

# Improvement Of Reading Comprehension Skills Through the Exelearning.Net Interactive Model in Upper Basic Students

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**Abstracts:** The purpose of this study was to investigate the impact of the interactive model known as "Exelearning.net" on improving reading comprehension skills among students of Basic Superior in Santa Elena, Ecuador. An experimental study with a quantitative approach was conducted, involving a sample of 70 students divided into two groups of 35. Pre and post-tests were administered to assess reading comprehension. Statistical analyses revealed significant improvements in the dimensions of literal, inferential, and critical comprehension, with higher scores in the experimental group than in the control group. The results showed a significance level of  $< 0.001$ , indicating that the application of the interactive model ExeLearning.net had a positive impact on strengthening students' reading comprehension skills. These findings suggest that using interactive programs can facilitate the relationship between reading and text comprehension.

**Keywords:** Skills, Literal Level, Inferential Level, Critical Level, Reading Comprehension.

## 1. INTRODUCTION

Promoting the habit of reading worldwide is considered a fundamental skill for academic and professional development. This has led to the implementation of various initiatives or programs in different countries with the aim of promoting and improving this skill in the population, especially among young people and students. This has led to the implementation of various initiatives or programs in different countries with the aim of promoting and improving this skill in the population, especially among young people and students. That is why reading comprehension aims to strengthen pedagogical ties and enhance learning through the integration of technological tools. This seeks to address various problems that arise when adequate foundations are not established in the reading habit from an early age. As a result, many students have difficulty recognizing and understanding paralinguistic elements of communication [1]. Current education in Latin America is experiencing multiple changes. However, many students do not show the initiative to maintain voluntary reading, which causes difficulties in reading comprehension. This is reflected in their ability to analyze the structure of narrative or expository texts, as well as their ability to carry out reflective and critical analysis. Therefore, the incorporation of ICT in the learning process can significantly contribute to improving the literary canon of students, both in the reading stage and in the subsequent stage, facilitating its interpretation and argumentation. According to the 2019 UNESCO report, it stands out that Latin America, according to a Regional Comparative and Explanatory Study (ERCE), shows a worrying situation in learning processes in classrooms. Where they point out that, in 16 countries in the region that show crises in their learning in their classrooms, having on average, more than 40% of 3rd grade students and more than 60% of sixth grade students in primary school did not achieve an adequate level of performance. This is attributed to the lack of implementation of new teaching methodologies and the adequate integration of digital tools in the educational process [2]. According to the report presented by the International Student Assessment Program PISA 2022, in

