiple resources, which are provided in advance to students. In this way, through flipping, the student is faced with interactive learning experiences through videos (either produced by the teacher themselves or selected from the infinite number of resources that can be viewed on platforms such as YouTube, Vimeo, etc.), podcasts (as with videos, podcasts can be made by teachers or chosen from those available on platforms such as iVoox, SoundCloud, etc.), readings, and applications, allowing these to be incorporated and implemented during the classroom activity as well [21–23]. In terms of class time, this method focuses on the hands-on component of the teaching–learning process. During classroom work, the teacher may provide individualized attention to students [24], promoting strategies and contexts of experimentation where the student can activate and develop aspects such as creativity, reflection, or social skills [25,26]. Hence, we are dealing with a methodology that promotes different skills, such as learning to learn before class or learning to do during the classroom session [27], with a transversal presence of cognitive skills, such as higher reasoning processes (inductive and deductive logic) or critical thinking [28], which are present throughout the process. In this way, it becomes one of the maximum exponents of blended learning [4,29,30], allowing the combination of online learning—where the student faces the learning process in an asynchronous way (without physical, spatial, and temporal barriers)—with classroom learning.

The flipped classroom model is built on four key aspects [31,32]:

1. Flexibility: Both in learning (with different environments and possibilities of choices for students without physical or temporal barriers) and in teaching (organization, types of activities, evaluation, etc.).

2. Culture of learning: The student goes from a passive role (teacher as a primary source of information) to an active role (the teacher guides the process and the student is the protagonist in the construction of knowledge).

3. Intentional content: Selected or designed according to the didactic purposes pursued, where it is the teacher's task to stipulate what will be worked on autonomously by the students and what will be practically implemented in the classroom.

4. Teaching role: The work of teachers goes beyond the transmission of knowledge, which is key to their didactic and pedagogical work, by applying the changes, adaptations, innovations, or challenges that are necessary to improve the training work and by supporting their decisions in a reflective and self-critical process of their work.

In this sense, different research works on the benefits of the flipped classroom have been reviewed [33], gathering below the most outstanding aspects of its implementation:

- Improvement of the learning capacity [9,34–36]: It has been verified that applying the flipped methodology increases the learning capacity by increasing both the quantity and the difficulty level, which is reflected in better grades. It encourages different types of learning [37,38]: It favors the development of both autonomous and collaborative learning.

- Development of skills and competences [39–42]: The implementation of the flipped classroom affects the improvement of interpersonal, communication, and problem-solving skills.

- Personalization of the processes [11,27,43]: The different learning rhythms are taken into account, as well as people' needs and interests, which encourages the acquisition of theoretical and practical knowledge and the improvement of the quality in the evaluation processes as a result of the personalized tracking and the greater amount of evidence (interactions, practical activities, etc.).

- Active student participation and engagement level [44–47]: There is an increase in motivation, curiosity, and self-confidence when taking a more active role.

- Time optimization [16,48,49]: Class time is further optimized by increasing the number of practical activities, such as peer-to-peer and teacher-to-student interactions, in the classroom, thus fostering curiosity and the desire to investigate, along with more personalized monitoring and feedback on the learning process.

Despite all these positive aspects, this didactic method also presents a series of drawbacks or difficulties with respect to its implementation, placing the focus on the two main agents: students and teachers. Concerning students, the difficulty arises around the level of engagement in the teaching–learning process [50], requiring a greater effort and willingness on their part. This is due to their leading role, as they are responsible for working on the contents that are located in the time before class, because otherwise, time in the classroom is no longer useful at the level of learning. As far as teachers are concerned, we are hampered by the digital competence of teachers [24,51,52]. This is a methodology that requires command of different resources and materials to design and implement its model correctly, so the shortcomings and lack of training in this area are one of the factors that need to be worked on from initial and continuing training.

However, it is necessary to point out that the benefits of its implementation will also be determined by the educational stage in which it is developed due to the developmental level of the students involved. In this sense, the application of the flipped classroom in primary education does not achieve the same level of personalization of the processes, since this stage is defined by the achievement of propaedeutic objectives that guide the achievement of similar learning standards for all students. At the same time, it does not guarantee a greater level of difficulty in the knowledge to be acquired, since many of the conceptual schemes on different subjects and contents are of a lesser level. This makes the construction of their own complex knowledge difficult without a closer process guided by the teacher, along with the degree of responsibility they must assume to make the methodology work. Although the objectives are still present in secondary school, the fact of having formed superior cognitive schemes with respect to the students of the previous stage allows for greater flexibility with respect to the needs

and interests of the students, as they are able to personalize procedures. In addition, the types of tasks focused on problem-solving can benefit them at a stage in which they are shaping their identity and can help them in their development. However, responsibility becomes the key factor again because, in a phase characterized by identity building, if the level of commitment is not complete, class time is not used efficiently for learning.

