

FLIPPED CLASSROOM METHODOLOGY TO IMPROVE ENGLISH WRITTEN COMPREHENSION IN EARLY CHILDHOOD EDUCATION STUDENTS

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ABSTRACT

Flipped classroom is a methodology which refers to the teaching process that reverses the way in which the contents of a subject are worked on. Several studies have shown that the flipped classroom methodology increases student participation and interaction with teachers. In this study, we analysed the degree of improvement in students' English written comprehension after taking a subject in English for a semester using the flipped classroom methodology. A quantitative study was conducted using a written test both at the beginning (pre) and end (post) of the semester to find differences in the results obtained in both tests through direct observation. The study was conducted at a Spanish public university with students of the Early Childhood Education Degree during the last academic year. For the selection of the instrument, checking its external validity relationship, five experts conducted the validation process providing a quantitative assessment on a Likert scale following Lawshe's content validity relationship model. Results showed a significant improvement in their written comprehension after the data was analysed using the JASP statistical programme. We could observe that the difference in the means obtained in each part of the test and in the overall standing is close to or exceeds the point difference.

Keywords: Early Childhood Education Degree; English language; flipped classroom; quantitative study; written comprehension

Introduction

The flipped classroom model refers to an inverted classroom in which the contents are first presented to the students outside the classroom through explanatory videos, online games, and other resources while class time is dedicated to practice, applying the knowledge acquired through collaborative activities and discussions. According to Sosa Diez et al. (2021), it is necessary to conduct a student-centred methodology, based on active and collaborative tasks in which the teacher acts as a guide, providing support and assistance. The role of the teacher is no longer that of a transmitter of content, nor are students considered to have absolute knowledge.

The flipped classroom can address the needs of the students allowing teachers to personalise the students' education. Flipping the classroom establishes a framework that ensures that students receive a personalised education which is tailored to their individual and unique needs (Bergmann & Sams, 2012). The review shows a deep concern about improving written comprehension in English among university students. Use of the flipped classroom model among Early Childhood Education students has not been investigated.

The study investigated whether there is an improvement in the written comprehension of Early Childhood Education Degree students after being taught a subject in English for one semester using the flipped classroom methodology in class.

Theoretical Framework

The current Spanish legislation (Organic Law 3/2020) states that the students' English level at the end of their Baccaulaureate studies corresponds to level B1, which agrees to an intermediate level within the independent user according to the Common European Framework of Reference for Languages (hereinafter "CEFR").

It has been more than two decades since the higher education system was restructured by means of the so-called "competences", understood as the set of knowledge that enables students to deal with situations specific to their academic profile (Crespo, 2022). Royal Decree 95/2022, which establishes the organisation and minimum teaching requirements for Early Childhood Education, defines competences as skills that are considered essential for students to progress with guarantees of success in their educational pathway and to face the main global and local challenges.

The CEFR recognises three different types of users: A (basic), B (independent), and C (proficient) with two levels within each user. Thus, the following proficiency levels were defined in the CEFR: A1 (beginner), A2 (elementary), B1 (intermediate), B2 (upper-intermediate), C1 (advanced) and C2 (very advanced). In addition, for each level, the CEFR establishes the following skills that students must acquire listening comprehension, written comprehension, oral expression, and written expression. Besides, the CEFR includes several skills within written comprehension: grammar, idiomatic expressions, vocabulary and reading texts.

Level B1 is recommended in the teaching guide for the English subject taught during the second semester of the first year of the Degree in Early Childhood Education at a Spanish public university. This subject has a teaching load of six credits

and is compulsory for all the students. Therefore, students should not have any problems following the course correctly in English.

Written Comprehension in English

Reading and written comprehension have traditionally been the most complex aspects of educational research in recent years according to Albarracín Vivo et al. (2022). Consequently, the number of authors focusing on them in their research has grown exponentially in recent years. According to Martínez and González (2019), students read and write large amounts of texts, although in most cases with a non-educational purpose due to the prevailing culture of immediacy. This means that pupils show serious problems or deficiencies in producing a written text (written expression) or understanding it (written comprehension), as they are more familiar with spontaneous texts from instant messaging.

