

Flipped Classroom model before and during COVID-19: using technology to develop 21st century skills

Flipped
Classroom
model

189

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Abstract

Purpose – The confidence placed in the use of technology and other computing resources is an important support for the deep transformation toward processes of very high quality teaching-learning based on active learning. This paper aims to present and describe a higher education experience with Flipped Learning before and during the transformation of education due to the COVID-19 pandemic. In addition, the study analyzes the effectiveness perceived by university students of Flipped Learning for the development of competencies for the 21st century.

Design/methodology/approach – For this study, a quantitative methodology is used in which 376 university students fill out a questionnaire after experiencing several sessions with an inverted classroom under both onsite and online instructions.

Findings – On average, the results show a high agreement among students on the benefits or effectiveness that learning designs with Flipped Classroom have on the development of skills that will be useful for their personal and professional future. These competencies include character building, collaboration, communication, citizenship, critical thinking and creativity. At the same time, and depending on some control variables such as the modality of teaching (onsite or online), the course, the predisposition to innovate or previous experience with innovation, significant differences are also observed.

Originality/value – Education and learning have the need to respond to the different educational and training needs for the future. In this sense, the Flipped Classroom methodology allows the development of



skills for the 21st century. In turn, this approach also makes it possible to approach blended learning. Experiences such as the one described in this study will characterize the future of education.

Keywords Higher education, Flipped Classroom, Learning methods, Other, Universities, Active learning, Flipped learning, COVID-19, Competencies for the 21st century

Paper type Research paper

Theoretical framework

The COVID-19 pandemic is requiring a substantial change in education systems around the world. The forced need for social distancing has structured a redesign of the teaching–learning processes toward approaches in which digital resources are the main protagonists in a reality according to the information society (Arora and Srinivasan, 2020; Lim and Kim, 2015). In fact, Learning and Knowledge Technologies have been established as the only tools for interaction and communication between teachers and students. Given the magnitude of this challenge, digital tools and different software are positioned as resources with better results than traditional teaching (Reimers and Schleicher, 2020; Uluçol and Sahin, 2016). Similarly, UNESCO (2017) highlighted in the fourth of the Sustainable Development Goals the need to promote quality education that adopts ICT tools to achieve greater sustainability in education systems.

In the context of higher education, the priority objective of the educational community is oriented toward training for the development of competencies for a 21st century society. With the unexpected arrival of the COVID-19 pandemic and its inevitable consequences, the priority of educational systems has been manifested in the use of ICT as the only resource to teach online synchronously or asynchronously (Karalis and Raikou, 2020; Viner *et al.*, 2020). Among these challenges is developing the skills required for the 21st century. In this context, the pedagogical model of a Flipped Classroom, or Flipped Learning (among other names), enables the implementation of various didactic modalities. Among many other issues, reflection, discussion and collaboration among students, teachers and the context in which the learning takes place are allowed (Arnold-Garza, 2014).

Organizing the dynamics of a classroom from the pedagogical perspective of the Flipped Classroom implies considering a set of relevant aspects. First, Schmidt and Ralph (2016) highlighted the use of audiovisual resources (such as videos). With an approximate duration of between 10 and 15 min, the teacher presents theoretical knowledge and learning through audiovisual resources. In the design of these products, the academic and aesthetic issues, the dynamism in the presentation of the contents, and the simplicity of the effects and the way in which the recording is designed, are very important (García-Gil and Cremades-Andreu, 2019). Since it began to be used, the essence of the Flipped Classroom has been oriented toward the development of learning outside the classroom through the visualization of digital content and other didactic materials produced by the teacher (Bergmann and Sams, 2016). Later, during onsite instruction in the classroom, the content learned was deepened and those questions that were more complicated for the students were solved. In this process, technology and the different activity modules (which include questionnaires, group discussions, practical activities, peer learning and tutoring, among other actions) generate rich cooperative learning environments of great attractiveness and interest for students (Sergis *et al.*, 2018). Consequently, a new learning culture is created, characterized by enthusiasm and motivation toward everything new that is learned.

However, and in the face of the unprecedented situation in which society is currently, educational institutions have begun to modify this design. Thus, educational meetings that were previously held via onsite instruction are now carried out through virtual meetings.