collaboration with the OECD, UNESCO, UNICEF and the World Bank, it was noted that two years after the start of the Covid-19 pandemic, children in America Latin America and the Caribbean experienced prolonged school closures. In Argentina, a decrease in the learning gap has been observed due to an improvement in the performance of low-income students; while, in Chile, students belonging to families with greater purchasing power have faced negative results in educational terms. On the other hand, Peru, Chile, Colombia and Brazil present positive long-term trends, while in Ecuador an intermediate level of learning has been observed [3]. According to studies presented by the National Evaluation Institute, it is estimated that approximately seven out of ten children and young people around the world are not fully developing their reading skills. This problem is reflected in a total of 617 million people, among whom there are 387 million children in primary education, aged between 6 and 11, who have difficulties in learning to read. Similarly, it has been observed that 230 million high school adolescents, aged between 12 and 14, have low levels of reading comprehension, which has an impact on their learning style [4]. In Ecuador, according to research carried out by the National Evaluation Institute, it recognizes the importance of reading comprehension in educational institutions, which seek to improve pedagogical practice and enhance the learning process. In this sense, evaluations were carried out on 6,100 students from 178 educational institutions; who focused on knowing the levels of academic achievement and performance from the Eighth Year of Education to the Third Year of High School in the area of Language and Literature, it was observed that after the evaluation many students showed low levels of reading comprehension, who were not able to identify the main ideas of a text [5]. According to studies carried out at the provincial level through the Impact on the Being a Student Test, tests called Being a Student (SEST) were carried out, which evaluate four knowledge competencies in the subjects of Mathematics, Language and Literature, Natural Sciences and Social Studies. 13,802 students from 484 Educational Units participated in these tests. The results indicate that, on average, 659 higher basic education students have many difficulties understanding texts from different learning levels. These problems can manifest themselves in various areas, such as understanding the meaning of words within a fragment, problem solving, coherence in understanding the texts read, memorizing ideas, coordination to structure a text and its vocabulary [6]. Given the context of the authors Núñez Cortés et al., we can maintain that the use of educational games improves reading comprehension at the literal, inferential and critical levels. It is highlighted that 86% of the participants perceived that reading habits and gamification have a positive impact by increasing satisfaction when reading and understanding texts, as well as by improving precision in carrying out work and activities in class when using games. table virtually [7]. The educational institution under study is located in the Province of Santa Elena, La Libertad Canton, and is located in a popular neighborhood where students from all social and economic conditions come, including dysfunctional families. This situation generates a serious problem in academic performance and behavior. Therefore, the educational institution has a population of 2,604 boys, girls, adolescents and young people, with a teaching staff of 63 professionals. During the development of the research, we have confirmed that the Educational Unit does not have an interactive model that allows teachers and students to interact in a more practical way in the optimal development of reading comprehension skills, grammar and spelling. Reading comprehension skills refer to the process by which a text or its relevant ideas are understood. That is why this ability is closely related to Piaget's learning theory, which supports a constructivist perspective where the student is the main protagonist of his own learning, in this process it begins from the observation of the subject and how he constructs his knowledge, by understanding simple texts and by facing more complex texts, so that the student could exchange their knowledge and linguistic skills [8]. From an educational perspective, the development of reading comprehension in students can be promoted, with the aim of strengthening the learning process, following the principles of Kenneth Goodman's Global Reading Theory. This theory focuses on a psycholinguistic process in which the student interacts with the text, becoming more active in their reading habits as they understand the content and seek information based on their previous experiences. Implementing interactive learning models can spark students' interest in their own learning process, which can lead to positive changes in their behavior or learning difficulties that they may have previously experienced with traditional teaching methods [9]. Teaching reading comprehension addresses the objectives as well as the theoretical assumptions and practical instructions that support the learning processes and tactics implemented in the classroom. Ontology has been useful in understanding the relationship between education and individuals or objects, allowing us to understand being, doing and learning. Therefore, the application of these skills must follow a constructivist approach that focuses on the student constructing their own learning process cognitively, through the assimilation of digital resources that encourage their use and adapt to the educational needs of the students. students [10]. learning sessions were developed from different levels of literal,

inferential and critical learning. Cáceres indicate that the different levels of reading comprehension are based on the development of cognitive skills. They argue that reading comprehension involves three levels of learning, as described by Smith (1988). At the literal level, the reader clearly understands the explicit information present in the text. At the inferential level, it shows its ability to construct its own interpretations from the text. Finally, the critical level involves evaluating both the semantic and syntactic meaning of the text while reading and understanding it [11]. The dimension of the literal level focuses on the clarity of ideas or information when interacting and recognizing the linguistic elements of a text such as the main ideas, the sequence of actions and the interpretation of texts of various kinds, where the reader You must build those skills through your prior knowledge. It is emphasized that the reader must fully develop those capacities that allow him or her to recognize and remember information from a text [12] y [13] at the literal level on reading comprehension where the reader is to extract information directly or explicitly, who was able to perceive the communication between the lines of the text that will have the purpose of the reader exploring the events that are identified in the text, their main and secondary characters, setting, the time the events occur and the moment the actions take place [14]. The dimension at the inferential level corresponds to reorganizing information, through the synthesis process, the classification of facts, places, among others. In this way, the reader can identify the types of arguments expressed in a text, which allowed the appropriate conclusions to be drawn, the identification of paragraphs, the reconstruction of meanings, and in turn will give the guideline to relate the text with their experience, by recognizing and remember useful information towards their learning [15] While the inferential level is based on the interpretation and analysis of content of books, fables, comics, among others. On the other hand, through the use of digital platforms it allows for a more practical diagnosis of the strengths and weaknesses acquired during the teaching and learning process. By implementing the use of technological tools, it allows students to interact with the various ranges of interactive games in line, among which we have Kahoot! Literary Escape Room, reading detective, educaplay, whose purpose is to awaken the learning interest of students and improve their levels of knowledge in reading comprehension [16] y [17] The level dimension of critical reading comprehension is based on making value judgments about the reality or fantasy that are involved in the development of reading, where the reader uses confronts the meaning of the text with his experiences, the previous information according to its grammatical structure, value judgments. It is indicated that the application of learning strategies such as the immersion of role plays displayed within a digital platform will allow readers to motivate their learning in individual or group workshops, through the confrontation of their criteria and the coherence of their ideas that They start from reading a text [18]. When examining critical comprehension, it is important to take into account the mechanisms of coherence in writing, which is based on the use of grammatical procedures that reinforce textual coherence. In such a way that these mechanisms can be divided into grammatical, lexico-semantic, and textual aspects such as: descriptive, narrative, synthetic, analytical and argumentative. That is why the reader will be able to express his or her own arguments with a critical sense regarding the reading of a text, where we begin with a prior diagnosis that will allow us to identify the academic performance problems in each of the students, through the use of innovative methodologies with the appropriate use of virtual programs that adjust to the learning needs of students, generating activities that motivate them to improve their critical reasoning [19].