As we can see, the flipped method has wide repercussions at the didactic level, in addition to its relevant role as a methodology in the field of educational research. In this sense, there are many studies that have implemented the flipped classroom in this context. Thus, we found research on primary and secondary education [53–56] and in different university programs, such as medicine [57,58], chemistry [59], physical education [60], engineering [61], nutrition [62], economics [63], mathematics [64], or language [65]. If we place the focus on the impact of its implementation, there are several works that confirm that the application of flipping increases both students' motivation [12,66–69] and their academic performance [70–76], which are two fundamental variables to assess the quality of the teaching–learning processes. Despite this, it should be highlighted that there are also studies that do not achieve better results in academic performance when implementing flipped classrooms [77–80], so we are dealing with a methodology that does not always improve student results. In addition to these factors, the students' perception becomes a key element, since it will influence both the overall assessment of this reality and the willingness to use it or reject it because of their self-confidence about its success or failure. In this sense, there are different studies that have analyzed the students' perception regarding the implementation of the flipped classroom methodology. We found longitudinal studies [10] on performance and perception regarding the use of the flipped classroom with 153 students from the University of Extremadura (Spain) during two academic years (2014/2015 and 2015/2016). The results showed a higher performance when implementing this methodology linked to its positive perception. In turn, in another study, perception of flipped classrooms was analyzed in a sample of 262 pedagogy students. The results highlighted that the students perceived advantages and benefits in the didactic level when implementing the flipped model [81]. Analyzing the perception of 210 primary education teachers in training at the University of Murcia regarding the motivation and learning derived from the implementation of the flipped classroom methodology, the results indicated a very positive opinion of both aspects [82]. Nevertheless, it should also be noted that the study of the relationship between perception and academic performance does not always produce positive results. The work of Baker et al. [83] reflects how students' results do not improve with the use of Power Point despite having a positive perception of its implementation. Similarly, in another study [84], the positive perception of smartphone use and its potential was not associated with improved academic performance, but rather translated into a negative relationship between student performance and the number of hours the smartphones were used. With this, we want to emphasize that the perception includes the vision and opinion of the participants about the possibilities of the flipped methodology, so, despite finding studies that confirm that a positive perception has a favorable impact on the results, it is not enough to have only a favorable opinion about a methodology, strategy, or resource to ensure that the academic performance will be positive. With respect to the analysis of perception, different variables have been studied that can influence these perceptions, such as the sex of the participants. In this regard, we found studies that highlight a better perception by women [82,85,86], and others in which no significant differences were found, although men show better perceptions [87,88].

Taking into account these aspects, our study parts from the interest in analyzing professionals' perception of education in the process of training on this method. In this case, the novelty lies in the fact that the participants' evaluations will be carried out with respect to an instrument [89] that analyzes this methodology from the communicative, instrumental, and pedagogical points of view. In this way, we can differentiate whether the positive or negative vision depends on the possibilities of interaction and relationship that the flipped methodology facilitates, on its operability when implemented in the formative context, and on its impact on factors that constitute the teaching–learning process. It is a question to know, in more detail, where the strengths or weaknesses of this proposal lie from the

perspective and opinion of the sample of subjects who put it into practice. The three dimensions proposed address different aspects but, at the same time, analyze the same reality, with greater or lesser interdependence between them, depending on the characteristics of the methodology, strategy, or resource being analyzed. In our case, we will evaluate these perceptions for the flipped methodology.

Given all of the above, the general objective of this research was to analyze 123 students' perceptions of the usefulness of the flipped classroom methodology as a teaching methodology in higher education. As a specific objective, the verification of the existence of significant differences in the perceptions on this method according to the sex variable was contemplated.

2. Materials and Methods

2.1. Methodological Approach

This research is based on an ex post facto (collection of perceptions about the usefulness of the flipped classroom methodology from a measurement instrument) and non-experimental (groups not random but pre-established without manipulation of study variables) quantitative study by performing descriptive and inferential analysis.

2.2. Sample

Regarding the sampling, it was developed in a non-probabilistic and incidental way by including the students of the subjects "Didactic and technological resources in education" of the Degree in Pedagogy and "Communication and information technologies applied to education" of the Degree in Primary Education during the academic year 2019–2020 at the University of Málaga. The sample was made up of 192 students, with 123 final participants ($n = 123$), representing 64.06% of the total. Regarding sex, 87% were women ($n = 107$) and 13% were men ($n = 16$), ranging from 18 to 46 years old (M = 20.01; SD = 3.97).