During these virtual encounters, deeper issues are discussed, and online activities are scheduled so that students can solve collaboratively (Flack *et al.*, 2020). Bergmann, one of the professors and researchers who protocolized the Flipped Classroom system, has recognized that the dynamics of this pedagogical model are those that could possibly provide the most effective solution to the global problem of transforming teaching into an online modality (Carreira, 2020). As a result, during the COVID-19 pandemic, many education systems have relied on this methodology to face the teaching-learning process. That is, why authors such as Yen (2020) support the applicability of Flipped Learning for the development of successful learning experiences in the university environment.

In recent years, Flipped Learning has attracted more and more followers. Thus, teachers at different educational levels and contexts have joined a Flipped Learning on which numerous investigations already exist (Karabulut-Ilgü *et al.*, 2017; Sergis *et al.*, 2018; Tourón and Santiago, 2015). In the context of Higher Education, the applications and experiences described are considerably numerous (Durán *et al.*, 2017; Lee, 2018; Mehring and Leis, 2018). In all of them, the multiple benefits that this pedagogical resource generates for learning and for the educational dynamics of the context in which it is applied are highlighted (Gilboy *et al.*, 2015; Pienta, 2016). Among these favorable aspects, mention is made of the efficiency in the use of the temporary resource during onsite instruction, the possibilities of active and meaningful learning, the increase in opportunities for interaction between teachers and students, the stimulation of various learning styles and, finally, autonomy to learn. Likewise, the systematic review by O'Flaherty and Phillips (2015) concluded that Flipped Learning is considered a strategy with great potential to improve student learning experiences through the creation of more dynamic interactions.

The technological trends of recent years are leading to important behavioral changes in the modern socio-cultural world that are visible in the educational context of 21st century students (Onyema and Daniil, 2017; Oparaocha *et al.*, 2014). Unlike previous generations, students in the 21st century are progressively demonstrating less tolerance for more conventional teaching (Roehl *et al.*, 2013). In this sense, methodological initiatives based on active teaching designs, such as the Flipped Classroom, promote deep learning that defines the character and the new generations of the knowledge society. Precisely for this reason, some studies began to focus their interest on the analysis that the benefits of applying active learning approaches have on the development of skills and competencies of the 21st century (Niemo *et al.*, 2016). These skills, specified in Fullan and Langworthy's (2013) proposal, include character building, citizenship, communication, critical thinking, collaboration and creativity. Thus, the methodologies in which the maximum use of communication networks and the increasing availability of educational resources are combined, lead to the development of character qualities required by students of the 21st century (Bezanilla *et al.*, 2019).

Students' perceptions about the usefulness of these teaching systems based on the use of ICT take on fundamental importance. In fact, the technology acceptance model developed by Davis (1989) theorizes that a person's intention to accept and adopt a new system (in this case, the Flipped Learning approach) is determined by their beliefs about the usefulness and perceived benefits. Saga and Zmud (1994) continued the research of Davis (1989) and found that experimentation with strategies based on the use of ICT was more common if the user perceived it as useful, convenient and socially desirable. In this regard, in recent years, universities in different countries that have incorporated elements of Flipped Learning in their classrooms have analyzed the effectiveness and perceived utility of this methodological approach (Lape *et al.*, 2014; McLaughlin *et al.*, 2013). To do so, some of the investigations chose to analyze the perceptions and the level of student satisfaction (Custer, 2016; Park and Howell, 2015). In this sense, the trend of most of the results of these studies is remarkably

positive (Day and Foley, 2006). However, even though academic performance among students increased after flipping classes, studies such as those of Missildine *et al.* (2013) found that student satisfaction was not favorable. The authors consider that these results could be due to the greater workload and effort perceived during the Flipped Learning sessions. This perceived demand was also highlighted in the previous literature (Gianoni-Capenakas *et al.*, 2019).