## **2. MATERIALS AND METHODS**

The research had a quantitative approach with a quasi-experimental experimental design. A census sampling was used aimed at students between 11, 12 and 13 years of age, given the context of analysis carried out within the José Pedro Varela Educational Unit. Randomly assigned study subjects were considered, selecting two research groups (control and experimental). The study was aimed at students in the Eighth Year of Basic Education, who participated in the collection of pre-test and post-test data. In this way, it was possible to identify the causes that affect the variable reading comprehension skills, including their respective dimensions at a literal, inferential and critical level. Instruments were used to collect information, through the development and application of an objective test that consisted of 28 questions directed to the students. This test allowed us to measure the students' learning about their comprehension skills, which involved the development of the three dimensions to be considered: at a literal level, which consisted of 9 questions; At the inferential level, 9 questions were included; and at a critical level, 10 questions were asked. The total weighting of the test was 10 points, with an estimated evaluation development time of 45 minutes. In addition, the validity and reliability of the instrument was considered through the evaluation of five professional experts, who issued their judgments on the instrument that measured reading comprehension

skills and their respective dimensions. A statistical program called SPSS version 25 was used, where the Aiken V test was applied, obtaining a value of 0.923 greater than 0.90, which guaranteed the validity and agreement of the instrument. The analysis of the sample data was carried out through Wilk's Shapiro test, given that the sample size was greater than 50, resulting in non-parametric tests, since the data did not maintain a normal distribution, given that the "Control" group, its p-value is  $0.118 > 0.05$ , and the data of the experimental group its p-value is  $<.001$ . Subsequently, after that process, statistical tests were carried out, including the Levene test, which determined the homogeneity of the variance between both groups of studies (before and after) the application of the interactive model. The research considered ethical aspects such as reliability, anonymity, legality and professionalism in the treatment of the information obtained from the surveys carried out with the students of the Educational Unit that was the object of the study. The study had a total population of 70 students from the Eighth Year of Basic Education "A" at the José Pedro Varela Educational Unit, which were divided into two days (morning and afternoon). Two research groups were selected, each made up of 35 students (control and experimental group), who participated in data collection.

### 3. RESULTS AND DISCUSSIONS

The results obtained were based on the analysis of the reading comprehension skills variable that is displayed in Table 1 of both the pre-test and the post-test.

