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Educational Potentials of Flipped Learning in Intercultural Education as a Transversal Resource in Adolescents

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Abstract: The evolution of technology in the educational field has resulted in the emergence of new ways of teaching and learning, adapted to the formative characteristics of a digital era. This is the case of Flipped Learning (FL), an innovative teaching methodology that uses technology to carry out instructional action and change learning moments and spaces. The objective of this study is to verify the effectiveness of FL on a traditional methodology without the use of digital resources in teaching content related to intercultural education. A quantitative research method has been followed by an experimental design. Two study groups have been set up. With the control group a traditional training methodology has been used, and with the experimental group an innovative one, through FL. A total of 60 students of the 4th level of Secondary Education from an educational center in Ceuta (Spain) have participated. An ad hoc questionnaire derived from other validated instruments has been used for data collection. The findings show that the FL has achieved better results in the different dimensions analyzed. Therefore, it is concluded that the implementation of innovative training actions such as FL can obtain better results in academic indicators than a traditional methodology.

Keywords: ICT; educational innovation; flipped learning; intercultural; methodological contrast; secondary education

1. Introduction

Information and communication technology (ICT) has occupied a large part of the daily actions we carry out, being a technology that is increasingly integrated into people's lives (Berea et al. 2019). In the field of education, technology has assumed a certain role, which is reflected in the innovative methodological approaches that are carried out both inside and outside the classroom (Area-Moreira et al. 2016). ICT has caused a change in the means of imparting content by education professionals (Li et al. 2019) and in the way students learn. All this is motivated by the potential that technology has in the service of education (Rojas et al. 2018).

The improvements in educational technology have placed education in a phase of transformation, oriented towards the inclusion of technological resources from a pedagogical perspective (Pereira et al. 2019). These changes have led to a modification and an improvement in the didactic processes, which have resulted in an increase of academic indicators such as 'motivation', and a set of digital training resources so that teachers can develop their work in learning spaces (Álvarez-Rodríguez et al. 2019; Khine et al. 2017). In addition, these technological advances promote

better access to information and content by students (Salleh et al. 2019). Therefore, students show a positive opinion of the use of ICT in teaching and learning processes (López-Quintero et al. 2019).

The development of educational technology has made it an essential means of carrying out teaching actions today (Escobar and Sánchez 2018; Nikolopoulou et al. 2019). This has been caused by new learning spaces generated by the various resources and digital platforms (Nogueira et al. 2018) that have caused an emergence of new training experiences for students (Cabero Almenara and Osuna 2018), improving the quality of characteristic instruction in a technological era (Cuevas et al. 2019).

Due to the demands of students of the digital age, the teaching practice must welcome and effectively use educational technology. A clear example of this is Flipped Learning (FL). This innovative teaching and learning methodology was created in 2012 by Jonathan Bergmann and Aaron Sams, who developed audiovisual teaching materials so that students with class attendance problems could access the contents from an electronic device connected to the Internet (Bergmann and Sams 2012). From its inception to date, this innovative didactic approach has accrued great relevance, demonstrated by the effectiveness that it grants formative action (He et al. 2016; López Belmonte et al. 2019; Zainuddin et al. 2019).

The fundamentals of FL focus on digital platforms and digital materials, created by the teacher and used by students (Long et al. 2017). This means the contents can be visualized and taught outside the conventional classroom, so that class time can be used for interactions between teacher, student, and content (López Belmonte et al. 2019; Mengual Andrés et al. 2019).

This pedagogical innovation means that the teaching and learning moments traditionally occurring in the classroom are reversed. This investment entails an increase in classroom practice, autonomy and problem-solving in a collaborative way, based on the experience and previous knowledge of the students (Zainuddin et al. 2019). Therefore, the FL provides more motivation for students to carry out their daily work in the training processes (Castellanos Sánchez et al. 2017; Hwang et al. 2015).

The specialized literature reveals that FL is presented in the educational field as an effective, innovative approach. This has been reported by previous studies on the state of the matter, where improvements have been achieved with respect to traditional methods regarding the commitment of students (Huang et al. 2019), the participation of educational agents (Chyr et al. 2017), their collaboration and socialization (Pérez and Beaufond 2019; Kwon and Woo 2017), motivation (Tse et al. 2019), autonomy (Fernández and Jácome 2016), the adaptation to the learning needs of each student (Tourón and Santiago 2015) and the resolution of problems arising in the daily praxis or raised by the teacher during the training action (Bognar et al. 2019).