Home learning and technology are causing different reactions among the education sector during the unique situation caused by the COVID-19 pandemic. If the digital age had already significantly accelerated educational and work contexts, as a consequence of this unpredictable situation, training contexts are further predicted in which online teaching-learning processes will acquire a significant role (Zhang *et al.*, 2020). The current challenges that all educational agents face have brought about certain changes in their perceptions that should be considered. On the other hand, and despite the increase in the literature specifically aimed at studying the impact of Flipped Learning experiences in the university classroom, the majority trend has been toward the analysis of benefits on academic performance or perceived satisfaction. However, it is not usual for the focus of interest to be placed on the perceptions of the students about the potential of the Flipped Classroom for the improvement and development of skills and competences required in a society of the 21st century.

Thus, within the framework of the development of a Flipped Classroom experience in the university context carried out during the current state of world, a study is proposed to answer the following research question: After participating in several sessions in the Flipped Classroom, to what extent do university students consider that this active methodology contributes to the development of skills for the 21st century? Therefore, this study aims to analyze the considerations of the university students who have been involved in Flipped Classroom learning. More specifically, the students' perceptions of the potential that the Flipped Classroom has for the development of skills and competencies of the 21st century are explored. In turn, the effects of some control variables related to the course, the type of teaching (onsite or online), the predisposition to innovate and the previous experience with innovation are analyzed. Finally, the need to face the radical change that has come about with the unexpected situation of online education is highlighted.

Flipped Classroom experience procedure

Due to the disparity of characteristics presented by the structure and content of each subject in which the experience has been implemented, a set of minimum criteria of homogeneity were established to ensure similar guidelines for the development of the learning model of the Flipped Classroom. First, the theoretical content was reserved for autonomous learning sessions. Subsequently, the learning sessions with the teacher could be onsite in the university classroom (if the classes were held prior to the COVID-19 pandemic) or synchronous (if the classes were held in a virtual format due to suspension of classroom attendance). In any case, these sessions were intended to reflect on the material analyzed autonomously and to consolidate everything previously studied (Roach, 2014). During the three weeks of the study, each teacher had to plan and design the audiovisual material that included the content to be learned. From the coordination of the project, they were recommended to rely on figures, diagrams, graphics and images, as long as the content of the subject was adequate.

Furthermore, prior to the Flipped Learning sessions, the dynamics of this methodology were explained to the students. Given the novelty of the experience, special emphasis was placed on the need to access the audiovisual material provided by the teacher in the

corresponding online media. In turn, they were informed that they would have to design activities arranged in an online format based on the theoretical content prepared for each of the three weeks. All this, with a weekly periodicity and prior to the onsite or synchronous session (depending on when the experience was carried out). For the onsite or synchronous sessions, teachers were offered different models of activities to apply: quiz-type questions, elaboration of mind maps or design of questions to exchange with other classmates. Each teacher remained free to schedule the activities that they considered best-suited to the content of their subject.

Method

A quantitative study is presented with a descriptive survey and non-experimental character based on a questionnaire. This approximates the objective under-study without introducing modifications of the variables, with the aim of exploring and describing it (Lietz, 2010). This type of design allows an objective and comparable systematic description of characteristics and facts of a population. Therefore, this is a valuable source of information for analyzing the perceptions of university students.

Sampling and data collection

The sampling of this study consists of 376 students from higher education of a Spanish University Institution. The study was launched during the first and second semesters of the 2019-2020 academic year. As seen in Table 1, 75% of the sample was enrolled in the initial university courses, and the remaining 25% of the sample was enrolled in the last courses. Almost 68% of the sample experienced Flipped Classroom sessions as onsite instruction, compared to 32% who experienced it as online instruction. The distribution of the sample, based on the attitude toward and predisposition to innovation, was similar for both categories. Finally, and in terms of previous experience with innovation, 36.70% of the sample had no experience at all, whereas 63.30% did have some prior contact.