**Table 1. Distribution of the level of reading comprehension before and after the application of the interactive model in Upper Basic students.**

	PRE-TEST					POST TEST			
	Control Group		Experimental Group			Control Group		Experimental Group	
Levels	F	%	F	%	Niveles	F	%	F	%
Low	31	88,60%	27	77,10%	Bajo	15	42,90%	0	0,00%
Half	4	11,40%	8	22,90%	Medio	20	57,10%	0	0,00%
High	0	0,00%	0	0,00%	Alto	0	0,00%	35	100,00%
Total	35	100,00%	35	100,00%	Total	35	100,00%	35	100,0%

The pre-test data of the two groups are shown: control and experimental. It was observed that both groups started at a low level, with 88.6% in the control group and 77.1% in the experimental group. This indicates that both groups started in similar conditions before the intervention. The same table details the level of reading comprehension after the implementation of the Exelearning.net interactive model. In the control group, 57.1% achieved a medium level of reading comprehension, while 42.9% showed a low level. On the other hand, in the experimental group, after the application of the Exelearning.net interactive model to Basic Education students, 100% reached a high level by mastering reading comprehension skills. While the processed data from the JAPS v18 statistical program is presented in table 2.

**Table 2. Normality test of the pre and posttest in both study groups**

	TOTAL PRE		TOTAL POST	
	Control	Experimental	Control	Experimental
Minimum	4	2	2	22
Maximum	11	12	14	28
Range	7	10	12	6
Half	7,1714	6,9429	9,2857	26,4857
Standard deviation	1,72330	2,77534	2,77140	1,61558
Kurtosis	-,791	-,530	,417	,317
Std. Error of Kurtosis	,778	,778	,778	,778
Shapiro-Wilk	0.945	0.961	0.951	0.846
P-value of Shapiro-Wilk	0,080	0,247	0,118	<,001

After analyzing the results of the Shapiro-Wilk normality test (with a sample size greater than 50), it is observed that, in the pre-test, the control group shows a p value of 0.080 and the experimental group of 0.247. Regarding the post-test, the control group returns a p-value of 0.018, while the experimental group obtains a p-value of less than 0.001. The pre-test data indicate that both the control and experimental groups are normally distributed, since the significance level is greater than 0.05. However, when analyzing the post-test data in the experimental group, it is confirmed that the level of significance is less than 0.01. This leads to rejecting the null hypothesis in a highly significant way and accepting the alternative hypothesis. It is concluded that the population distribution of the variable "reading comprehension skills" differs significantly from the normal distribution. Therefore, he decides to use a parametric statistic for independent related samples (Student's t) and the non-parametric test (Wilcoxon). In Table 3, statistical data were obtained that refer to the pre-test of the control and experimental group. Table 3. Mann-Whitney/Wilcoxon U test on the variable Reading comprehension skills before application Control and experimental group.

**Table 3. Mann-Whitney/Wilcoxon U test on the variable Reading comprehension skills before application Control and experimental group.**

Reading Compression Skills	Study groups	N	Average Rank	Sum of Ranks	U de Mann-Whitney	W de Wilcoxon	Z	P
Pretest	G.C.	35	36,24	1268,50	586,500	1216,500	-0,308	0,758
	G.E.	35	34,76	1216,50				

From these data it can be inferred that the level of significance in the pre-test of the control and experimental group is ( $p \text{ value} = 0.758 > 0.05$ ). This suggests that the null hypothesis should be maintained, since before the implementation of the ExeLearning.net interactive model, both groups do not present similar results in strengthening reading comprehension skills in the literal, inferential and critical dimensions. In the pre-test, Levene's test was carried out to evaluate the equality of variances in the control and experimental groups before the application of the interactive model, in order to determine if there was homogeneity in the data. After examining the value obtained in the statistical program, we can conclude that ( $p=0.163 > \alpha 0.05$ ), This leads us to affirm that there is not enough evidence to reject the null hypothesis. Consequently, it can be stated that the variances are similar. Data obtained through the statistical test of the Mann-Whitney/Wilcoxon U Test after the application of the interactive model are shown in Table 4.