Other researches have demonstrated the efficiency of this methodology, working through intercultural competences in several areas, such as mathematics, language or even music (Ogan et al. 2009; Garrett-Rucks 2017; Kohn and Hoffstaedter 2017; Yang and Qian 2018), although these researches have focused more on language competence and not on social competence.

The benefits derived from previous research are demonstrated by the results and achievements in learning (Karabulut-Ilgu et al. 2018). This implies that students obtain a higher performance, that improves their grades (Fisher et al. 2017) and has an impact on the scope of the objectives formulated by the teacher (Awidi and Paynter 2019; Nortvig et al. 2018; Yoshida 2016). The benefits derived from the implementation of FL affect the attitude of students in the learning process positively (Lee et al. 2018).

All of the above leads us to consider FL as an effective pedagogical innovation when compared to traditional teaching and learning approaches in which ICT does not intervene (Sola Martínez et al. 2018).

However, we must not forget that every learning process generates anxiety in the student. In a recent study, it was shown that students with high levels of anxiety obtained better learning achievements through an active methodology (Hwang et al. 2017). On the other hand, not all anxiety is beneficial, therefore it is recommended that specialists carry out educational practices that reduce anxiety and increase academic performance (Martínez-Álvarez and Muñoz 2018).

1.1. Justification and Objectives

The migratory crisis seen in many countries as a result of political and economic problems, has caused many people to emigrate to other places to find a better quality of life and to fulfil their needs as a human being (Belattar 2014; Juaristi 2017). Child immigration is a phenomenon that is especially increasing, especially in countries such as Spain, which faces complex problems due to a lack of resources in the face of a wave of foreign minors who arrive at its shores every day (Bravo and Santos-González 2017).

Minors who arrive from abroad encounter various problems. The communicative deficit they have stands out, since they do not know the language of the region in which they are located (Frutos et al. 2017), and they face problems of inclusion in the host society, since they suffer great prejudice from the rest of the citizens (Díaz 2017).

To solve this complex situation from the educational context, the promotion of the inclusion of this group is pursued in order to guarantee a society in the future with social justice, equity and multiculturalism (Angelidou et al. 2019).

In short, educational institutions must combine their efforts to give adequate attention and training to the broad spectrum of students in the classroom (Rubio and Hawrylak 2016). The literature reflects that every educational system should welcome all subjects, in spite of their place of origin or culture, which is one of the educational challenges nowadays (Segura-Robles and Parra-González 2019).

In an era marked by cultural diversity caused by constant migratory flows, education stands as a means to attend and respect religious, linguistic, political and cultural differences (Frutos et al. 2017). Current education pursues the rejection of any educational system that seeks the imposition of content, activities or the promotion of values related to the hegemony of a single culture (Sánchez and Tirso 2016). In this sense, the development of intercultural skills, knowledge and skills is sought, in a transversal way, with the aim of forming a link between the different cultures in the learning spaces (Dietz 2017).

In this way, educational centers become suitable institutions to export and disseminate democratic values and respect for the interculturality that today's society presents (Ciges 2012). To achieve this goal, the school must reinvent itself through the development of training activities articulate in cultural variety, respect and awareness of human rights and peace (Sacavino and Candau 2014). In addition, these school institutions must conceive of intercultural education as a path towards the acquisition of social and civic competencies of citizens (Tomé and Manzano 2016).

Throughout this process, synergy between the different cultures that coexist in society is relevant, so that none have to reject their identity. Therefore, a cultural symbiosis must be achieved in order to promote the development of people, with intercultural education being an effective means to achieve this (Arévalo et al. 2018).

The specialized literature considers that the cultural range of the classroom exerts a negative influence, both on the coexistence of the students and on their academic performance, especially for students from other regions (Fernández Batanero and Parra 2016). In line with this, a teaching and learning process must be deployed from an intercultural perspective, to increase the approach and prominence of the diverse cultures and achieve coexistence, with the intention of enhancing the learning results, behavior and attitude of students (Solbes and Galacho 2018). Therefore, an intercultural education will increase the indicators of coexistence, respect, equality and well-being among students and will contribute to improving the quality of life and inclusion of people (Leiva Olivencia 2017).