Survey design and descriptive analysis

The respondents were asked to indicate their level of agreement with 21 statements about the contribution of the Flipped Classroom methodology to the development of skills for the 21st century. These competences were arranged in seven different dimensions: character

Variable	N	% Of The Sample
<i>Course</i>		
First courses (1° and 2°)	282	75.00
Last courses (3°, 4° and Master)	94	25.00
<i>Type of experience with Flipped Classroom</i>		
Onsite instruction	255	67.82
Online instruction	121	32.18
<i>Willingness to innovate</i>		
Little	197	52.39
Yes, always	179	47.61
<i>Previous experience with innovative experience</i>		
Never	138	36.70
Yes, on occasion	238	63.30
TOTAL	376	

Table 1.
Sociodemographic
characteristics of the
sample

building; collaboration; communication; citizenship; critical thinking; creativity; and others. A Likert scale was used with an interval from 0 (totally disagree) to 10 (totally agree). This scale was used because it corresponds to the natural evaluation system within the Spanish educational system. Consequently, the university students were fully accustomed to this interval. These indicators were taken from the questionnaire used in the study of [Martín and Tourón \(2017\)](#). The survey was completed by the students in an online format once the three Flipped Classroom sessions were completed. A platform for creating and sending questionnaires called “Qualtrics” was used. This platform was open since the first Flipped Classroom experiences began (in October 2019) until the last (in May 2020).

After data collection and statistical analysis, it was found that the percentage of item non-responses was below 15%. To test for the existence of a specific pattern of missing data, a missing completely at random (MCAR) test was performed. The MCAR test estimated whether a significant relationship existed between the missing data and the values that were observed or missing. The null hypothesis for the MCAR test is that the data is missing completely at random. The insignificance of the MCAR test ($\chi^2(30) = 33.59$) means that the null hypothesis cannot be rejected. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett’s test of sphericity were performed to determine whether the data is suitable for structure detection.

Descriptive statistics were calculated to evaluate the appropriateness of the 21 indicators related to the development of the 21st century skills with the experience of the Flipped Classroom by calculating the means of all the responses, standard deviations, skewness and kurtosis per item. In the “survey design and descriptive analysis” section, an additional explanation has been included about the indicators of the questionnaire, which respond to seven different competences, and about the reason why these analyzes have been applied.

Additionally, with a Likert scale it was necessary to calculate and report Cronbach’s alpha coefficient for internal consistency reliability ([Gliem and Gliem, 2003](#)), which is an index of how related a set of items is as a group. The most and least agreed-upon statements were identified according to the following control variables: course, type of experience with the Flipped Classroom, willingness to innovate and previous experience with innovative experience. In turn, a two-sided independent sample *z*-test was used to compare the mean scores for the different perceptions between the levels of control variables and for this reason were an effective statistical approach confirming relationships and revealing their causal nature and strength ([Smith, 2018](#)).

Results

[Table 2](#) presents the means, standard deviation, skewness, kurtosis, item total correlation (correlation coefficient between the score on the individual item and the sum of the scores on the remaining items), and Cronbach’s alpha coefficient if the individual item is discarded from the scale. In general, there is a high agreement among all the indicators on the scale. Almost all of them exceed the average score of 7. The respondents agreed most with the Q7 item, which defines Communication for Skills for the 21st century as “Accessibility of learning material and content” (mean 8.24), followed by Q16 (“My learning autonomy”; mean 8.11) and Q11 (“The teacher promotes a facilitating learning context; mean 8.10.”) The least agreed-upon statement was Q10, which defines Citizenship as “Take into account my strengths, weaknesses and interests” (mean 6.89). Likewise, a substantially high index of agreement was not obtained regarding the perceived improvement of grades with the Flipped Classroom methodology (Q20, mean 7.40), the flexibility to choose the type of materials most appropriate for their learning (Q1, mean 7.43) and, finally, the increase in the interactions and contact with the teacher (Q19, mean 7.49). The skewness values ($\leq |1.112|$)