Prado and Escalante (2020) conducted a study to establish the degree of relationship between different learning strategies and written comprehension among students at a private university. The results revealed a significant relationship between learning strategies and the comprehension of written English texts.

Núñez et al. (2020) stressed that an important aspect to highlight in the comprehension of English texts is that the students can develop skills to activate prior knowledge, formulate assumptions, and contrast ideas by understanding the text and context. Written comprehension in a foreign language helps to improve the type of appropriation of concepts that correspond to a particular discipline or field of knowledge.

English, as a global language (*lingua franca*), is required in many fields of work and academia. Therefore, developing written comprehension skills in English is essential for communicating and working in both national and international contexts. The acquisition of written comprehension is an effective tool to improve vocabulary, reading, and grammar. As stated by Birello and Gil (2014), written comprehension fosters critical thinking and reflection as students must analyse, evaluate, and put into context the information they read.

Educational research on written comprehension has increased in recent years (Aziza & Abu, 2019). Its consideration as one of the most complex fields of research has been one of the reasons why it has a smaller number of authors than the rest of the linguistic skills. This competence is a fundamental skill for the teaching of any language, and in the case of English as a foreign language, it enables learners to understand and contextualise written texts and communicate effectively what they feel, want or need (Nieva et al., 2020).

Within the framework of higher education, written comprehension has become an efficient tool for students' academic, relational and professional development. In addition to strengthening this understanding, the teacher has a mediating function among students and between them and the different objects of knowledge. In addition, part of the problem of not acquiring written comprehension stems from the fact that educational institutions do not have sufficient training structures to guarantee successful practices, which limits the development of actions that favour the acquisition of a second language.

Written comprehension responds to society's needs, labour competences, as well as the internationalisation of higher education, the development of linguistic competence and progress in cognitive and relational skills among students (Bulté & Housen, 2018). Therefore, teaching written comprehension should be an integral part of the English subject in this degree. Obviously, at a university level, we cannot extrapolate the situation to all contexts since it depends on the type of training for students.

The promotion of written comprehension as a methodological strategy has a significant impact on students' learning as it allows them to reinforce what they have already learned through reading, writing, and the contextual expression of content (Marín & Hernández, 2022).

The Flipped Classroom Methodology

New technologies continue to transform university teaching in different disciplines, proposing ways in which it differs from traditional methods. The relevant use of ICT and the innovation processes that incorporate them take on greater importance when considering that students today are distinguished by their technological skills. This justifies the development of initiatives aimed at pedagogical innovation through the incorporation of ICT. In this context, it is worth noting that activities accompanied by technologies are motivating in foreign language learning, as they promote interaction between students, offer the possibility of having contact with the real and functional use of the language and constitute a great source of authentic material that improves communicative competence (Zarrinfard et al., 2021).

Digital technology has profoundly influenced various aspects of life, including teaching pedagogy. In the last years, innovative teaching methods such as Massive Open Online Courses (MOOCs) and flipped classrooms have been introduced (Shaw & Patra, 2022). Similarly, technology implementation can significantly benefit both in-class and out-of-class learning experiences (Nja et al., 2022).

In this scenario, the pedagogical model known as the flipped classroom, a term coined by Bergman and Sams (2012), refers to the teaching process that reverses the way in which the contents of a subject are worked on. These two chemistry teachers were motivated to support the learning of students who did not attend class for various reasons. Therefore, they promoted the use of filming classes and realised that this resource not only favoured those who did not attend, but also those who attended regularly, because it allowed them to review, deepen the content and resolve their doubts (Boubih et al., 2020).

Flipped classrooms in English teaching allow for better time management so that students can resolve doubts, conduct group exercises, and participate in collaborative practices, favouring the development of communicative competence (Masero & Albort, 2023). According to Umar and Ko (2022), flipped classrooms foster higher-order thinking, enhance teaching, improve speaking skills, increase student engagement, and develop social interactions and critical thinking skills.

The opportunity offered by the flipped classroom when applied to English teaching contrasts with that offered by a predominantly grammatical and teacher-centred curriculum, which hinders communicative interaction in the classroom. When

students engage in real communication, they use their natural strategies for language acquisition, which enables them to learn how to use the language (Guayasamin & Inga, 2023).

