

Reading Comprehension and Cognitive Processes in Ecuadorian Middle School Students

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Abstract

Objective: The research aimed to determine the influence of reading comprehension on the development of cognitive processes in middle school students in the canton of El Carmen. **Methodology:** It was based on the positivist paradigm through a quantitative approach with a correlational field research. The study population consisted of 983 teachers belonging to the ten educational circuits that make up the canton, applying a survey through a polytomous questionnaire with a Likert scale. **Results and Discussion:** Among the most relevant results, it is evident that there is a moderate correlation calculated at 0.457, which establishes that reading comprehension influences the development of cognitive processes in middle school students. **Conclusion:** It is of utmost importance that teachers working in the educational institutions under study not only develop their classes through the execution of curricular content but also employ strategies that allow students to learn to learn, which is achieved by stimulating the cognitive system.

Keywords: reading comprehension, cognitive processes, teaching, learning.

Introduction

Human beings are capable of processing information through a set of psychological processes that eventually become learning. Cognitive processes develop throughout schooling, enabling students to perform autonomously and acquire learning that will be useful throughout their lives. Among the basic but very important learning that children develop is the calculation of basic operations, writing, and reading. The latter is often taken lightly, and it is considered that when the student manages to decipher the codes that compose it and manages to read fluently and respecting punctuation marks, optimal reading has been achieved. In this regard, reading is an activity that every individual in normal conditions is capable of carrying out, as long as they have gone through a teaching process, whether formal or informal. It consists of the interpretation through the sense of sight of the phonetic component of a set of written signs. Cáceres, Pérez, and Zúñiga (2018) agree that reading is a highly important and complex cognitive activity, normally used for acquiring knowledge. This activity becomes the main learning tool for students, since most academic activities are based on reading. Therefore, academic success at all school levels, and primarily in higher education, will depend to a large extent on the strategies and resources that a good reader possesses (pág. 4). Reading is a fundamental skill that enables learning both inside and outside of school; however, reading is not just about achieving coding, but rather about understanding what is being read. Cantú (2017) expresses herself about reading comprehension and mentions that it "is a fundamental part of the life of every student, since, through it, one can undertake the reading of texts with the objective of understanding the meaning of the written text, in order to subsequently increase the reader's knowledge base", therefore reading not only improves the understanding of texts but also provides the reader with new knowledge acquired through it. In general, teachers place a lot of emphasis on the reading and writing process, but they give relevance to being able to do so in such a way that fluency and autonomy are evident when doing so, however, the fundamental part of reading that corresponds to the reflection of it, the analysis of the texts read, is neglected, which means that the cognitive processes involved in reading comprehension are not potentiated. It is necessary to point out that, in reading comprehension, three levels are distinguished: literal, which refers to the student's ability to understand explicitly what is said in the text; inferential, which indicates the student's ability to make conjectures and hypotheses about the text; critical, which is linked to their ability

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to evaluate the quality of a text and make reasoned judgments about it (Gallego, Figueroa, and Rodríguez, 2019, pág. 190). The aforementioned invites us to reflect on the level of reading comprehension that basic education students have at the Latin American level. In Ecuador, a low level is generally evident, so it is necessary for teachers to adopt innovative strategies that allow them to revolutionize the teaching of reading, not only from the point of view of fluency but from comprehension as such. It is important to point out that basic and higher-order thinking processes are, in a way, subordinated to the development of reading comprehension in human beings, among other reasons because it allows one to decipher the content of the necessary elements, and subsequently execute the aforementioned cognitive actions that will in one way or another guide learning throughout all educational levels. The problem raised is not foreign to the reality experienced by some educational institutions in the canton of El Carmen, where through informal conversations certain deficiencies are evident regarding the understanding of texts in students belonging to the middle level of General Basic Education (EGB), in which they manage to read by deciphering the written code, identifying words and applying punctuation rules; however, the understanding of what is read is not so high, the analysis or critical thinking that they manage to do in relation to the texts read is somewhat deficient. Due to the aforementioned, it is necessary to diagnose the reasons for the lack of application of strategies that help develop the correct reading comprehension and how this influences the cognitive processes that develop through it. Due to this, the following question is raised: What is the influence of reading comprehension on the development of cognitive processes? This question allowed the generation of the following research hypothesis: H: reading comprehension influences the development of cognitive processes in middle school students in the canton of El Carmen. This allows the generation of the present objective: to determine the influence of reading comprehension on the development of cognitive processes in middle school students in the canton of El Carmen.