Perception about skills for the 21st century	Mean	SD	Skewness	Kurtosis	Item total correlation	Cronbach's alpha
<i>Character building</i> (Cronbach's alpha = 0.812)						
Q1. Flexibility to choose the type of materials that are best for my learning	7.43	1.70	-0.488	3.684	0.539	0.778
Q2. Work at your own pace	7.81	1.63	-0.374	2.463	0.594	0.815
Q3. Fun and learning	8.00	1.66	-0.811	4.211	0.463	0.721
Q4. Increase my motivation	7.94	1.79	-0.826	3.738	0.479	0.734
<i>Collaboration</i> (Cronbach's alpha = 0.878)						
Q5. Collaboration with my classmates	7.92	1.63	-0.854	3.942		
Q6. Learning from/with my classmates	7.96	1.68	-0.874	4.045		
<i>Communication</i> (Cronbach's alpha = 0.657)						
Q7. Accessibility of learning material	8.24	1.47	-0.553	2.530	0.362	0.532
Q8. Development of my oral and written expression	7.54	1.83	-0.965	4.810	0.337	0.504
Q9. Learn using digital technology	7.65	1.77	-1.054	5.219	0.469	0.639
<i>Citizenship</i> (Cronbach's alpha = 0.755)						
Q10. Take into account my strengths, weaknesses and interests	6.89	1.84	-0.556	3.997		
Q11. The teacher promotes a facilitating learning context	8.10	1.54	-0.753	3.384		
<i>Critical Thinking</i> (Cronbach's alpha = 0.861)						
Q12. Decision-making participation when collaborating with my classmates	7.91	1.59	-0.985	4.571	0.574	0.802
Q13. Participate in problem resolution	7.87	1.59	-1.112	5.227	0.572	0.800
Q14. Develop my critical thinking	8.04	1.67	-1.086	4.784	0.577	0.804
Q15. Auto-evaluate my learning progress	7.71	1.55	-0.406	2.804	0.710	0.880
<i>Creativity</i> (Cronbach's alpha = 0.758)						
Q16. My learning autonomy	8.11	1.44	-0.487	2.841	0.576	0.731
Q17. Improved learning process	8.02	1.39	-0.551	3.048	0.336	0.503
Q18. Increased creativity	7.71	1.73	-0.795	3.848	0.618	0.764
<i>Others</i> (Cronbach's alpha = 0.748)						
Q19. Frequent interaction/contact with the teacher	7.49	1.73	-0.809	4.273	0.498	0.665
Q20. Improvement of my grades	7.40	1.56	-0.329	3.286	0.507	0.673
Q21. I such as the methodology used	7.74	1.78	-0.702	3.098	0.488	0.656

Table 2.
Descriptive statistics

and kurtosis values ($\leq |5.227|$) were within the range of recommended values (Kline, 2016), so it is possible to assume that the responses were relatively normally distributed. The internal consistency of the concepts measured by Cronbach's alpha for Skills for the 21st century was acceptable to good, ranging from 0.657 for Communication to 0.878 for Collaboration; and Cronbach's alpha for the overall scale was 0.945.

Regarding the analysis of differences based on various control variables (Table 3), some results have been found that should be highlighted. In general, and in comparison with the students of the highest university courses (3rd, 4th and Master), the agreement between those enrolled in the first courses is significantly less. This pattern of responses occurs in almost all the indicators of the different competencies. As exceptions in which no differences are found, there is the "fun and learning" and the "development of the oral and written expression."

When paying attention to the so-called online effect, very few significant differences have been found in the statements. Students who tried the Flipped Classroom experience during

Table 3.
Analysis of
significant effects of
the control variables
in skills for the 21st
century student's
perceptions

