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READING COMPREHENSION AS A DETERMINING FACTOR IN PERFORMANCE IN MATHEMATICS

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ABSTRACT

This study investigates reading comprehension as a decisive factor in students' performance in mathematics in the final years of elementary school. It starts from the understanding that learning mathematics goes beyond mastering calculations and procedures: it requires attentive reading, interpretation of statements, comprehension of problem situations, and attributing meaning to symbolic representations. The research, using a qualitative approach with quantitative data support, was conducted with 6th-grade classes through the application of diagnostic assessments of reading and mathematical problem-solving. The data analysis showed that students with greater reading proficiency performed better in interpreting problems, identifying relevant information, and choosing problem-solving strategies. Conversely, many of the difficulties attributed to mathematics were revealed to be related to failures in textual comprehension, and not just to a lack of numerical skills. The results reinforce the importance of pedagogical practices that integrate literacy into mathematics teaching, recognizing reading as a structuring competence of school learning.

Keywords: Reading skills. Literacy. Mathematics education. Problem solving. School learning.

INTRODUCTION

In recent decades, large-scale assessments, such as the Basic Education Assessment System (SAEB) and the Programme for International Student Assessment (PISA), have highlighted a recurring scenario: students exhibit significant difficulties in mathematics that are often not only related to mastering calculations or algorithmic procedures, but also to understanding the wording of the questions. Mathematical problems, especially contextualized ones, require careful reading, interpretation, selection of relevant information, establishment of logical relationships, and attribution of meaning to the data presented.

In this context, a central question emerges: how does students' reading comprehension influence their performance in mathematics, especially in understanding and solving problem situations in the final years of elementary school?

Historically, schools have treated reading as a primary responsibility of the Portuguese Language subject. However, school mathematics is deeply mediated by language, involving symbols, graphs, tables, and statements that demand active, inferential, and critical reading. When a student has difficulty understanding specific vocabulary, logical connectives, or identifying the central issue of a problem, their difficulty is not exclusively mathematical, but also linguistic and cognitive.

Therefore, understanding the relationship between reading and learning mathematics becomes fundamental for improving pedagogical practices. The Brazilian National Common Curriculum Base (BNCC) reinforces reading as a transversal competence, necessary in all areas of knowledge, by proposing practices that involve interpretation, analysis, and problem-solving.

Furthermore, authors such as Solé (1998) highlight the importance of reading strategies—before, during, and after reading—as fundamental to the construction of textual comprehension, while Vygotsky (1998) emphasizes the role of language as a structuring instrument of thought. These perspectives reinforce that mathematical learning is directly related to the development of reading competence.

In this context, a central question emerges: to what extent is poor performance in mathematics associated with weaknesses in reading comprehension? Given literacy events, one must select reading strategies appropriate to different objectives and characteristics of genres and media, according to the aforementioned skill:

> To read autonomously and understand – selecting reading procedures and strategies appropriate to different objectives and taking into account the characteristics of genres and media – children's and young adult novels, folk tales, horror stories, Brazilian, indigenous and African legends, adventure narratives, mystery narratives, myths, chronicles, autobiographies, comic books, manga, free and fixed form poems (such as sonnets and cordel literature), video poems, visual poems, among others, expressing an evaluation of the text read and establishing preferences for genres, themes, and authors. (BRAZIL, 2018, p. 169)

Traditionally, schools separate areas of knowledge, treating reading as the primary responsibility of Portuguese Language. However, school mathematics is strongly mediated by language: symbols, graphs, tables, written problems, and problem-solving situations are forms of text that demand active, inferential, and critical reading. When a student does not understand specific vocabulary, logical connectives, cause-and-effect relationships, or cannot identify the central question of a problem, their difficulty is not exclusively mathematical, but also linguistic and cognitive. Thus, failure may stem less from an inability to solve and more from a difficulty in understanding what needs to be solved.

Thus, Solé (1988, p. 90) proposes reading strategies, seeking to contribute with viable methodologies for a better understanding of meaningful reading practices. For her, the use of these strategies is essential to promoting students' reading skills. Therefore, the reading activity, according

to the author, should follow some stages, namely: before reading, during reading, and after reading.