2.3. Instrument

In order to measure students' perception of the usefulness of the flipped classroom methodology, the instrument validated by [89] was applied. Different proposals for the evaluation of didactic resources, strategies, and methodologies were included in its construction [90–92], as well as the Common Framework for Digital Teaching Competence [93]. It consists of 21 items divided into three dimensions (Table 1):

- Communicative dimension: This dimension contains items that focus on the construction, reconstruction, and presentation of information, as well as the social interactions that take place during the implementation of the methodology, strategy, or resource. Thus, it evaluates the interaction possibilities through linguistic means to transfer information, allowing both the constructive use of language (oral and written) to produce messages and the understanding of them linked to the educational field. As an educational methodology, within the way of structuring the teaching–learning processes, the flipped classroom must favor the communicative competence. This dimension includes different skills, abilities, and actions linked to their development, and there are works that corroborate that this methodology has a positive impact on communicative competence [94,95].
- Instrumental dimension: This dimension contains items aimed at analyzing the characteristics and operational functions of the element being considered. In this way, it values the usability and potential of the flipped classroom as a methodology that allows one to face different problems or situations from the technological resources. This is associated with the development of cognitive skills as a result of its implementation in training processes. The skills and instrumental abilities that can be developed with educational tools (cognitive, functionality, etc.) have been considered by different authors when evaluating them [96,97], thus attending to aspects such as attention, motivation, accessibility of resources, or adaptability of contents.

- Pedagogical dimension: This dimension contains the aspects that affect the teaching and learning processes are examined. Specifically, the didactic possibilities of the methodology are analyzed, focusing on aspects such as evaluation and the processes of acquisition and regulation of learning. The considered items will allow the evaluation of how the use of this methodology will influence the acquisition of learning and the educational development of the students, questioning about types of learning (significant, autonomous, group) and the characteristics of the evaluation (feedbacks, self-evaluation). The pedagogical possibilities of the flipped classroom have been considered in different works [35,38,42], hence the relevance of its inclusion as a dimension.

Table 1. Dimensions, instrument items, and associated codes.

Dimension	Item	Code
Communicative	Encourages oral expression	C1
	Encourages written expression	C2
	Boosts argumentation skills	C3
	Contributes to disseminating and sharing content	C4
	Improves the ability to communicate in public	C5
	Promotes social interaction	C6
	Contributes to the adequacy, clarity, and understanding of information	C7
Instrumental	Allows the presentation in multimedia format of complex contents	I1
	Encourages the development of digital competence	I2
	Promotes attention span	I3
	Encourages motivation for learning	I4
	It is a flexible resource that can be adapted to different contents	I5
	Encourages the development of creativity	I6
	It is accessible and intuitive to navigate	I7
Pedagogical	Encourages feedback (feedback and peer review)	P1
	Contributes to the development of critical thinking	P2
	Encourages meaningful learning	P3
	Encourages autonomous learning	P4
	Promotes group work	P5
	Support for the development of skills	P6
	Fosters self-evaluation	P7

Source: Developed by the authors.

The evaluations were based on a Likert-type scale, ranging from 1 to 5 ((1) strongly disagree; (2) disagree; (3) neither disagree nor agree; (4) agree; (5) strongly agree). The instrument satisfies the criterion of content validity, guaranteed by its application in previous studies [79], as well as its original validation by expert judgment; and that of reliability, with an acceptable Cronbach's alpha, $\alpha = 0.721$.

However, the reliability of the instrument was analyzed according to its original dimensions: communicative, instrumental, and pedagogical. We applied Cronbach's Alpha and obtained an excellent coefficient ($\alpha = 0.93$) of the instrument, achieving good reliability in each of the dimensions: communicative, $\alpha = 0.86$; instrumental, $\alpha = 0.81$; pedagogic, $\alpha = 0.84$. With respect to the validity, we carried out an exploratory factorial analysis (EFA), establishing three factors (coinciding with the dimensions that conform the instrument and were theoretically sustained), obtaining an adequate Kaiser–Meyer–Olkin (KMO) value (0.910) and finding significance in the model through Bartlett's Sphericity test (1267.475, $p < 0.05$). The theoretical three-dimensional model on which the instrument is based explained 56.25% the total variance of the participants' scores. We are facing a stable model that explains enough variance for the study objective we are pursuing. The adjustment indices found reflect that the proposed three-dimensional model approaches a correct adjustment of the values required for the confirmation of the model, collecting the different coefficients of the Confirmatory Factor Analysis (CFA) in Table 2. Therefore, considering the good reliability, the significance, and the stability achieved in the EFA, the approximation to the correct adjustment in the CFA, and the theoretical support of the

instrument (based on experts in evaluation of teaching resources, strategies, and methodologies), we decided to apply this instrument for our study.

Table 2. Confirmatory Factor Analysis (CFA) adjustment rates.

χ2	df	*p*	CFI	TLI	IFI	RMSEA	90% CI
1.645	186	<0.001	0.895	0.882	0.897	0.073	[0.058–0.087]

However, it should be noted that this instrument was not created specifically for this study and, as we have pointed out, it has some limitations. However, the purpose of using this instrument was to know the perceptions of this specific sample about the communicative, instrumental, and pedagogical possibilities (the three dimensions of study) of the flipped classroom in order to facilitate the learning process.