Perception	First years effect	Online effect	Willingness to innovate	Previous experience
<i>Character building</i>				
Q1. Flexibility to choose the type of materials that are best for my learning	$z = -1.99^{**}$	$z = -0.80$	$z = 2.85^{***}$	$z = -0.19$
Q2. Work at your own pace	$z = -4.02^{***}$	$z = -1.16$	$z = 2.58^{***}$	$z = -1.43$
Q3. Fun and learning	$z = -1.40$	$z = -1.95^{*}$	$z = 3.48^{***}$	$z = -0.89$
Q4. Increase my motivation	$z = -2.12^{**}$	$z = -0.94$	$z = 3.17^{***}$	$z = -0.37$
<i>Collaboration</i>				
Q5. Collaboration with my classmates	$z = -2.36^{**}$	$z = -2.12^{**}$	$z = 2.73^{***}$	$z = -1.01$
Q6. Learning from/with my classmates	$z = -2.48^{**}$	$z = -2.09^{**}$	$z = 3.18^{***}$	$z = -0.96$
<i>Communication</i>				
Q7. Accessibility of learning material	$z = -2.73^{***}$	$z = 0.60$	$z = 0.83$	$z = -1.64^{*}$
Q8. Development of my oral and written expression	$z = 0.09$	$z = 0.76$	$z = 1.25$	$z = -0.66$
Q9. Learn using digital technology	$z = -1.66^{*}$	$z = 1.47$	$z = 1.32$	$z = -0.75$
<i>Citizenship</i>				
Q10. Take into account my strengths, weaknesses and interests	$z = -1.87^{*}$	$z = -0.77$	$z = 1.59$	$z = -0.54$
Q11. The teacher promotes a facilitating learning context	$z = -2.64^{***}$	$z = -1.43$	$z = 3.00^{***}$	$z = -0.31$
<i>Critical Thinking</i>				
Q12. Decision-making participation when collaborating with my classmates	$z = -1.97^{**}$	$z = -1.45$	$z = 2.31^{**}$	$z = -2.80^{***}$
Q13. Participate in problem resolution	$z = -1.82^{*}$	$z = 0.18$	$z = 2.76^{***}$	$z = -1.74^{*}$
Q14. Develop my critical thinking	$z = -2.77^{***}$	$z = -0.66$	$z = 3.87^{***}$	$z = -1.79^{*}$
Q15. Auto-evaluate my learning progress	$z = -2.04^{**}$	$z = 0.78$	$z = 2.68^{***}$	$z = -1.28$
<i>Creativity</i>				
Q16. My learning autonomy	$z = -3.50^{***}$	$z = 0.28$	$z = 3.17^{***}$	$z = -1.35$
Q17. Improved learning process	$z = -3.52^{***}$	$z = 0.08$	$z = 3.15^{***}$	$z = -0.87$
Q18. Increased creativity	$z = -1.91^{*}$	$z = -0.34$	$z = 1.94^{*}$	$z = 0.03$
<i>Others</i>				
Q19. Frequent interaction/contact with the teacher	$z = -2.70^{***}$	$z = -1.23$	$z = 2.29^{**}$	$z = 0.27$
Q20. Improvement of my grades	$z = -2.45^{**}$	$z = 0.78$	$z = 1.39$	$z = -0.24$
Q21. I such as the methodology used	$z = -4.29^{***}$	$z = -0.93$	$z = 3.23^{***}$	$z = -0.13$
Notes: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$				

home confinement due to the COVID-19 pandemic less strongly supported the development of some of the skills for the 21st century with this pedagogical approach. Specifically, this trend was observed in the “fun and learning” ($z = -1.92$, $p < 0.1$) and in the two indicators of collaborative competence, that is, in “collaboration with the classmates” ($z = -2.12$, $p < 0.05$) and in “learning from/with the classmates” ($z = -2.09$, $p < 0.05$). For the rest of the indicators, greater agreement is observed between the development of 21st century competencies in those university students who carried out the Flipped Classroom experience prior to confinement.

The degree of agreement in many of the indicators of the students with a positive vision toward the experiences of innovation in the university has been significantly higher than that of the students who do not present this predisposition for innovation in education. Exceptions are in the three communication-related skills, in the consideration of interests,

strengths and weaknesses (indicator of the competence dimension of citizenship) and in the improvement of qualifications (included in the “other competences” section). On the other hand, previous experience with innovation activities yielded statistically significant differences in some of the statements. Specifically, the agreement in participation in decision-making ($z = -2.80, p < 0.01$), in problem solving ($z = -1.74, p < 0.1$) and in the development of critical thinking ($z = -1.79, p < 0.1$) was lower in those students who had previous experiences of innovation in the university classroom.

Discussion

The learning method with Flipped Classroom already has many experiences that support its effectiveness and potential for active student learning (Brewer and Movahedazarhouli, 2018). However, in this research, the considerations contributed by a group of university students directly involved in the experience have been highlighted. Specifically, the perceived usefulness of Flipped Learning has been analyzed, but less on instructional design and more on the process of acquiring and developing competencies of great relevance for performance in 21st century society. In addition to the evidence supporting the improvement of academic performance thanks to these learning dynamics in university settings (Crimmins and Midkiff, 2017; Thai *et al.*, 2017), this research has highlighted the usefulness of this methodology for the development of other fundamental qualities that define a competent person. Today, the qualities analyzed here are considered essential to successfully face personal, social and professional demands.