Numerous studies have shown that the flipped classroom model encourages student participation and interaction with teachers. This shift to digital devices in the classroom improves student engagement as it allows for a range of interactive activities, such as discussions, collaborative and cooperative work (González et al., 2020). We offer an analysis of different studies related to the flipped classroom methodology in the English classroom.

Aguayo et al. study (2019) studied 56 students' perceptions of the incorporation of the flipped classroom methodology in the subject of Communicative English in Architecture and Chemical Engineering at a public university in Chile. The results showed that students valued the availability of the videos with the contents, which they could review before the face-to-face class. Martínez (2019) applied this methodology to improve English grammar learning in two equivalent groups of adult students.

Rodríguez and Cedeño (2020) studied flipped classroom as a strategy for significant learning of the English language using an exploratory-bibliographic documentary method. They showed that the innovative pedagogical model of the flipped classroom was an advantage for the scope of meaningful learning in English.

Roohani and Etemadfar (2021) investigated the effect of the micro-flipped methodology on English learners' speaking fluency in comparison with the traditional face-to-face teacher-fronted methodology in a group of 40 intermediate-level Iranian learners. The analysis of the data revealed significant differences in the measures of fluency. On the other hand, Yulian (2021) proposed improvement in reading through the flipped classroom teaching model of EFL in 37 higher education students. The results showed that this teaching model enhanced the students' critical reading in terms of accuracy, clarity, precision, depth and relevance.

Fernández (2022) analysed the influence of this methodology on the attitudes of a group of 40 students towards the subject "Language learning through ICT" by means of a practical classroom experience. The results revealed students' preferences for the flipped classroom methodology vs. traditional approaches. By contrast, Mayer et al. (2022) listed some requirement criteria for using the flipped classroom methodology: user perception, lecturer, and technology.

Jiménez (2023) implemented the flipped classroom methodology in an English reading comprehension course, similar to our study. This study addressed an intervention with the inverted classroom model for a reading comprehension course in English for first-year students at a university located in Mexico. Finally, Jia et al. (2023) evaluated a set of design principles for an online flipped classroom to support students' learning outcomes.

Methodology

In this study, we followed a non-experimental observational design (ex-post-facto) since there was no manipulation of variables and participants were not assigned to experimental and control groups. Within this design, we conducted a descriptive

study with a single group using two multiple-choice written tests conducted throughout the semester (at the beginning and end) to collect quantitative data on the participants performance. The independent variable was the selection of the selected students, while the dependent variable was the written test consisting of 78 multiple-choice questions that the students had to complete twice.

Participants

A study was conducted with 56 undergraduates enrolled in the English in the Degree of Early Childhood Education at a Spanish public university in the 2022-2023 academic year. The students were given a written test, administered in two different situations: at the beginning of the semester (pre-test) and at the end (post-test). In addition, we conducted direct observations of class projects.

During the last academic year, the Degree in Early Childhood Education had 340 students in the first course, divided into five groups, 307 of whom took the English subject. We did not apply the formula proposed by Fischer and Navarro (1997) to select a finite sample, which would have required the participation of 170 students since the selection criteria are not representative of the assignment. Therefore, the selected sample of 56 students belonging to one of the groups represented 18.2% of the student population

However, as stated by Gómez-Nuñez et al. (2020), the number of participants is not linked to their representativeness but to the information potential they can offer. In fact, the sample we provide is justified by the quality of the data obtained to the detriment of a larger number of students.

The selected sample of 56 students aged between 18 and 25 comprised 54 female students (96.4%) and two male students (3.6%). Regarding nationality, 55 students were Spanish (98.2%), and only one was Turkish (1.8%). It is also important to note that all students enrolled in the group voluntarily participated in the study.

Instruments

Our study mainly used two data collection techniques: a written test taken twice during the semester and a direct observation of various projects in class. For the written tests, a diagnostic test available on the market was used. Before choosing the test, the test characteristics and the external validity were checked. For this purpose, the validation was conducted by five experts in the field, who were asked to provide a quantitative assessment on a Likert scale from 0 (strongly disagree) to 5 (strongly agree) following Lawshe (1975) content validity relationship (CVR) model.