Theoretical Review

Reading is a complex cognitive process involving the decoding and interpretation of written language. Beyond merely recognizing words, readers construct meaning by drawing on prior knowledge, making inferences, and engaging with the text on a deeper level. This process is influenced not only by the text itself but also by the reader's unique perspective and experiences.

Comprehension, a central aspect of reading, encompasses understanding both the explicit and implicit meanings within a text. It involves processing the language at a word level, as well as grasping the overall message and underlying themes. Jiménez (2014) defines reading comprehension as the ability to accurately capture an author's intended meaning.

Developing strong reading comprehension skills is essential for students, but it requires more than just individual effort. A supportive learning environment, including family and school, is crucial for fostering these skills. Educators must provide engaging activities that challenge students and help them develop the strategies needed to become proficient readers.

Teachers who implement tools and strategies to develop reading comprehension in their students must strike a balance between in-class and at-home activities. It's essential to ensure that these activities are engaging and gradually increase in difficulty based on the students' grade level. As Quincho (2019) points out, activities assigned to students at home should also be motivating and avoid overwhelming children with excessive reading material. Educational institutions should provide reading materials that cater to the diverse needs of their students.

The importance of different levels of reading comprehension is evident. Literal comprehension, the most basic level, involves understanding the explicit information presented in a text, such as facts, names, and events. This level is foundational for developing higher-order comprehension skills. Inferential comprehension requires readers to go beyond the text and make inferences based on clues and their own background knowledge. Critical comprehension involves analyzing the text, evaluating the author's arguments, and forming one's own opinions. Appreciative comprehension focuses on the emotional and aesthetic aspects of reading, such as identifying with characters or appreciating the author's style.

Cognitive processes play a significant role in reading comprehension. These processes include attention, memory, and thinking. Attention allows readers to focus on the text, while memory helps them retain information and make connections. Thinking skills, such as analysis, synthesis, and evaluation, are essential for deep understanding.

Building on the previous points, Feldman (2010) conceptualizes cognitive processes as "higher-level mental processes in human beings, which include how people know and understand the world, process information, make judgments and decisions, and describe their knowledge."

Expanding on this, Suárez (2016) defines cognitive processes as "the procedures that humans carry out to incorporate knowledge, involving a variety of faculties such as intelligence, attention, memory, and language, which can be conscious or unconscious (pág. 11)." Therefore, all these aspects must be considered when working with students, understanding how to work with them optimally.

Cognitive perception allows us to organize and understand the world through the stimuli we receive through our senses. We can receive information through basic senses like taste, smell, touch, sight, and hearing, but also through less known ontologies like "proprioception," the sense that informs us about our body position and place in space. Additionally, we can receive information through "interoception," which is how we perceive the state of our internal organs and allows us to recognize basic needs like thirst or hunger. Once this data is received, the brain integrates all the captured information, creating new knowledge.

Attention is a crucial cognitive process that enables humans to focus on a specific stimulus or activity, and from there, process the received information more deeply and consciously. Attention is an indispensable cognitive function for the development of daily life and is used in most of the tasks we perform continuously. In fact, it is considered the mechanism that controls and regulates other cognitive processes: from perception (attention is needed to attend to stimuli that arrive through the senses) to more complex processes such as learning or reasoning.

Memory is another essential element in the cognitive realm, perceived as a fundamental aspect of the learning process, as it allows us to create a sense of identity. There are various types of memory, including short-term memory, which allows us to temporarily retain information in our minds, such as remembering a phone number until we can write it down. Long-term memory is the ability to retain information, memories, or knowledge for a very long period.

Memory can also be divided into declarative memory, which involves both knowledge acquired through language and education, as well as knowledge obtained through personal experiences, such as a memory of a grandparent performing a certain activity. Procedural memory refers to learning through routine, such as learning to prepare a meal or ride a bicycle. Other types of memory include auditory memory, contextual memory, naming memory, and recognition memory.

It is imperative to highlight that thought, as a cognitive process, is the foundation of all cognitive processes, as it allows us to integrate all the information a person receives and create relationships between the data that composes it. For this, it uses other skills such as reasoning, synthesis, and problem-solving, which together make up executive functions.