Despite the importance of the studies presented on the development of intercultural education in learning spaces, the literature does not detail the methodological premises of its approach. Therefore, in this work, experimentation was carried out using the FL as a tool for learning contents related to intercultural education. The implementation of this innovative methodology aims to ensure that the teaching and learning processes adapt to the new times, means, and didactic and technological resources that have emerged over time (Alderman and Headey 2017).

The study has been carried out at the last level of the Secondary Education stage, for the students demonstrated skill in the use of emerging technologies (Larionova et al. 2018), and were thus able to reduce the error bias in the use of the technological tools that are required for commissioning the FL.

Therefore, the general objective of this experimentation is to analyze the effectiveness of FL for the development of intercultural competences compared to the performance of a traditional methodology in the 4th year of Secondary Education. From this general objective, the following specific objectives arise:

- To determine the effect of the traditional methodology on learning intercultural competences in students;
- To know the effect of the flipped methodology on learning intercultural competences;
- To determine the impact of the flipped methodology on the academic results obtained;
- To determine the strength of the possible differences found.

1.2. Intervention Description

Due to the migratory flows mentioned above and the current configuration of society, some cities have become a melting pot of cultures and races, in which intercultural education is vital. For this experimentation this descriptor has been used as a fundamental axis for conveying to all students the values that this entails through transversal education. If we add an active methodology to this, as is the case, the result might be useful.

In addition, this study is especially relevant for the context in which it is carried out. The Autonomous City of Ceuta is one of the cities with the greatest global inequality, where four different cultures coexist, each associated with a religion. The students who have participated belong to each of these cultures, and also profess a different religion. In addition, this multiculturalism is increasing due to the fact that Ceuta is a cross-border city, which entails a relevant cultural mix at all levels.

Intercultural education has been treated as an interdisciplinary issue, and different aspects and details have been used to study the variables. The creation of heterogeneous working groups, in terms of culture and religion, have served as a fundamental basis for its development.

In the didactic unit carried out, contents such as migratory movements, cultural diversity, social inclusion, respect, empathy, social and civic values, democracy, coexistence, human rights and peace have been worked on. To ensure the active participation of all participants, the materials have been translated into Dariya¹ with the assistance of a teacher who is also a Dariya native speaker. In addition, the videos used have been subtitled in Spanish. Information search activities have focused on the countries of origin of migrants that arrive in the city. From these contents, the following learning objectives to be achieved by students have been formulated:

- To know the causes and repercussions of the migratory movements of society;
- To assimilate cultural diversity as a potential feature of society;
- To foster the social inclusion of all people in today's society;
- To develop social interactions based on respect, empathy, coexistence and democratic behavior;
- To export to citizens social and civic values for the development of peace;
- To foster respect for human rights in a society in constant transformation.

2. Materials and Methods

2.1. Research Design and Data Analysis

The present study was carried out through the experimental design of a descriptive and correlational type, based on the quantitative perspective, as indicated by the experts

¹ An oral language with numerous groups of mutually intelligible dialect varieties coming from the Arabic language.

(Pérez-Escoda 2018; Hernández Sampieri et al. 2014). The students have been classified into two analysis groups. A control group was established, with which a traditional teaching methodology was followed. On the other hand, an experimental group was set up, using the FL as the main tool for teaching and learning content. Therefore, the type of methodology used as an independent variable was defined; the effectiveness obtained being the dependent variable, with different indicators, to be evaluated.

All statistics have been carried out with the Statistical Package for the Social Sciences (SPSS) v25 program. In the data analysis, descriptive statistics such as mean (M) and standard deviation (SD) have been used. The measurement of the size of the effect caused has been obtained by biserial correlation (r). Also, a $p < 0.05$ is established in the study as a statistically significant difference.

2.2. Participants

A total of 60 secondary school students participated in this experiment. Recent studies of relevant impact show that the sample size in these investigations is not a conditioning for the performance of these experiments (Rodríguez 2011).

The students have been selected by carrying out an intentional sampling, thanks to the ease of access to the students. They were enrolled in an educational center of the Autonomous City of Ceuta (Spain), as the researchers work there and detected the need for research after working with these students. The development of this type of research makes sense in cities like Ceuta, because it is a city whose main characteristic is the coexistence of different cultures, besides being a European zone of high migratory pressure. Therefore, it can be affirmed that Ceuta is a perfect laboratory for the development of this type of research.