Following their considerations, a placement test from Oxford University Press was chosen, with 78 questions consisting of four dimensions related to both the learners' knowledge of the language and the written comprehension: 24 grammar questions, 24 idiomatic expression questions, 20 vocabulary questions, and 10 reading questions. This test was performed individually on both occasions in class. All questions in the test were multiple-choice with four different options. The same diagnostic test was used on both occasions to conduct the study. As Mendoza and

Ramírez (2020) state, the use of the same research instruments validates the results and avoids distortions in their interpretation.

To prevent possible negative effects of the test, Cronbach alpha coefficient was used to check the internal consistency of the test, which yielded a value of .81. This value indicates that the instrument was highly reliable with high internal consistency and reliability, and its measurements were stable and coherent.

On the other hand, direct observation to check their written comprehension improvement was developed through the completion of seven projects related to the theoretical contents of the subject throughout the course that the students had to perform individually in class. In these projects, which were carried out every two weeks, students had to write their work in English, combining purely linguistic content with specific didactic ones by reading texts or fragments.

These seven projects that the students had to carry out in the practice class were as follows: designing an activity appropriate to each language competence; designing an activity related to each of Krashen (1982) hypotheses; designing an activity according to the teacher role in class; designing a class session by choosing a method; finding three websites to use in class; designing an activity for each skill; and designing a class corner.

Data Collection Procedure

The data collection and analysis procedure consisted of three parts. We followed the indications of Souza et al. (2017), who divided the data collection procedure into three phases: the exploratory phase, the fieldwork, and information processing. To do so, we corrected the answers given by the 56 students in both tests and directly observed the projects performed in class.

The exploratory phase is the preliminary study which clarifies the procedure used to constitute the fieldwork. In this phase, we delimit the problem and objectives of our study and develop them on a theoretical and methodological level. In addition, we chose the instruments to be used and established a timetable for implementation, the space to be used, and participants.

The second phase is based on the available fieldwork. We put into practice the theoretical construction elaborated in the previous phase with the choice of the two days necessary for the collection of the quantitative data. This second phase was performed at two specific times to provide us with the data: February (pre-test) and June (post-test). The pre-test was distributed at the beginning of the semester in February 2023 to detect the students' level of prior knowledge. And the second test was conducted in June at the end of the semester (post-test), to determine whether there had been any improvement in the students' written comprehension analysing the differences from the results obtained.

Between both tests, the students had three hours a week of class in English, two theoretical and one practical, where they worked on both linguistic and teaching contents. During the theoretical class, we worked with an intermediate-level textbook in which they practised grammar, vocabulary, and reading exercises. In the practical class, the students performed seven individual projects related to the theory in which they had to correctly use both grammar and vocabulary as well as the idiomatic

expressions seen in class. Through direct observation, we recorded data on the quality of students' written productions during the projects. This observational research technique allowed us to collect the necessary information to justify the difference in the results obtained from one test to another by means of the JASP statistical program.

Finally, the third phase concerns the overall evaluation, understanding and interpretation of the empirical data articulated with the theory on which our study is based. This last phase was conducted at the end of the semester, always guaranteeing the anonymity of the students, as following the ethical code is crucial in any research. Research should provide value that outweighs any potential risk or harm, aiming to maximise the research benefits and minimising the potential risk of participants. All potential risk should therefore be mitigated to protect the dignity, rights, and welfare of research participants.

Data Analysis

The results were transcribed for analysis using Microsoft Excel, a descriptive statistical data processing software provided by Microsoft. The procedure followed consisted of preparing an Excel spreadsheet and entering and processing the data for each test using the JASP statistical programme to analyse the inferential data obtained.

First, the Kolmogorov-Smirnov normality test was used to measure the degree of agreement between the data set distribution and the theoretical distribution determined. The calculated Kolmogorov-Smirnov value (Ks c-value) was .1065, whereas the Kolmogorov-Smirnov table value (Ks t-value) was .1179, with a p-value greater than $>.1$. As the c-value was lower than the t-value and the p-value was higher than the accepted degree of significance (.05), we decided to use a parametric test (student t-test) to analyse the results.