In the same context, language as a cognitive process is related to people's ability to express thoughts and feelings through the use of words. It is a communication tool that allows us to organize and transmit information about ourselves and the world. Language and thought are functions that develop in parallel and are deeply interconnected, influencing each other.

Given the above, it can be affirmed that learning, as a cognitive process, encompasses everything in a compact way, as it is a cognitive process through which new information is integrated into the prior knowledge that one possessed. Learning includes different behaviors or learning habits such as brushing one's teeth or learning to walk, in the same way that all the knowledge acquired through living in society and school is acquired.

Methods

At the level of scientific research, several authors have proposed their definition of paradigm. Among them, we can find Kuhn, cited by Beltrán and Ortíz (2020), who mention that a paradigm is "a set of interrelated assumptions about the social world that provides a philosophical framework for the organized study of this world" (pág. 82). In this sense, this perspective positions the paradigm as a conceptual framework based on theoretical and methodological beliefs and hypotheses that guides the scientific community. Therefore, the positivist paradigm was used to develop this study.

The approach that guided the research was quantitative. Martínez (2013) states that one of its most prominent features is its quantitative nature, ensuring the precision and rigor required by science. Therefore, this approach allowed for the collection of information from middle-level teachers in the different educational institutions belonging to the canton of El Carmen, with the purpose of analyzing and interpreting data based on the fulfillment of the stated objective.

Similarly, the type of research used was field research, which Arias (2006) defines as "that which consists of collecting data directly from the subjects under investigation, or from the reality where the facts occur (primary data), without manipulating or controlling any variable" (pág. 43). In relation to the level, a correlational approach was used, as it allowed establishing the degree of association between reading comprehension and cognitive processes in the study context. In this regard, Hernández, Fernández, and Baptista (2014) express that this "type of study aims to know the relationship or degree of association that exists between two or more concepts, categories, or variables in a particular sample or context... Such correlations are expressed in hypotheses that are tested" (pág. 62).

Regarding the study population, Arias (2006) states that it is "a finite or infinite set of elements with common characteristics to which the conclusions of the research will be extended. It is delimited by the problem and the objectives of the study" (pág. 38). The present study consisted of nine hundred and eighty-three (983) teachers belonging to the middle level of basic education in the different educational institutions of the canton of El Carmen - Manabí. It is necessary to point out that since the entire population was considered, it was not necessary to calculate a sample.

The technique used for data collection was a survey. Arias (2006) states that this technique aims to obtain information that a group or sample of subjects provides about themselves or in relation to a particular topic. This technique will allow collecting the necessary information to verify the hypothesis created by the researcher. The instrument used was a questionnaire, which, according to Fabregues (2016), is "a standardized instrument that we use to collect data during the field work of some quantitative research, fundamentally those carried out with survey methodologies." In correspondence with this information, it can be corroborated that it is not possible to apply the previous technique without this instrument (pág. 18).

Regarding the analysis and processing of data, once the data was obtained through the survey, it was processed through data tabulation using the SPSS statistical package version 25, to subsequently analyze it by confronting authors associated with the study variables. Likewise, it is necessary to indicate that the same software allowed calculating the correlation between these variables, using the Spearman coefficient.

Results and discussion

In the following section, the most important results of the variables 'reading comprehension' and 'cognitive processes' are presented, through the distribution and frequencies by subdimensions. In this sense, it is shown that:

Table 1. Frequency distribution and percentages of responses provided by middle school teachers in the canton of El Carmen, variable: "reading comprehension", dimension: "levels of reading comprehension", subdimension: "literal level".

Ítems	Always		Almost Always		Sometimes		Almost Never		Never	
	F	%	F	%	F	%	F	%	F	%
4. When your students read, do you think they are able to recall specific details such as characters, places, and names?	73	7,43	345	35,10	492	50,05	73	7,43	0	0,0
Average	73	7,43	345	35,10	492	50,05	73	7,43	0	0,0

When middle school teachers in El Carmen were asked if their students could recall specific details from their readings, the results were as follows: 7.43% believe that students always do so, 35.10% believe that they almost always do, while 50.05% indicated that they sometimes do, and 7.43% believe that they almost never do. Notably, no teacher responded "never." Regarding the literal comprehension level, Clavijo and Sanchez (2018) state that at this level, "the reader recognizes key phrases and words in the text, and focuses on ideas and information that are explicitly stated in the text through recognition or recall of facts" (pág. 52). Due to the accuracy of the data collected from a text when it is read, this level is fundamental, as it provides the foundation for advancing to higher levels of comprehension.