**Table 4. Mann-Whitney/Wilcoxon U statistical test on the variable Reading comprehension skills after the application Control and experimental group**

Reading Compression Skills	Study groups	N	Average Rank	Sum of Ranks	U de Mann-Whitney	W de Wilcoxon	Z	P
Posttest	G.C.	35	18,00	630,00	0,000	630,000	-0,723	0,000
	G.E.	35	53,00	1855,00				

In the analysis of Table 4, significant differences were highlighted in the Post-test, with the control group showing an orientation towards a parametric test, while the experimental group showed a significance level  $< 0.05$ , which led to the application of a non-parametric test. Therefore, we can conclude that by performing the Wilcoxon test on both groups, experimental and control, a two-sided significance level of 0.00 was obtained, which is less than 0.05. As a result, the Null Hypothesis is rejected and the Alternative Hypothesis is accepted. This indicates that after the implementation of the ExeLearning.net interactive model, students in the experimental group demonstrated a more notable strengthening in reading comprehension skills, both at the literal, inferential and critical levels, compared to students in the control group. The homogeneity of variances test was carried out where the following results were shown: 0.011, which indicated that its significance value is less than 0.05. Thus, demonstrating that there is no equality in their variances that are the object of study during the post-test. The information was verified through the Wilcoxon signed rank test before and after the application in Table 5.

**Table 5. Wilcoxon test data pre-post test**

Pre-test - Pos-test	N	Average Rank	Sum of Ranks	Z	Sig. asin. (bilateral)
Negative ranges	8 <sup>a</sup>	9,75	78,00	-6,438 <sup>b</sup>	<.001
Positive ranges	56 <sup>b</sup>	35,75	2002,00		
Ties	6 <sup>c</sup>				
Total	70				

According to the analysis of Table 5, in relation to the Wilcoxon rank test before the implementation of the interactive model, negative ranks are observed (8th), which indicates that before the test the scores are lower than those of the Post-test. . This suggests that many students were not fully developing their skills. Subsequently, after the application of the model, positive ranges are observed with a value of (56b), where the values are greater than those of the Post-test. This leads to the conclusion that the students managed to improve their comprehension skills, both at the literal, inferential and critical levels. Therefore, the Asymptotic Significance (Bilateral) value shows a result (<0.001), indicating that this value is less than (<0.05). In this way, the validity of the alternative hypothesis can be confirmed, which maintains that there is a significant influence of the interactive model ExeLearning.net in strengthening reading comprehension skills in Upper Basic students. Furthermore, the Z value results show normal behavior of the data. Additionally, the data was examined, which indicated a value of p=0.00 was less than 0.05. This confirms that there is sufficient evidence to reject the null hypothesis and accept the alternative. Therefore, it is concluded that variances were not equal. The information was analyzed through statistical data on the independent samples of Wilcoxon experimental group before and after the application in table 6.

**Table 6. Wilcoxon test experimental group pre and post test**

Pre-test	N	Average Rank	Sum of Ranks
Experimental	35	34,76	1216,50
Experimental	35	53,00	1855,00
Total	70		

Table No. 6 shows the results of the two study groups before and after the application of the Exelearning.net interactive model; where we analyze the average ranges of the Pre-test, the experimental group with a value of 34.76; and in the same way the results of the Post-test were observed with an average range greater than 53. In this way we can conclude that the experimental group showed a positive average range after the application of the interactive model that contributed to improving comprehension skills. reader in Upper Basic students. Statistical values and their level of significance in both study groups are shown below in Table 7.

**Table 7. U de Man – Whitney statistics for the Pre-test and Post-test (GE).**

	Pre-test	Post -test
U de Mann-Whitney	586,500	,000
W de Wilcoxon	1216,500	630,000
Z	-,308	-7,238
Sig. asin. (bilateral)	,758	<.001