2.4. Method

We conducted research in the subjects of "Didactic and technological resources in education" of the Degree in Pedagogy and "Communication and information technologies applied to education" of the Degree in Primary Education in the University of Málaga. These subjects are for freshmen and sophomores in the second semester or four-month period. We must point out that during the 2019–2020 academic year, due to the pandemic caused by COVID-19, the Faculty of Education Sciences of the University of Málaga and the degrees taught there have been forced to replace the usual presence in their classes with an on-line format. In this situation, the interactions across the campus and the combination of synchronous and asynchronous sessions, along with the resources provided by the faculty, have generated a new methodological context to address the training process. However, the subjects that form part of the object of study have been developing and applying this methodology for several courses, so it is a structured training proposal designed independently of the exceptional situation that has caused the compulsory e-presence. Methodologically, both subjects are structured around the flipped classroom, with the teachers being responsible for providing different resources (videos, both self-produced and selected related with the subject matter to be worked on, readings, simulations, etc.) and working autonomously and asynchronously before the class sessions, leaving the same (in this case, e-presence by the pandemic) synchronous and virtual presence (through Google Meet or Blackboard Ultra, used at the discretion of teachers) to resolve questions and start various practical activities (problem-solving, design, and development of resources and/or digital materials, etc.). The resources provided were available on the course page of the virtual campus seven days before the practical session, coinciding with the upload on the campus itself with the conclusion of the previous practical sessions of e-presence.

Throughout the course, the different contents set out in the teaching guide were developed, as well as the development of the competences associated with them. The students have to work both individually (tests, reflections, e-portfolios) and in groups (learning through projects and group presentations).

The collection of the evaluations was done through an online survey developed by LimeSurvey. The reason for choosing this application is due to its flexibility when configuring the surveys, as well as the personalization of the process, since it allows restriction of access to potential participants through their email. At the beginning of the questionnaire, the objective of the research was highlighted, guaranteeing the privacy of the participants, as the surveys are anonymous. The information was sent electronically to the 192 students of the subjects after the conclusion of the surveys, making several reminders to participate (option available in the application that discriminates between students who have already participated and those who had not yet done so).

2.5. Data Analysis

The analysis was performed with the SPSS v.25 statistical package. Based on the proposed objectives, different tests were carried out. Initially, an exploratory analysis of the statistics was conducted, describing the responses, both of the dimensions and of the items, and considering the frequencies and percentages of the response options of the Likert scale. In addition, the existence of significant differences according to the sex variable was analyzed. To do so, we looked at the parametric assumptions of homoscedasticity and normality, both by dimension (Appendix A, Table A1) and by item (Appendix A, Table A2). For the dimensions, Leven's statistic showed a significance greater than 0.05 ($p \geq 0.05$) in all three dimensions. On the other hand, the Kolmogorov–Smirnov test (with Lillierfors' significance correction) reached a significance level lower than 0.05 ($p \leq 0.05$) for the female sex in two of the three dimensions, not adjusting to normality.

As a result, the non-parametric Mann–Whitney U test was implemented. In terms of the items, the assumption of homoscedasticity was satisfied (Levene showed significance greater than 0.05 ($p \geq 0.05$) in all 21 items), but not the assumption of normality (Kolmogorov–Smirnov significance less than 0.05 ($p \leq 0.05$) in all items), so the Mann–Whitney U test was used again.

3. Results

Taking the proposed objectives as a starting point, we begin with the exploratory analysis of the test by dimension (Table 3).

Table 3. Statistical results by dimension.

	Likert Scale (%)					N*	Mean	SD
Dimension	**1**	**2**	**3**	**4**	**5**			
Communicative	11 (1.28)	54 (6.27)	156 (18.12)	352 (40.88)	288 (33.45)	861	3.99	0.67
Instrumental	1 (0.12)	37 (4.30)	117 (13.59)	339 (39.37)	367 (42.62)	861	4.20	0.55
Pedagogical	2 (0.23)	31 (3.60)	145 (16.84)	371 (43.09)	312 (36.24)	861	4.12	0.59

Source: Developed by the authors. *N = 861 because each dimension has seven items and each one is evaluated by 123 participants, with only one answer per item, obtaining 861 answers in each dimension.

The students' evaluations were very positive in the different dimensions, ranging from 3.99 to 4.20 points on average out of the 5 possible, with a mere 0.21 point range between them. The data highlight that participants show a high level of agreement (between 74.33% and 81.99%) regarding the fact that the intervention with this methodology, according to their perception, was positive. Ambivalence with respect to the implementation of the flipped methodology ranged from 13.59% to 18.12%, with less than one in five students in this position. As for the general disagreement about this didactic intervention, it was lower than 10% of the participants (between 3.83% and 7.55%). All this makes us indicate that choosing to use the flipped classroom was a good decision if we consider the general agreement in the participants' perceptions.