Especially, students have been selected from the 4th year of Secondary Education ($n = 60$; $M_{age} = 16$ years; $SD = 1.62$). The configurations of the two groups on which the experimentation was carried out is specified in Table 1.

Table 1. Study groups by sex.

Groups	Boys n (%)	Girls n (%)	Total n (%)
Experimental group	16 (53.33)	14 (46.67)	30 (50)
Control group	10 (33.33)	20 (66.66)	30 (50)
Subtotal	26 (40)	34 (60)	60 (100)

2.3. Instrument

Data collection was followed by an ad hoc questionnaire. The design of this tool is based on other validated instruments, obtained from the scientific literature (Yilmaz and Soyer 2018; Rodríguez et al. 2016). The questionnaire has 42 items in total. The questions are divided between the dimensions Learning Achievement, Learning Anxiety, motivation, and Autonomy. To configure the items, a Likert scale has been followed with a range of four points (from 1 = Strongly disagree to 4 = Strongly agree).

The instrument was validated both quantitatively and qualitatively. First, a Delphi method was carried out to obtain qualitative validity. This procedure involved 10 experts in emerging technologies in the field of education of different universities. The questionnaire was positively assessed by the experts ($M = 4.87$; $SD = 0.21$; $min = 1$; $max = 6$), and recommendations were given. In this review, the Kappa de Fleiss and W de Kendall were applied to achieve the indexes of concordance and relevance of observations granted, drawing positive results ($K = 0.87$; $W = 0.89$). Subsequently, performing an exploratory and confirmatory factor analysis by the principal components' method with varimax rotation quantitatively validated them. The results show an appropriate factorial structure to the initial theoretical approach. Correlations between factors are positive. The tests determined the dependence between the delimited variables (Bartlett's test of sphericity = 2647.21; $p < 0.001$) and the adequacy of the sample (Kaiser–Meyer–Olkin = 0.86).

In addition, other statistics were used to measure the reliability of the questionnaire, such as Cronbach's alpha (α), compound reliability (CR) and average variance extracted (AVE), confirming all the values reached for the internal consistency of the questionnaire.

2.4. Procedure

This experimentation has been carried out in several phases. First, the ad hoc instrument with which the different variables involved in this study were measured was designed and validated. Second, the students who participated in the research were selected. Family consent was obtained to develop the experimentation with students and data collection. In the investigation, all ethical principles of confidentiality were respected. Subsequently, students were randomly divided into two groups of the same number, one being established as a control group and the other as an experimental group. The data collection was done at two points, before starting the subject and after the evaluation. The time between the two tests was four months.

To develop the study, teachers were responsible for imparting the knowledge and content that we established as appropriate for 10 sessions, with a traditional methodology for the control group and an innovative methodology through FL for the experimental group. To complete the study, the data were collected and analyzed.

Figure 1 shows a summary of the investigation process followed. Participants were divided into two groups that coincided with the class in which they were studying (fourth year of ESO²). The control group received the classes with a traditional methodology. The experimental group applied a flipped learning methodology, in which most classes were uploaded in small videos and activities that may be consulted online and at any time. This allowed the promotion of student autonomy, the ubiquity of learning, and the interactions of students with their peers, the content and the teacher in digital media, increasing classroom time taken to deepen the contents, solve doubts and work as a team, and motivate the reflection and participation of students to achieve knowledge, as the experts have reflected in the literature.

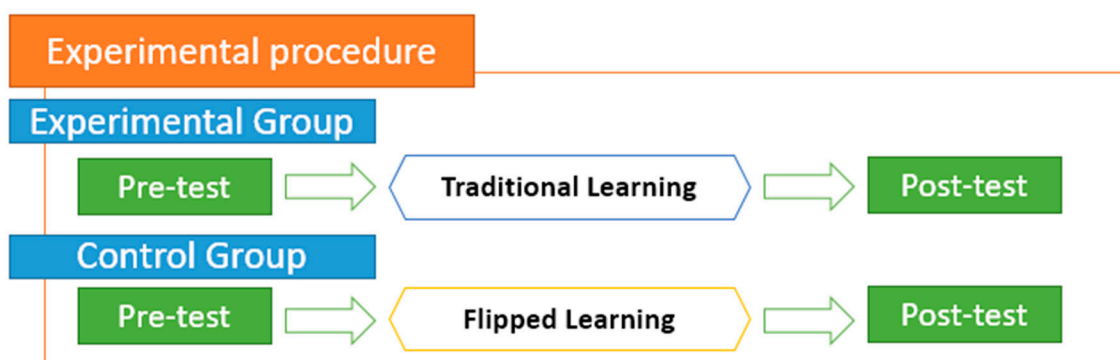


Figure 1. Overview of experiment procedure.