Results and Discussion

Pre-Test

The initial test (pre-test) was performed at the beginning of the semester in February to obtain information about the students' prior knowledge. Since all students came from compulsory secondary education, their level of written comprehension was expected to be acceptable.

The test consisted of 78 multiple-choice questions divided into four dimensions: grammar (24 questions), idiomatic expressions (24 questions), vocabulary (20 questions) and reading (10 questions). To take the test, the students were given the two hours of class time during which the theory session lasted.

Table 1 shows the descriptive statistics of this initial test obtained from the JASP programme. The following data were included for each dimension: mode, median, mean, standard error, standard deviation, coefficient of variation, variance, skewness, kurtosis, Shapiro-Wilk p-value, range, minimum, and maximum.

Table 1
Pre-Test Descriptive Statistics

	Grammar	Everyday Expressions	Vocabulary	Reading	Total
Mode	6.751	6.611	7.960	9.773	7.492
Median	7.000	6.800	7.500	9.000	7.300
Mean	6.762	6.760	7.250	8.393	7.123
Standard error	0.208	0.203	0.226	0.225	0.177
Standard deviation	1.553	1.522	1.690	1.681	1.327
Coefficient of variation	0.230	0.225	0.233	0.200	0.186
Variance	2.413	2.315	2.855	2.825	1.761
Skewness	-0.925	-0.296	-0.298	-1.178	-0.390
Kurtosis	1.855	-0.406	-0.822	1.233	-0.592
Shapiro-Wilk	0.950	0.963	0.959	0.851	0.965
Shapiro-Wilk p value	0.021	0.085	0.056	<.001	0.101
Range	8.350	6.300	6.500	7.000	5.100
Minimum	1.250	3.300	3.500	3.000	4.100
Maximum	9.600	9.600	10.000	10.000	9.200

From the information in Table 1, we can extract some significant data. Of the 78 questions in the test, the range (numerical value indicating the difference between the maximum and minimum values) was 5,100 points, the mean was 7,123 points, and the mode (value that appeared most frequently) was 7,492 points. The kurtosis, which determines the degree to which the values of a variable are concentrated around the zone, was negative (-0.592), implying that the distribution was relatively flat. Skewness was also negative (-0.390), indicating that the distribution of the data was skewed to the right and had a negative orientation. The highest score was 9.2 points, while the lowest was 4.1 points. Fifty-two students (92.9%) passed the test. As the Shapiro-Wilk p-value is greater than the significance level, we can state that the data from this test have a normal distribution.

Based on the results from each part of the test, the first dimension consisted of 24 grammar questions with a range of 8,350 points and a mean of 6,762 points, with a standard deviation of 1,553 and a coefficient of variation of 0.230. The highest score was 9,600 points, whereas the lowest was 1,250 points. This first part was passed by 51 students (91%). The kurtosis was positive (1.855), indicating a relatively high distribution, but the skewness was negative (-0.925); therefore, the distribution was skewed to the right.

The second block consisted of 24 idiomatic expressions questions. The range was 6,300 points and the mean obtained was 6,760 points with a deviation of 1,522 and a coefficient of variation of 0.225. In this second part, the highest score was again 9,600 points. The lowest score was 3,300 points. Forty-eight students passed this second part (84.5%). On this occasion, both kurtosis (-0.406) and skewness (-0.296) were negative, indicating a relatively flat distribution skewed to the right.

The third part consisted of 20 vocabulary questions with a range of 6,500 points and a mean of 7,250 points, with a standard deviation of 1,690, and a coefficient of variation of 0.233. On this occasion, the Turkish student obtained the highest score with all questions being correct. In contrast, the lowest score was 3,500 points. Fifty-

three students passed this part (94.6%). Here, both skewness (-0.298) and kurtosis (-0.822) were negative.

Finally, the fourth block consisted of ten reading questions with a range of 7.000 points and the mean obtained was 8.393, with a deviation of 1.681 and a coefficient of 0.200. In this part we found 19 students with all the questions correct. However, one student had only three correct answers. This part was the highest scoring with 54 students passing (96.4%) and where the kurtosis was positive (1.233) indicating a relatively high distribution. In contrast, the skewness was negative (-1.178), and the data were quite skewed to the right. This last block was the only one that had a p-value below its significance level, indicating that the data did not have a normal distribution.