The instrumental category stands out, as it is the most evaluated and the one that received the least variability in its responses (4.20 ± 0.55). We cannot forget that we are evaluating the usefulness of a methodology, so it is logical, to some extent, that the students highlight its characteristics and functionalities as the most relevant. We are facing the category with the highest frequency of five-point registrations by the participants (42.62%) and the one with the highest level of agreement that the implementation of the flipped methodology promotes learning (81.99%). On the other hand, less than one sixth of the participants (13.59%) were not inclined towards it because it favors or hinders learning; only 4.42% of the participants in the sample were those who indicated that applying the flipped methodology does not promote learning.

Then comes the pedagogical dimension, obtaining the second-best score and the second-lowest dispersion (4.12 ± 0.59), reflecting the positive perception about the potential of flipping to impact the teaching–learning processes. This is the category with the highest frequency of registration with

five points by participants (42.62%) and the one with the highest level of agreement in stating that the implementation of flipping promotes learning (81.99%). On the other hand, less than a sixth of the participants (13.59%) are in an equidistant position, with only 4.42% of the participants in the sample who indicated that the implementation of the flipped methodology does not promote learning.

The communicative dimension is the one that obtained the worst score and the greatest heterogeneity in the participants' answers (3.99 ± 0.67), given that the informative and social interaction factor in the implementation of flipping is not the highest priority, just as it is in other types of educational tools (videoblog or virtual forum). Despite being the least valued category, 74.33% of participants agreed that the implementation of the flipped methodology improves this dimension. It was the least valued because it is the one that obtains more ambivalence (18.12%). At the same time, they indicate the highest percentage of participants (7.55%) whose perception was negative regarding the use of the flipped methodology in improving the learning processes, with one out of every four participants among those who reject it and those who are equidistant.

After the exploratory analysis of the descriptive statistics of the dimensions of the test, we moved on to present the results by item, attending specifically to each of the dimensions (Table 4). At this point, we must emphasize that the interest of the study is focused on the analysis of the dimensions of the instrument and the perception of the participants regarding the potential of flipping to promote learning. Including an exploratory analysis of the items is only intended to provide more information on the dimensions. This allows us to know which aspects were considered better or worse without diverting attention from the main focus.

Table 4. Statistical results by item.

	Likert Scale (%)					N	Mean	SD
Items	**1**	**2**	**3**	**4**	**5**			
C1	0 (0)	11 (8.94)	23 (18.70)	54 (43.90)	35 (28.46)	123	3.92	0.91
C2	2 (1.63)	12 (9.76)	40 (32.52)	52 (42.28)	17 (13.82)	123	3.57	0.91
C3	1 (0.81)	6 (4.88)	24 (19.51)	54 (43.90)	38 (30.89)	123	3.99	0.88
C4	1 (0.81)	2 (1.63)	7 (5.69)	49 (39.84)	64 (52.03)	123	4.41	0.75
C5	3 (2.44)	8 (6.50)	24 (19.51)	46 (37.40)	42 (34.15)	123	3.94	1.01
C6	2 (1.63)	10 (8.13)	18 (14.63)	48 (39.02)	45 (36.59)	123	4.01	1.00
C7	2 (1.63)	5 (4.07)	20 (16.26)	49 (39.84)	47 (38.21)	123	4.09	0.92
I1	0 (0)	3 (2.44)	10 (8.13)	50 (40.65)	60 (48.78)	123	4.36	0.74
I2	0 (0)	1 (0.81)	5 (4.07)	31 (25.20)	86 (69.92)	123	4.64	0.60
I3	0 (0)	16 (13.01)	19 (15.45)	53 (43.09)	35 (28.46)	123	3.87	0.98
I4	0 (0)	10 (8.13)	31 (25.20)	45 (36.59)	37 (30.08)	123	3.89	0.93
I5	0 (0)	2 (1.63)	8 (6.50)	53 (43.09)	60 (48.78)	123	4.37	0.72
I6	0 (0)	5 (4.07)	22 (17.89)	44 (35.77)	52 (42.28)	123	4.16	0.86
I7	1 (0.81)	0 (0)	22 (17.89)	63 (51.22)	37 (30.08)	123	4.10	0.74
P1	0 (0)	2 (1.63)	20 (16.26)	54 (43.90)	47 (38.21)	123	4.19	0.76
P2	0 (0)	5 (4.07)	32 (26.02)	56 (45.53)	30 (24.39)	123	3.90	0.81
P3	1 (0.81)	8 (6.50)	21 (17.07)	50 (40.65)	43 (34.96)	123	4.02	0.93
P4	0 (0)	4 (3.25)	14 (11.38)	53 (43.09)	52 (42.28)	123	4.24	0.78
P5	0 (0)	5 (4.07)	14 (11.38)	42 (34.15)	62 (50.41)	123	4.31	0.83
P6	0 (0)	3 (2.44)	17 (13.82)	62 (50.41)	41 (33.33)	123	4.15	0.74
P7	1 (0.81)	4 (3.25)	27 (21.95)	54 (43.90)	37 (30.08)	123	3.99	0.85

Source: Developed by the authors.