From the responses obtained, it can be inferred that, in general, teachers believe that students are not able to retain specific details from their readings. This leaves room for speculation, as factors affecting retention could range from the complexity of the text to the student's interest in the topic. Unfortunately, it is not possible to obtain answers regarding the causes, as this would require a separate or additional investigation.

Table 2: Frequency distribution and percentages of responses provided by middle school teachers in the canton of El Carmen, variable: "reading comprehension", dimension: "levels of reading comprehension", subdimension: "inferential level".

Ítems	Always		Almost Always		Sometimes		Almost Never		Never	
	F	%	F	%	F	%	F	%	F	%
5. Do you believe that after reading, your students can extract ideas that were not explicitly stated in the text?	91	9,26	236	24,01	492	50,05	164	16,68	0	0
6. Do you consider that your students are able to extract the lesson or moral that a reading leaves?	73	7,43	400	40,69	419	42,62	91	9,26	0	0
Average	82	8,34	318	32,35	455	46,29	128	13,02	0	0

When middle school teachers in El Carmen were asked if their students could extract ideas that were not explicitly stated in the text, 9.26% chose "always," 24.01% chose "almost always," 50.05% chose "sometimes," and 16.68% chose "almost never." The extraction of ideas from a text is part of the inferential level, which, as Ochoa, Mesa, Pedraza, and Orlando (2019) state, "inferential reading requires a high degree of abstraction on the part of the reader, (...) involving describing the ideas of the text beyond what is explicitly read or stated in it, adding information and previous experiences to prior knowledge" (pág. 8). This demonstrates the importance of this level and the cognitive processes involved in achieving it.

Similarly, teachers were asked about their students' ability to extract the lesson or moral from a reading. The survey results showed that 7.43% indicated that students always do so, 40.69% mentioned that they almost always do, 42.62% stated that they sometimes do, and 9.26% indicated that they almost never do. This level can be understood from what Ruiz & Petro (2020) state: "Understanding a text at the inferential level means interpreting everything that the author wants to communicate, but which on some occasions is not explicitly stated or written" (pág. 15).

Few teachers believe that their students can extract ideas about aspects present in the reading, even if they are not mentioned. The majority, that is, 91.67% of them, consider that students are not capable of doing so. The reasons for this are undoubtedly diverse.

Table 3: Frequency distribution and percentages of responses from middle school teachers in El Carmen regarding students' ability to analyze, synthesize, and evaluate their readings.

Ítems	Always		Almost Always		Sometimes		Almost Never		Never	
	F	%	F	%	F	%	F	%	F	%
Table 3: Frequency distribution and percentages of responses from middle school teachers in El Carmen regarding students' ability to analyze, synthesize, and evaluate their readings.	91	9,26	200	20,35	601	61,14	91	9,26	0	0
8. Do you estimate that your students can make value judgments about a text they have read?	91	9,26	218	22,18	547	55,65	127	12,92	0	0
Average	91	9,26	208	21,16	573	58,29	111	11,29	0	0

Similarly, teachers were asked if they believe their students are capable of making value judgments after reading. The results showed that 9.26% suggested that students always do so, 22.18% mentioned that they almost always do, 55.65% stated that they sometimes do, while 12.92% indicated that they almost never do. Castillo & Pérez (2017) agree that "critical reading develops in students the ability to analyze, reflect, make value judgments, contrast with other texts, search for problems, and propose possible solutions and changes" (pág. 180).

The idea that students can analyze and formulate value judgments about what they read is present in a small number of teachers. The majority, that is, 90.74%, are not convinced of this, which implies that learning in this aspect is deficient.