3. Results

The first means used to analyse matrix data was a classical parametric Student's *t*-test. After verifying that the sample obtained did not follow a normal distribution (a mandatory requirement for parametric tests), we decided to develop a non-parametric analysis. Normality was tested using Shapiro–Wilk test. The results obtained (*p*-value 0.02 in control group and 0.03 in experimental group) show a non-normal distribution of the sample (<0.05).

² This corresponds to compulsory education for students between 15–16 years old.

3.1. Reliability Analysis

To measure the reliability of the instrument, we used a classical Cronbach's alpha with two complementary indices—Average Extracted Variance (AVE) and Composite Reliability (CR)—which show the validity of the instrument used. All indices obtained can be considered acceptable $\alpha = 0.92$. Likewise, $AVE > 0.5$ (Table 2).

Table 2. Reliability and validity indices.

	Alpha (α)	CR *	AVE **
Learning Achievement	0.85	0.910	0.753
Learning Anxiety	0.89	0.823	0.615
Motivation	0.91	0.855	0.755
Autonomy	0.86	0.845	0.653

Note: * Composite Reliability, ** Average Extracted Variance.

3.2. Descriptive Analysis

As shown in Table 3, the values obtained in the pre-test and post-test for the control group are similar for each dimension. The highest values in the control group were obtained for learning anxiety (4.78 ± 0.82) and lowest for motivation (2.69 ± 1.13). In the same way, the highest values in the pre-test control group were obtained for anxiety (4.60 ± 0.77) and lowest for motivation (2.50 ± 1.03). It is in the values of the experimental group's post-test in which data seem to change significantly.

Table 3. Descriptive analysis of each dimension in two kind of learning.

Traditional Learning (Control group)		
	Pre-test	Post-test
	Mean (SD)	Mean (SD)
Learning Achievement	—	4.10 (1.11)
Learning Anxiety	4.78 (0.82)	4.70 (0.91)
Motivation	2.69 (1.13)	2.79 (0.61)
Autonomy	3.00 (0.72)	3.50 (0.62)
Flipped learning (Experimental group)		
	Pre-test	Post-test
	Mean (SD)	Mean (SD)
Learning Achievement	—	4.9 (1.21)
Learning Anxiety	4.60 (0.77)	3.13 (0.82)
Motivation	2.50 (1.03)	4.55 (1.13)
Autonomy	4.01 (0.62)	4.98 (0.72)

In order to analyze these differences, each dimension is analyzed separately to verify the influence of this type of methodology on the teaching processes of the students.

3.3. Inferential Analysis

The first analysis is carried out for the learning achievement dimension (Table 4). In this case, the results obtained in the post-test are compared between the two dimensions. The results show significant differences ($Z = -1.515$; $p = 0.049$). These differences, despite being unique, do not show great strength ($d = 0.11$). In this case, flipped learning obtained a higher mean rank (MR = 60.82) value than traditional learning (MR = 40.23). On the other hand, the learning anxiety dimension (Table 5) was analyzed for each of the types of learning used during the subject. As shown in Table 3, in the control group, where a traditional methodology was used, anxiety values were not significant

($Z = -1.405$; $p = 0.061$). In the experimental group, where the flipped methodology was used, anxiety values have been reduced significantly, being similar to those of the control group in the pre-test ($MR_{\text{control}} = 55.13$; $MR_{\text{experimental}} = 50.23$) but decreasing significantly with the development of the flipped subject ($Z = -1.454$; $p = 0.041$). These differences show a small strength of association ($r = 0.10$).

Table 4. Mann–Whitney U test for learning achievement dimension.

		Mean Rank	U	Z	p	r
Post-test	Traditional	40.23	151.000	−1.515	0.049	0.11
	Flipped	60.82				

Note: r the following intervals for r : 0.10 small effect; 0.30: intermediate effect; and 0.50 or higher: strong effect.

Table 5. Mann–Whitney U test for learning anxiety dimension.