According to what is observed in Table 7, we can interpret that the Mann-Whitney U values in the post-test are less than the Wilcoxon W value of 630,000; In the study before the application of the interactive model we have that  $p = 0.758 > 0.05$  □ AHo where both groups (Experimental and control) have similar scores in the pre-test; and that  $p = 0.01 < 0.05$  □ Rho in both groups have different scores in the post-test. In such a way that we conclude that the Null hypothesis is rejected and we accept the alternative. With respect to the findings found when evaluating the impact of the ExeLearning.net interactive model on the improvement of reading comprehension skills in upper elementary students, it was observed that, at the beginning of the intervention, the students did not demonstrate a solid command of their learning, with a low level detected in 88.6% (experimental group) and 77.1% (control group) according to the analysis of the pretest data. After the application of the interactive model, the control group remained at a low level of learning, unlike the experimental group, where 100% of the students reached a high level of mastery in their learning, which is reflected in a value of statistical significance ( $p < 0.001$ ). After the implementation of the interactive model, a notable impact was observed in the improvement of reading

comprehension skills. The research reveals that students faced difficulties in identifying the parts of a text, their interpretation, as well as the ability to summarize and synthesize the main idea of a text. However, after the program intervention, they demonstrated significant improvements in these skills related to reading comprehension. When describing the reading comprehension skills in the dimensions at a literal, inferential and critical level in the control and experimental group of the José Pedro Varela Educational Unit, before the application of the interactive model, results were observed whose level of significance is higher than 0.05. According to the results obtained before the intervention of the interactive model, no significant discrepancies were detected when evaluating the study groups. This is because many readers face difficulties in extracting information in a coherent way, such as identifying the main ideas of a text, the main and secondary characters, as well as the events and the context in which they develop. Therefore, it is necessary to apply modern learning theories that allow changing atypical learning behaviors, appropriately using digital tools that motivate their learning based on their experiences. This helped students significantly improve their reading comprehension skills when faced with a text. The results were examined by evaluating reading comprehension skills in the literal, inferential and critical dimensions in the experimental and control group of the José Pedro Varela Educational Unit after the implementation of the interactive model, which consisted of 15 learning sessions through of the Exelearning.net platform. It was found that, in the literal dimension, the value obtained was ( $p < 0.001$ ), which indicates a significant difference between the means and leads to the rejection of the null hypothesis in favor of the alternative. Similarly, in the inferential dimension, a value of ( $p < 0.017$ ) was obtained, also significant. Regarding the critical dimension, the value obtained was ( $p = 0.05$ ). The theory presented by Kenneth Goodman and Piaget emphasizes that, by relating the interaction between thought and language, learning is successfully improved. From the literal level, where the reader often perceives, identifies, matches, observes, orders and retains previous information; At the inferential level it is based on comparing, describing, explaining, analyzing and summarizing information; and at a critical level it is aimed at discussing previous ideas, evaluating the construction of a text or its resolution. After the implementation of the interactive model, a comparison of reading comprehension skills in the literal, inferential and critical dimensions was carried out between the experimental group and the control group of the José Pedro Varela Educational Unit. The Mann-Whitney U statistical analysis was used in the experimental group, revealing a significance level of ( $p < 0.01 < 0.05$ ) after the intervention of the interactive model. The study confirmed that it is linked to the identification of significant differences when analyzing the learning levels before and after strengthening reading comprehension skills in two study groups. This was achieved through the intervention of virtual activities and games designed to significantly strengthen reading habits. The design and validation of the Exelearning.net interactive model based on Piaget's principles, a notable strengthening of reading comprehension skills was observed at the literal, inferential and critical levels within the experimental group of eighth grade students in the Educational Unit José Pedro Varela. During the implementation of the interactive model in this group, it was evident how the difficulties in recognizing, identifying and analyzing the parts or elements of a text were considerably overcome. This progress is attributed to maintaining students' interest and motivation to learn.

## CONCLUSIONS

The implementation of the interactive platform Exelearning.net demonstrated to have a positive impact on the development of reading comprehension skills in students of the Upper Basic stage. The results of the study revealed significant differences between the study groups. While the control group, which did not use Exelearning.net, did not show significant improvements in their reading comprehension, the experimental group that did use the platform showed a notable increase in their learning level. Before implementation of the interactive model, homogeneity of variance between groups was confirmed, indicating that they began the study under similar conditions. After the intervention with Exelearning.net, favorable results were observed in the development of reading comprehension skills in the three dimensions (literal, inferential and critical) of the experimental group. This finding suggests that the use of information and communication technologies (ICT), such as Exelearning.net, can effectively improve reading comprehension skills in Upper Basic students.

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