First, we start with the communicative dimension. The scores are between 3.57 points for item C2 and 4.41 for item C4, with a range of 0.84 points. Thus, the lowest score is linked to the perceived usefulness of the flipped classroom to favor written expression (C2), with 3.57 points, making it the worst perceived item of the whole inventory. On the other hand, the best perceived item in the communicative dimension (52.03% agreed with the statement, making it the second most frequently

recorded item with five points by the participants) is related to their contribution to disseminating and sharing contents (C4), with 4.41 points, obtaining the lowest degree of variability among the items of this dimension (0.75 points). If we pay attention to the dispersion, in the communicative dimension, the two items with the highest degrees of heterogeneity in the participants' answers are found, all of them associated with the improvement of the capacity of communication in public (C5), with 1.01 points, and the capacity of flipping to promote social interaction (C6), with 1.00 points.

Further to the instrumental dimension, it should be emphasized that four of the items (I1: "It allows the presentation of complex contents in multimedia format"; I2: "It favors the development of digital competence"; I5: "It is a flexible resource that can be adapted to different contents"; and I6: "It favors the development of creativity") obtained a percentage over 40% in the evaluation of "completely agree". According to their score, item I2 (4.64 points) stands out as the best perceived in the questionnaire (117 participants registered a frequency of four or five points in their valuation). This level of agreement also means that it is the item with the least dispersion of the entire inventory (0.60 points), which is linked to its contribution to the development of digital teaching competence. In addition to this, items I1 (4.36) and I5 (4.37) also stand out in the instrumental dimension, as they were very well valued for the possibility of flipping complex contents to the multimedia format in a flexible and adaptable way. Regarding the less valued items, we found I3 "Promotes attention span" and I4 "Favors motivation for learning" to be the second item (it presents, with 13.01%, the highest percentage in the evaluation "in disagreement") and the third item with the lowest scores in the questionnaire. This resulted in a difference of 0.77 points in the instrumental dimension due to the variation between items I2 and I3. In terms of variability, this dimension has the third least homogeneous item in the participants' responses (I3, with 0.98 points).

Finally, in the pedagogical dimension, scores are between 3.90 and 4.31 points, with a range of 0.41 points between the highest and lowest scores, making it the lowest of the three dimensions considered. The lowest scores for the flipped classroom are related to its usefulness for the development of critical thinking (P2), with 3.90 points, and for promoting self-evaluation (P7), with 3.99 points. In contrast, the participants considered this methodology to be especially useful for promoting group work (P5), with 4.31 points, and for promoting autonomous learning (P4), with 4.24 points, occupying the fifth and sixth positions with respect to the most valued items of the instrument. Regarding dispersion, the greatest heterogeneity is linked to its capacity to promote significant learning (P3), with 0.93 points, and the least with its capacity to help develop competencies (P6), with 0.74 points, with little difference between them and without being one of the items with greater or lesser variability in the questionnaire.

Once the descriptive analysis was completed, we moved on to check whether there were significant differences according to the sex variable, both by dimension and by item. For this purpose, we applied the non-parametric Mann–Whitney U test for both cases. With respect to the dimensions, no statistically significant differences were found between the perceptions of the women and men in the sample ($p \geq 0.05$), with men's perceptions being superior to those of women in all cases (Table 5).

Table 5. Results of the Mann–Whitney U test according to the sex variable.

Dimension	Sex	N	Mean	SD	Sig.
Communicative	Women	107	3.98	0.67	0.458
	Men	16	4.07	0.70	
Instrumental	Women	107	4.18	0.57	0.383
	Men	16	4.30	0.44	
Pedagogical	Women	107	4.11	0.60	0.895
	Men	16	4.16	0.53	

Source: Developed by the authors.

As we can see, considering the mean scores (the biggest difference between the mean scores is in the instrumental dimension with a value of only 0.12 points) and the standard deviations (ranging from 0.44 to 0.70 points), the participants of both sexes in this sample reflected opinions between slightly and very much in agreement that the intervention was useful, with no statistically significant differences.

As for the items, Mann–Whitney's non-parametric U test did report significant differences ($p \leq 0.05$) in the sex variable for item P4, as reflected in Table 6.

Table 6. Results of the Mann–Whitney U test according to the sex variable.

Item	Sex	N	Mean	SD	Sig.
P4	Women	107	4.30	0.77	0.035 *
	Men	16	3.88	0.81	

Source: Developed by the authors. * = $p < 0.05$.

As we can see, females value the usefulness of the flipped classroom in promoting autonomous learning more than males. However, we should highlight the similarities between the scores of both genders, as there are only differences in 1 of the 21 items that make up the questionnaire (Appendix A, Table A3), reflecting a difference that, although significant, has a mean of only 0.42 points and a standard deviation between 0.77 and 0.81. This reflects, as we emphasized in the inferential analysis by dimension, that there are hardly any differences between the perceptions of the participants of this study according to sex. In addition, it should be noted that the unequal distribution of participants in both sexes means that these data should not be irrefutably valued. In order to be able to make more precise statements on this issue, the number of participants should be equated according to the sex variable on which this analysis is applied. In this way, these results are aimed to allow us to know if there are differences by sex for this specific sample of students.