Table 4: Frequency distribution and percentages of responses provided by middle school teachers in the canton of El Carmen, variable: "reading comprehension", dimension: "levels of reading comprehension", subdimension: "critical level"

Ítems	Always		Almost Always		Sometimes		Almost Never		Never	
	F	%	F	%	F	%	F	%	F	%
Do you consider that your students are capable of understanding and feeling the experiences of the protagonist of a story when they read it?	109	11,09	346	35,2	400	40,69	109	11,09	19	1,93

Average	109	11,09	346	35,2	400	40,69	109	11,09	19	1,93
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Middle school teachers in El Carmen were asked if they believe their students can understand and feel the experiences of the protagonist in a story. 11.9% responded that students always do so, 35.2% mentioned that they almost always do, 40.69% stated that they sometimes do, 11.01% indicated that they almost never do, and only 1.93% mentioned that they never do. Acurio (2018) reinforces the meaning of the appreciative level, mentioning that, at this level, "the reader emits emotional responses related to the content. That is, they express their interest and appreciation of what they have read: (boredom, fun, fear or other sensations, feeling identified with the characters both in sympathy and empathy)" (pág. 24). According to the teachers' responses, the ability to comprehend and feel the experiences presented in a reading is generally not a characteristic of students. Since 88.89% of teachers chose options other than "Always," it suggests a serious learning problem, as it can be inferred that students are reading mechanically.

Table 5: Frequency distribution and percentages of responses provided by middle school teachers in the canton of El Carmen, variable: "Cognitive processes", dimension: "Cognitive functions", subdimension: "Thinking"

Ítems	Always		Almost Always		Sometimes		Almost Never		Never	
	F	%	F	%	F	%	F	%	F	%
Do you encourage the development of critical thinking in your students so that they are able to analyze the information they receive and relate its components to reach valid conclusions?	618	62,87	292	29,70	73	7,43	0	0	0	0
Do you consider it necessary to exercise executive functions (reasoning, synthesis, and problem-solving) for the development of thought as a cognitive process?	674	68,57	255	25,94	54	5,49	0	0	0	0
Average	647	65,82	273	27,77	63	6,41	0	0	0	0

When middle school teachers in El Carmen were asked if they stimulate the development of critical thinking in their students, allowing them to analyze information and relate its components to reach valid conclusions, 62.87% of respondents indicated that they always do so, 29.7% responded almost always, and 7.43% sometimes. Similarly, when asked if they consider it necessary to exercise executive functions (reasoning, synthesis, and problem-solving) for the development of thought as a cognitive process, the average of the responses obtained showed that 68.57% indicated always, 25.94% mentioned almost always, and 5.49% stated sometimes, while "Almost never" and "Never" were not selected. Regarding this topic, Villarini (2004) defines thought as follows, "we have defined 'thought' as the ability to process information and construct knowledge, through the combination of mental representations, operations, and attitudes." (pág. 38) The results obtained from the survey regarding the stimulation of thought are satisfactory, since having 65.82% of teachers who always stimulate it in their students shows that, for the most part, they have a deep interest in improving those fundamental cognitive processes that accompany learning.

Table 6. Distribución de frecuencias y porcentajes de las respuestas emitidas por los docentes del subnivel medio de educación básica del cantón El Carmen, variable: "Procesos cognitivos", dimensión: "funciones cognitivas", subdimensión: "lenguaje".

Ítems	Siempre		Casi siempre		Algunas veces		Casi nunca		Nunca	
	F	%	F	%	F	%	F	%	F	%

17. Do you believe your students can express their feelings appropriately for their grade level and age?	218	22,18	547	55,65	218	22,18	0	0	0	0
18. Can your students express their thoughts appropriately for their age and grade level?	254	25,84	419	42,62	310	31,54	0	0	0	0
19. Do you use strategies that contribute to the development of language as a tool for communication, organization, and information transmission?	510	51,88	382	38,86	91	9,26	0	0	0	0
Average	327	33,27	449	45,68	207	21,06	0	0	0	0

When middle school teachers in El Carmen were asked if they believe their students can express their feelings appropriately for their grade level and age, 22.18% of respondents indicated that they always do so, 55.65% responded almost always, and another 22.18% sometimes. Similarly, when asked if their students can express their thoughts appropriately for their age and grade level, the following responses were obtained: 25.84% indicated always, 42.62% mentioned almost always, and 31.54% stated sometimes, while "Almost never" and "Never" were not selected. Another question asked was whether they apply strategies that contribute to the development of language as a tool for communication, organization, and information transmission, to which they responded as follows: 51.88% stated that they always apply, 38.86% indicated almost always, and 9.26% stated sometimes. Cantú, Alejandro, García, and Leal (2017) mention in their book that "Language is constituted as a series of connected and articulated sounds through which humans manifest what they think and feel." (pág. 24) They also state that "through the practical mastery of language, the individual's behavior acquires meaning in such a way that their relationship with others becomes effective." (pág. 28) The results obtained show that teachers apply strategies that contribute to the development of language as one of the basic cognitive functions on a permanent basis, and it is also noticeable that, although there are teachers who only do so sometimes, it is a very low percentage.