Post-Test

The second test (post-test) took place in June at the end of the semester, after taking the course and completing the seven projects in the practical sessions. Therefore, the results are expected to improve with respect to the initial test. The descriptive statistics of this second test are shown in Table 2.

Table 2
Post-Test Descriptive Statistics

	Grammar	Everyday Expressions	Vocabulary	Reading	Total
Mode	8.990	8.448	8.943	9.999	8.589
Median	7.900	7.900	8.500	10.000	8.250
Mean	7.565	7.845	8.250	9.071	8.025
Standard error	0.221	0.176	0.199	0.216	0.165
Standard deviation	1.652	1.317	1.489	1.616	1.234
Coefficient of variation	0.218	0.168	0.181	0.178	0.154
Variance	2.728	1.736	2.218	2.613	1.523
Skewness	-0.489	-0.427	-1.256	-2.745	-0.918
Kurtosis	-0.388	-0.574	1.852	10.382	0.572
Shapiro-Wilk	0.941	0.953	0.892	0.627	0.963
Shapiro-Wilk p value	0.009	0.028	<.001	<.001	0.005
Range	7.100	5.000	7.000	9.000	5.400
Minimum	2.900	5.000	3.000	1.000	4.600
Maximum	10.000	10.000	10.000	10.000	10.000

Of the 78 questions, the range obtained was 5.400 points, the mean 8.025 and the mode 8.589. The kurtosis was positive (0.572), indicating a relatively high distribution, while the skewness was negative (-0.918); therefore, the data were skewed to the right with a negative orientation. One student scored all questions correctly, while the lowest score was 4.600 points. Fifty-four students passed the second test (96.4%). Considering the Shapiro-Wilk p-value, we can state that the data of this second test also have a normal distribution.

Analysing each dimension, the grammar questions had a range of 7.100 points, the mean 7.565 points, with a standard deviation of 1.652, and a coefficient of

variation of 0.218. The Turkish student was the only one who answer all the questions correctly while the lowest score was 2.900 points. Fifty-three students passed this part (94.6%). Both kurtosis (-0.388) and skewness (-0.489) were negative, indicating a relatively flat distribution skewed to the right.

The second part consisted of 24 idiomatic expression questions. The range was 5,000 points and the mean was 7,845 points, with a deviation of 1.317 and a coefficient of 0.618. On this occasion, two students got all the correct answers, including the Turkish student (lo quitaría). The lowest mark was five points. All students passed this second part in which again the kurtosis (-0.574) and skewness (-0.427) were negative.

As for the third block, the 20 vocabulary questions, had a range of 7,000 points and the mean 8,250 points, with a standard deviation of 1.489 and a coefficient of variation of 0.181. Six students managed to get all the questions right, one of whom the Turkish student was. On the other hand, one student scored only three points. Fifty-four students passed this part (96.4%). In this block, the kurtosis was positive (1.852) whereas the skewness was negative (-1.256), indicating a relatively high distribution skewed to the right.

Finally, the fourth part corresponded to the ten reading questions with a range of 9,000 points and a mean of 9,071 points, with a deviation of 1,616 and a coefficient of 0.178. Thirty-four students got all the answers in this part right, one of them being a Turkish student. The counterpoint came from another student with only one point. Almost all students passed this last part (55 students, 98.2%). As in the previous block, the kurtosis was positive (10.382), whereas the skewness was negative (-2.745).

In these last two parts of the test, the Shapiro-Wilk p-value was below the significance level, denoting a non-normal data distribution, as the data were mostly high. Both the means of each test (8.250 and 9.071) and mode (8.943 and 9.999) were significantly higher than those obtained in the other parts of the test.

Regarding the development of the projects through direct observation, we observed a significant improvement in the students' written comprehension results from a qualitative point of view, although we could not quantify that improvement from a quantitative point of view.

Students' Written Comprehension Scores Before and After Taking an English Subject

The statistical programme JASP allowed us to find that the data obtained had an overall normal distribution. In the previous section, we applied the parametric student t-test to collect the information. This test was used to determine whether there was a significant difference between the means of two tests assuming that the variables had a normal distribution. The inferential statistics are shown in Table 3. Cohen D is a measure of effect size based on the difference between the two means and measures the relative strength of the differences.