4. Discussion

After the results obtained, we can affirm that the flipped classroom is valued as a very useful methodology for its implementation in higher education, taking into account the students' perception of the subjects "Didactic and technological resources in education" of the Degree in Pedagogy and "Communication and information technologies applied to education" of the Degree in Primary Education at the University of Málaga. In this sense, the level of agreement regarding the perceptions about the potential that its implementation has to promote learning was reflected by a proportion of subjects in this study that ranged from 74.33% to 81.99%. The evaluation of this method coincides with multiple works [63,64,98–103], which allows us to support the choice of the flipped classroom as a methodology to address motivational, flexible, and personalized teaching–learning processes in line with the implementation of active methods for university education.

The instrumental dimension of flipping stands out within this positive vision, linked to its characteristics and functionalities as a method that allows a better use of time, giving the teachers more availability. This aspect is also considered in other research [8]. This is the dimension with the highest proportion of participants (8 out of 10) who agree that the implementation of the flipped classroom has the potential to promote learning. In addition, its pedagogical potential is highlighted (with a 79.33% of agreement regarding the training possibilities of the flipped classroom), since it favors the development of competencies [104], as well as autonomous learning and group work [37,38], making it an enriching methodological option for learning.

On the other hand, we analyzed the existence of statistically significant differences in the perception of utility of the flipped classroom according to the sex of the students. Again, we must point out that the data are not intended to be generalizable due to the unequal distribution of participants by sex. Thus, the data obtained are focused on allowing us to know if there are differences by sex for the specific sample of students. The results indicated that no differences were found if we compared the dimension scores, in which the men's assessments were always higher than the women's. Although the purpose

is not to generalize, we want to compare our findings with other studies to determine if the differences in our group are related to other research. These results are not consistent with other research, where it is women who have better attitudes towards the use of Information and Comunnication Technologie's (ICTs) [105], who prefer active methodologies to traditional ones [106,107], and who have a better perception of the use of flipped classrooms [82]. On the contrary, this research is in line with studies where no significant differences between sexes are found or where women have more objections to the use of ICTs [87]. If we attend to differences by items, we only find them in the promotion of autonomous learning (P4), where, in this aspect, women perceive greater usefulness in using the flipped classroom than men.

4.1. Conclusions

As we have seen, the flipped classroom is a methodological alternative that has been positively evaluated by the students. In a context conditioned by COVID-19, this methodology has facilitated a blended learning modality where virtual synchronous sessions are used to solve doubts and work in class. On the other hand, the time outside the classroom is oriented towards the acquisition of learning about the contents through a variety of resources that teachers have made available to students through the Moodle platform of the virtual campus. Characteristics such as autonomy and time optimization have been made possible by focusing on a group of university students, thus achieving a real commitment on their part to the teaching–learning process. The flipped methodology has offered us a new possibility to undertake educational acts through emphasis on the motivation reflected by the students, the promotion of significant learning, the possibility of sharing content, the promotion of creativity, and the improvement of digital competence. This last issue is a key factor both for the current digital context and for the virtual reality to which we have had to resort because of the pandemic we have suffered. For all these reasons, the analysis carried out reflects that the students who made up the sample responded positively to the initiative to implement the flipped classroom and appreciated its potential to promote learning.

4.2. Future Lines of Research

Finally, considering the results achieved, it is necessary to incorporate specific training on active methodologies in the initial and continuous training of future teachers, with the flipped classroom an option. It is not only a matter of explaining it in a conceptual way, but also of experiencing it during the educational process itself, so that its key aspects are internalized with practice. In this way, teachers will be able to teach in a more motivating, personalized, and interactive way by applying the flipped classroom.

4.3. Limitation

As a limitation, it would be interesting to expand the study sample, as well as to be able to propose a pretest–posttest to analyze if there are differences in perception before and after implementing the methodology. Along with this, it is necessary to reflect upon the fact that the responses were about the perception of a tool that was new for most, and that it has been adapted to the situation experienced with COVID-19 with respect to other subjects, including greater innovation and dynamism in the teaching–learning process. In addition, there may be a bias in the responses to the statements contained in the instrument, but the results achieved are useful for understanding the perceptions of the specific study sample. As a future line of research, we are interested in knowing, along with the perception of its utility, its impact on motivation and academic performance. To do this, the focus is on proposing an experimental study (with a control group) in which we can analyze both the grades (in the same subject with several groups, in which the flipped classroom is implemented in some and a traditional methodology in others), as well as the motivation with respect to the teaching–learning process.

Appendix A

Table A1. Results of the parametric assumptions for the sex variable by dimension.