		Mean Rank	U	Z	p	r
Traditional	Pre-test	55.13	231.000	−1.405	0.061	–
	Post-test	57.19				
Flipped	Pre-test	50.23	201.800	−2.454	0.041	0.10
	Post-test	39.17				

One of the most important aspects of any innovative experience in the classroom is motivation. The results (Table 6) do not show singular differences between the students' previous and post-experiment motivation in a traditional learning model ($Z = -2.231$; $p = 0.093$). The results show a significant modification of students' motivation before and after the experiment based on a flipped methodology ($Z = -2.111$; $p = 0.039$). These differences show a small association strength ($r = 0.15$).

Table 6. Mann–Whitney U test for learning motivation dimension.

		Mean Rank	U	Z	p	r
Traditional	Pre-test	41.03	181.500	−2.231	0.093	–
	Post-test	43.05				
Flipped	Pre-test	42.83	231.100	−2.111	0.039	0.15
	Post-test	23.31				

In relation to autonomy, as in previous dimensions, there is a significant difference for the experimental group (Table 7). While the traditional teaching group does not increase in autonomy ($Z = -1.931$; $p = 0.081$), autonomy increases in the flipped group ($Z = -1.128$; $p = 0.025$). These differences show a medium association strength ($r = 0.21$).

Table 7. Mann–Whitney U test for the learning autonomy dimension.

		Mean Rank	U	Z	p	r
Traditional	Pre-test	41.38	121.500	−1.931	0.081	–
	Post-test	39.55				
Flipped	Pre-test	45.98	101.300	−1.128	0.025	0.21
	Post-test	54.26				

4. Discussion

As has been shown in the results, the highest values in the control group were obtained for learning anxiety and the lowest for motivation. Flipped learning has proven to be a methodology that contributes to students having a positive attitude towards the teaching and learning process (Lee et al. 2018), as it

causes high levels of motivation among students (Tse et al. 2019; Shih and Tsai 2016), especially among students who are accustomed to a more traditional methodology (Huan 2016). So, as it in previous studies, it has also been proved within this study that the FL provides more motivation for students to do their daily work in the learning process (Castellanos Sánchez et al. 2017; Hwang et al. 2017).

In the research carried out by Thai et al. (2017), it was also shown that the motivation and achievement of the students increased following the flipped learning methodology than with other methodologies with similar characteristics. In our research, in the group where the flipped learning methodology was used, anxiety values were reduced in a significant way, which led to a better achievement. Therefore, when students' motivation increases, their participation increases significantly in learning situations (Bharali 2014).

It has been shown that, for learning strategies to be effective and efficient, the motivation of the student has to be increased, since this will lead to the student wanting to work to achieve the objective (Pintrich et al. 2006), as well as giving more importance to the student than the teacher in the teaching–learning process, which is just what is pursued with this methodology.

In line with previous studies (Ogan et al. 2009; Garrett-Rucks 2017; Kohn and Hoffstaedter 2017; Yang and Qian 2018), favorable results related to the effectiveness of flipped learning have been obtained. This positions this emerging methodology as ideal for working content related to intercultural education.

For prospective and future research, we would like to compare the effectiveness of flipped learning and gamification in teaching, as both are active methodologies in education.

Finally, as a limitation of this study, we wanted to highlight that, although recently much research and progress has been made in the analysis of the positive and negative effects of these active methodologies, there is still much theoretical work needed to justify them (Parra-González and Segura-Robles 2019; van Roy and Zaman 2019).

5. Conclusions

The general objective of this research was to analyze the effectiveness of FL for learning intercultural competences versus the use of a traditional methodology in the 4th year of Secondary Education. It has been proved that students show less learning anxiety and are more motivated when using the FL methodology.

In this way, the effect of the traditional methodology on developing intercultural competences in students has been proved to be less effective in terms of motivation among students. Therefore, the effect of the flipped methodology in relation to motivation and learning anxiety seems to be more effective than traditional methodologies. This aspect should be taken into account by teachers, as using FL in their teaching process would be positive for their students' achievement, thus increasing their motivation and reducing their anxiety in class.

In relation to learning achievement or academic results obtained by students, it has also been proved that, when using the FL methodology in class, the level of academic achievement among students is increased. One of the main worries among teachers is their students' results, and, with this research, it has been proved that students have better results when using the FL methodology, so teachers would find this methodology to be useful in this regard.

The strength of the differences found within the use of these two methodologies seems to be significant, so FL appears to be a positive methodology in the teaching and learning process in relation to the variables analyzed.

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