Considering these results, a fairly positive reception is appreciated by university students of this Flipped Classroom methodology. In general, there is a favorable appreciation regarding the benefits of the Flipped Classroom for developing skills for the 21st century. This coincides with other previous investigations in which the potential of using active methodologies in Higher Education have been investigated (Ramnanan and Pound, 2017). The Flipped Classroom is based on the premises of the European Higher Education Area (Reyes, 2015) and is a resource with great potential so that students have the possibility of self-regulating and leading their particular learning process. As Tucker (2012) points out, the Flipped Classroom does not translate into viewing audiovisual material from home. In contrast, the Flipped Classroom is arranged as a very well-structured combination of teaching practices and constructivist learning. Therefore, paying attention to the learning process is a key aspect to guarantee the success of any educational methodological design with this approach.

The differences that have been observed in relation to previous experience with innovation in the educational field could be due to the way in which the student interprets the term “innovation.” As Kopcha *et al.* (2016) indicated, innovation applied to teaching and technology is often understood as a placeholder description for those initiatives that do not correspond to typical or traditional practices. However, the concept of educational innovation goes much further. According to Cohen and Ball (2007, p.19), innovation includes “novel practices, tools or technologies, and knowledge and ideas.” From the university context, and an example of this are the results of this study, freedom of experimentation with new and innovative approaches that take maximum advantage of technology to develop a more effective type of teaching for all students is demanded.

On the other hand, students who carried out the online experience are less supportive of the indicators of the competences related to fun and learning, with collaboration with the classmates and with learning from the classmates. According to Goh and Sandars (2020), with the COVID-19 pandemic, education around the world has undergone a major disruptive change. In this process, technology has been used in a very rapid way to ensure teaching

and learning. Students and teachers have been forced to reformulate their ways of teaching and receiving classes. As a result, perhaps the higher education students in this study have perceived that the effects of the Flipped Classroom on skill development for the 21st century are not as noticeable as they would like. In this sense, the education and training to configure online learning contexts and elevate the requisite skills acquires fundamental importance, especially in regard to synchronous teaching tools. It is likely that if the students had perceived that their needs regarding the use of technology and monitoring of the teaching-learning processes were met, their assessment of the acquisition of skills with the Flipped Classroom during distance learning would have been more positive.

From the perspective of these students, other aspects could be subject to improvement, as we are currently in the process of adapting to virtualized teaching that places value on the training of both teachers and students in the domain of technological competence that prepares for the challenges of 21st century society (Ahmed *et al.*, 2020; Murphy, 2020). Learning with this Flipped Classroom methodology and in a virtual way implies investing efforts in the reconstruction of student-teacher connections and supporting the well-being of students (Ferding *et al.*, 2020). Let us take into account that active methodologies such as the one described here and the emergence of COVID-19 have modified and renewed the way in which education will be understood from now on, probably from the initial educational stages to higher education levels.

Conclusions

Although continuous research and evaluation is needed on Flipped Classroom experiences applied in the classroom, regardless of the educational level in which they are implemented, the results of this study highlight the potential of this pedagogical model and its promising applications. In addition, it has been possible to answer the research question, as the results show that inverted learning has the potential to transform the dynamics of university classrooms and contribute to the development of creativity, critical thinking, communication and collaborative skills, citizen competence and construction of character. In other words, innovative technologies and methodologies are key tools for the future of development and improvement of education as a result of the large number of benefits that are produced in the learning process and development of student skills.

The common objective to which every university system must focus its efforts refers to a balanced and complete education of people so that they are able to take responsibility for the social, economic and intellectual demands of the society of the 21st century (Caena and Redecker, 2019; Smith, 2012). In turn, the scenario facing the Higher Education sector in the age of technology has been revealed. Therefore, the need arises for the pedagogical models used to resonate with the reality that surrounds the students of the 21st century. Although higher education has interacted with technological progress for several decades, trends in today's society are presented as challenges of enormous complexity (Cheng *et al.*, 2009; Ding and Wang, 2017).