Dimension	Sex	Levene		Kolmogorov–Smirnov	
		Statistic	Sig.	Statistic	Sig.
Communicative	Women	0.253	0.616	0.083	0.065
	Men			0.209	0.059
Instrumental	Women	1.250	0.266	0.136	0.000 *
	Men			0.174	0.200
Pedagogical	Women	0.026	0.872	0.110	0.003 *
	Men			0.118	0.200

Source: Developed by the authors. * = $p < 0.05$.

Table A2. Results of the parametric assumptions for the sex variable by dimension.

Items.	Sex	Levene		Kolmogorov–Smirnov	
		Statistic	Sig.	Statistic	Sig.
C1	Women	3.838	0.052	0.248	0.000 *
	Men			0.330	0.000 *
C2	Women	2.404	0.124	0.232	0.000 *
	Men			0.312	0.000 *
C3	Women	0.042	0.837	0.238	0.000 *
	Men			0.337	0.000 *
C4	Women	0.020	0.888	0.312	0.000 *
	Men			0.273	0.002 *
C5	Women	0.607	0.437	0.235	0.000 *
	Men			0.251	0.008 *
C6	Women	0.009	0.924	0.250	0.000 *
	Men			0.282	0.001 *
C7	Women	0.719	0.398	0.243	0.000 *
	Men			0.268	0.003 *
I1	Women	0.459	0.500	0.288	0.000 *
	Men			0.348	0.000 *

Table A2. *Cont.*

Items.	Sex	Levene		Kolmogorov–Smirnov	
		Statistic	Sig.	Statistic	Sig.
I2	Women	2.578	0.111	0.418	0.000 *
	Men			0.462	0.000 *
I3	Women	0.616	0.434	0.277	0.000 *
	Men			0.236	0.017 *
I4	Women	0.149	0.701	0.212	0.000 *
	Men			0.251	0.008 *
I5	Women	0.089	0.766	0.283	0.000 *
	Men			0.343	0.000 *
I6	Women	0.201	0.655	0.262	0.000 *
	Men			0.256	0.006 *
I7	Women	0.492	0.484	0.271	0.000 *
	Men			0.202	0.080
P1	Women	0.335	0.564	0.239	0.000 *
	Men			0.268	0.003 *
P2	Women	0.541	0.464	0.245	0.000 *
	Men			0.257	0.006 *
P3	Women	0.051	0.822	0.248	0.000 *
	Men			0.251	0.008 *
P4	Women	0.462	0.498	0.277	0.000 *
	Men			0.312	0.000 *
P5	Women	1.791	0.183	0.290	0.000 *
	Men			0.382	0.000 *
P6	Women	0.308	0.580	0.258	0.000 *
	Men			0.300	0.000 *
P7	Women	0.503	0.479	0.248	0.000 *
	Men			0.214	0.048 *

Source: Developed by the authors. * = $p < 0.05$.

Table A3. Results of the Mann–Whitney U test according to the sex variable.

Item	Sex	N	Mean	SD	Sig.
C1	Women	107	3.89	0.95	0.457
	Men	16	4.13	0.62	
C2	Women	107	3.52	0.92	0.130
	Men	16	3.88	0.81	
C3	Women	107	4.00	0.87	0.952
	Men	16	3.94	1.00	
C4	Women	107	4.42	0.75	0.436
	Men	16	4.31	0.70	
C5	Women	107	3.96	0.99	0.701
	Men	16	3.81	1.17	

Table A3. *Cont.*

Item	Sex	N	Mean	SD	Sig.
C6	Women	107	3.97	0.99	0.185
	Men	16	4.25	1.07	
C7	Women	107	4.07	0.90	0.401
	Men	16	4.19	1.11	
I1	Women	107	4.34	0.75	0.459
	Men	16	4.50	0.63	
I2	Women	107	4.63	0.62	0.561
	Men	16	4.75	0.45	
I3	Women	107	3.83	1.00	0.339
	Men	16	4.13	0.81	
I4	Women	107	3.84	0.93	0.145
	Men	16	4.19	0.91	
I5	Women	107	4.36	0.72	0.622
	Men	16	4.44	0.73	
I6	Women	107	4.17	0.86	0.844
	Men	16	4.13	0.89	
I7	Women	107	4.11	0.73	0.539
	Men	16	4.00	0.82	
P1	Women	107	4.18	0.78	0.814
	Men	16	4.25	0.68	
P2	Women	107	3.87	0.83	0.263
	Men	16	4.13	0.72	
P3	Women	107	4.00	0.93	0.422
	Men	16	4.19	0.91	
P4	Women	107	4.30	0.77	0.035
	Men	16	3.88	0.81	
P5	Women	107	4.27	0.85	0.222
	Men	16	4.56	0.63	
P6	Women	107	4.14	0.76	0.931
	Men	16	4.19	0.66	
P7	Women	107	4.00	0.85	0.807
	Men	16	3.94	0.93	

Source: Developed by the authors. * = $p < 0.05$.

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