Table 3
T-student Test

	Mean	Mean difference	t value	p value	Cohen D	Cohen ET D
Grammar Pre	6.762	0.804	5.197	<.001	0.694	0.107
Grammar Post	7.565					
Idiomatic expressions Pre	6.760	1.085	7.083	<.001	0.947	0.128
Idiomatic expressions Post	7.845					
Vocabulary Pre	7.250	1.000	4.609	<.001	0.616	0.148
Vocabulary Post	8.250					
Reading Pre	8.393	0.679	2.731	0.008	0.365	0.156
Reading Post	9.071					
Total Pre	7.123	0.902	8.682	<.001	1.160	0.104
Total Post	8.025					

First, we observe that the difference in the means obtained both in each part and overall is close to or exceeds the point difference. The only part in which the difference was smaller was reading because the first test results were already quite high and the number of questions was smaller, so the margin for improvement was small. This means that both the t-value (2.731) and Cohen D (.365) were lower, so this dimension effect size was low. This part was the only one in which the p-value (.008) was above the significance level.

Second, the other three parts of the test yielded quite high t-values and very high Cohen D-values, considering that values above 0.5 in Cohen D indicate high or very high effects. These data indicate that there are quite significant differences in the dimensions of grammar (5.197 - .694), idiomatic expressions (7.083 - 0.947) and vocabulary (4.609 - .616). These values were similar for both the grammar and vocabulary dimensions, with slightly higher values for idiomatic expressions.

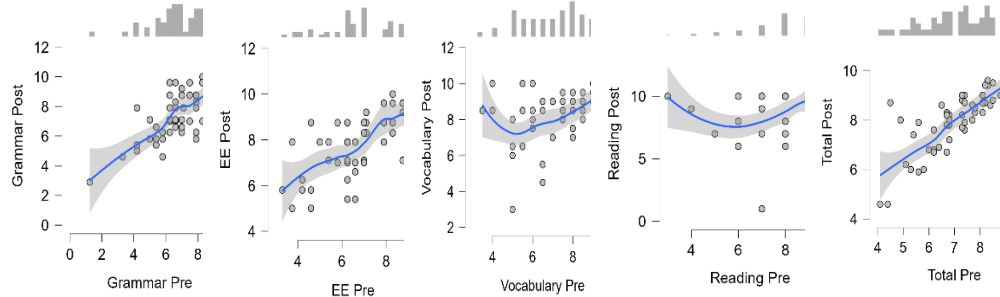
Third, the differences at the total test level are particularly striking. Cohen D is greater than one point (1.160), denoting a very high effect size, and an extremely high t-value (8.682). This shows that the differences between the two tests are quite significant, corroborating our initial hypothesis. Students' written comprehension has significantly improved after taking an English subject using the flipped classroom methodology for one semester.

By conducting several practical projects in class, we were also able to verify the positive evolution of the students throughout the semester through direct observation, which was reflected in the results obtained in the second test. Along the semester, we could check how their written comprehension improved being able to reduce the number of errors as well as the time devoted to each project. Therefore, we can deduce that the methodology used supported an improvement in the students' written comprehension as Jiménez (2023) also suggested in his study. The following scatter graph shows the differences between both tests for each part and the overall results.

In our research, we have been able to demonstrate that by using the flipped classroom methodology, students could improve their English written comprehension

substantially, partially coinciding with Yulian (2021). However, Martínez (2019) also found that students improved their performance in other skills and foreign language knowledge.

Figure 1
Dispersion of the Results in Both Tests



Conclusion

The study found a significant improvement in students' ability to improve written comprehension after taking a subject in English supported by the flipped classroom methodology. We were limited in analysing the results obtained in only one of the five groups that comprised the Degree in Early Childhood Education course. Considering the limited teaching load of the subject, we focused on the written comprehension skill, forgetting other skills. A significant weakness addressed is that we could not implement a delayed post-test with the participant time after implementing the post-test to check the validity of our results. Future research can investigate other groups of students taught using the flipped method and implement a delayed post-test.

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