The current society and the new jobs that have emerged in recent years have brought with them new demands in learning contexts. Tablets, mobile phones and virtual platforms are already a daily and completely necessary part of our lives and have become ubiquitous (Gündüz and Akkoyunlu, 2019). Recent university graduates face a labor market characterized by great challenges, and certain skills and competencies adapted to it are highly valued. As Gündüz and Akkoyunlu (2019) point out, critical thinking, creativity, collaboration and communication skills, problem solving and the adoption of responsibilities are some of these desired skills for 21st century societies. This is why a large part of the teaching staff invests considerable effort in transforming the training systems to

adapt them to this type of demand. Learning in an inverted way allows the design of a learning environment that has the potential to equip students with skills for the 21st century, improve their critical thinking and increase participation (O'Flaherty and Phillips, 2015)

The variability of areas of knowledge in higher education in which the Flipped Classroom has been implemented highlights the concern of teachers to improve the learning of their students (Sola *et al.*, 2019). In turn, it is also indicative that a wide sector of teaching staff knows the multiple benefits associated with this pedagogical approach (Matsumura *et al.*, 2018; O'Flaherty and Phillips, 2015). In these times of crisis, more than ever, students from all educational stages need the presence and active work of their teachers in virtual terms. Initiative and creativity take on essential importance in a setting that offers the possibility of individual commitment, trust and responsibility, as well as a sense of union between groups and personal reinvention.

Today, more than ever, actions based on the principles of the Flipped Classroom will enable a renewal of onsite instruction through audiovisual systems and other multimedia resources (Sánchez *et al.*, 2016). The necessary transformation of the teaching-learning processes caused by the COVID-19 pandemic will force classes to be "turned around" in many educational contexts and present the contents through virtual systems so that students can learn from a more autonomous way outside the traditional classroom. This guarantees the acquisition of fully required competences for students in a 21st century society and from a practical perspective that integrates debate, play and reflection (Bergmann and Sams, 2012). Companies, schools and universities are already beginning to envision e-learning as a learning modality with a character that is oriented more toward permanence than circumstantiality. Broadly speaking, behind the implications of this study is an abrupt change in the way we are going to relate, work and communicate from now on. It is very likely that the use of ICT in the classroom will become the norm for everyone. More and more teachers will develop their teaching-learning methods based on digital media (such as those used by the Flipped Learning method). Therefore, technology is becoming an opportunity to improve student learning.

It would be useful for future studies to analyze the relationships between the utility perceived by students on this methodological approach, the ease of use and its acceptance to be integrated as part of the teaching-learning dynamics of their university study plans. Finally, to investigate the true effectiveness of this learning approach, additional studies are required that compare the Flipped Classroom methodology with other non-inverted learning models. Regarding the possible limitations, this study had a relatively low sample size, mainly due to the contextualized nature of the data. Future studies could expand the sample size and incorporate comparisons between educational systems in different countries.

COVID-19 challenges and opportunities

The COVID-19 crisis has changed many social and educational dynamics. The rapid evolution that this global crisis is forcing will require both students and teachers to have a certain flexibility in learning and the application of educational methods that easily adapt to changing circumstances. In this study, the implementation of the Flipped Classroom experiences both before and during the first months of COVID-19 has proven to be successful. This methodology is perfectly adapted to the context and peculiar circumstances in which it is applied if the students and teachers commit themselves and assume active responsibility. However, it is important that the Flipped Classroom application (whether in online or onsite format) is done in combination with other learning methodologies.

At this very sensitive and special moment in human history, active methodologies (such as the Flipped Classroom) and digital competence are crucial. In the case of the Flipped Classroom, it is a step beyond the simple recording of videos and the performance of isolated activities. In this way, the approach would be about programming authentic virtual classes in which the students had collaboration roles and teamwork. This occurs while the online classes are being carried out synchronously through video calls. Therefore, the principles of the Flipped Classroom are perfectly applicable to the current context of the health crisis and, even, to a confinement situation that could be decreed again because of the pandemic. Onsite instruction could be replaced by online classes or “online tutoring” and, as has been evidenced in this study, university students continue to perceive certain benefits for the development of their skills for the 21st century. In any case, it will be essential that students have open access to computer equipment and Internet connections from their homes. In addition, the key to the success of these learning activities with the Flipped Classroom will be the organization that teachers make for their teaching practice.

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