Table 7: Frequency distribution and percentages of responses provided by middle school teachers in the canton of El Carmen, variable: "Cognitive processes", dimension: "Cognitive functions", subdimension: "Learning".

Ítems	Siempre		Casi siempre		Algunas veces		Casi nunca		Nunca	
	F	%	F	%	F	%	F	%	F	%
20. ¿Considera necesario la aplicación de estrategias que desarrollen los procesos cognitivos en los estudiantes para lograr que se dé el aprendizaje?	728	74,1	201	20,4	54	5,6	0	0	0	0
Average	728	74,06	201	20,45	54	5,49	0	0	0	0

When middle school teachers in the canton of El Carmen were asked if they consider it necessary to apply strategies that develop cognitive processes in students to achieve learning, the following results were obtained: 74.06% believe that they should always be applied, 20.45% believe that they should almost always be applied, while 5.49% indicated that they should sometimes be applied. According to Solorzano (2017), learning should be viewed as follows: "Learning ceases to be an observable behavior to be resignified as a process that causes the modification and transformation of mental structures into much richer and more complex ones." The results obtained show that, for the most part, teachers consider the importance of applying strategies that develop cognitive processes. However, it is somewhat surprising that 5.6% of

teachers do not consider it so important, since by responding that it is sometimes necessary, it shows a lack of awareness regarding the importance they give to learning. Correlation analysis Once the data obtained from the respondents' answers had been processed, a correlation analysis was carried out between the variables "reading comprehension" and "cognitive processes" using Spearman's correlation coefficient, through the use of the SPSS statistical package, which allowed us to obtain the following results:

Correlations

		VI	VD
Spearman's Rho	VI	Spearman's correlation coefficient	1,000
		Sig. (2-tailed)	,457**
		N	983
	VD	Spearman's correlation coefficient	,457**
		Sig. (2-tailed)	1,000
		N	,001

** La correlación es significativa en el nivel 0,01 (bilateral).

As observed, the calculated correlation coefficient is 0.457, indicating a moderate correlation. This allows us to accept the hypothesis that "reading comprehension influences the development of cognitive processes in middle school students in the canton of El Carmen."

Conclusions

Upon completion of this study, we present the following conclusions based on the objective of determining the influence of reading comprehension on the development of cognitive processes in middle school students in the canton of El Carmen, Manabí Province.

Regarding students' mastery of reading and written code identification, it was found that the level is low, indicating a need for improvement. However, teachers do attach due importance to the process of reading comprehension, which may facilitate the implementation of actions to mitigate the aforementioned problem. With respect to the levels of reading comprehension employed by the students in question, significant deficiencies were evident. This is a crucial element in the teaching-learning process, not only at the basic level or any other within the unified general high school, but it also serves as a foundation for the development of higher education studies.

The aforementioned findings suggest weaknesses in the educational process in institutions belonging to the basic level of the canton of El Carmen. If corrective measures are not taken, the integral development of the inhabitants of Manabí may be jeopardized, which is a vital element in the construction of the Ecuadorian nation.

Regarding teachers' perceptions of students' ability to apply cognitive functions within the teaching-learning process, it is evident that there are weaknesses in basic processes such as perception, attention, memory, and thought, which are vital for processing information and subsequently converting it into knowledge.

In general, it is of utmost importance that teachers working in middle school institutions in the canton not only develop their classes through the execution of curricular content but also employ strategies that allow students to learn to learn, which is achieved through the stimulation of the cognitive system.

Based on the foregoing and the statistical analyses, including Spearman's correlation coefficient, the hypothesis is accepted. This establishes that there is a moderate relationship between reading comprehension and the development of cognitive processes in the students under study. In other words, the development of reading comprehension depends, to some extent, on the use of students' cognitive processes, which should be stimulated by teachers.

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