Studies in the fields of Mathematics Education and Applied Linguistics indicate that reading in Mathematics has specific characteristics, but maintains common bases with general reading competence: efficient decoding, fluency, construction of inferences, monitoring of comprehension, and articulation between text and prior knowledge. Furthermore, the Brazilian National Curriculum Base (BNCC) reinforces the idea that reading is a transversal competence, necessary in all areas, by proposing practices that involve data interpretation, information analysis, and contextualized problem-solving. Therefore, it is not just about teaching mathematical content, but about ensuring that the student develops strategies to understand mathematical texts according to the BNCC (2017):

> "(...) a competent reader possesses diverse skills, attitudes, and values. Skill is knowing how to do something. Being competent means mobilizing a set of skills in pursuit of a specific goal, to solve problems. A competent reader is able to perform various actions on the text in order to understand it."

The relevance of this discussion becomes even greater when considering the profile of basic education students, especially in contexts of social vulnerability, where access to reading practices outside of school may be limited. In these situations, the classroom assumes a decisive role in the formation of the reader, including the reader of mathematical texts. If reading is not worked on intentionally and integrated into mathematics classes, learning inequality widens, as students with a greater reading repertoire tend to have advantages in mathematical performance as well.

Furthermore, understanding the relationship between reading comprehension and mathematical learning contributes to rethinking pedagogical practices. Instead of attributing difficulties exclusively to "lack of logical reasoning" or "aversion to mathematics," space is opened for interventions that involve guided reading of problems, collective discussion of statements, expansion of mathematical vocabulary, analysis of different forms of representation, and development of textual comprehension strategies. This perspective dialogues with interdisciplinary approaches and pedagogical proposals that value language as a tool for constructing thought. According to (VYGOTSKY, 2001):

> Language is not only a means of communication, but a fundamental instrument in the formation of thought and the organization of cognitive functions. (VYGOTSKY, 2001)

Therefore, investigating reading comprehension as a determining factor in mathematical performance is justified both from a theoretical point of view—by articulating fields of study that have historically progressed in parallel—and from a practical point of view, by offering support for improving teaching practices and, consequently, learning outcomes. It is about recognizing that reading well is a prerequisite for learning mathematics with comprehension, autonomy, and meaning.

Given this scenario, this study aims to analyze how reading comprehension influences students' performance in mathematics, especially considering the comprehension of statements, the interpretation of problems, and the construction of problem-solving strategies. To this end, it seeks to identify the main reading difficulties that interfere with the resolution of mathematical problems, as well as to investigate the relationship between levels of reading comprehension and students' performance in mathematical activities. Furthermore, it intends to analyze pedagogical practices that integrate reading into mathematics teaching and to propose didactic approaches that favor the development of reading comprehension in the context of mathematics classes.

Thus, this research is justified by the need to understand reading as a structuring element of mathematics learning, contributing to the development of more integrated, meaningful, and equitable pedagogical practices.

METHODOLOGY

This research is characterized as a qualitative study, supported by quantitative data, of a descriptive-analytical nature, focusing on understanding the relationship between reading competence and performance in mathematics in the context of basic education. In an interdisciplinary manner, it is based on the assumption that mathematical performance cannot be analyzed in isolation, and that it is necessary to consider the reading and interpretation processes involved in problem-solving.

The study was conducted in a 6th-grade class in the final years of elementary school at a state public school located in the municipality of Conceição do Castelo, Espírito Santo, involving regularly enrolled students. The choice of research field is justified by representing a real context of pedagogical practice, in which recurring difficulties are observed in both reading and mathematics learning.

The participants initially comprised the entire class, totaling 28 students. However, for the purposes of a more in-depth analysis, an intentional selection of 10 students was made, with 5 showing higher reading performance and 5 showing lower performance. This choice is justified by the need to compare contrasting profiles, allowing for a more detailed analysis of the relationship between reading proficiency levels and performance in mathematics, as recommended by qualitative studies that value the comparative analysis of cases. The inclusion criteria for participants considered regular class attendance and participation in the activities proposed during the research period.

The data collection instruments involved four pillars:

1. Diagnostic reading activities, consisting of verbal and non-verbal texts, with questions that assess literal, inferential, and interpretive comprehension;
2. Math activities with contextualized problems, requiring reading, interpreting statements, analyzing data, and developing problem-solving strategies;
3. Classroom observation, with recording in a field diary, in order to identify how students interact with mathematical texts and what strategies they use to understand them;
4. A questionnaire or semi-structured interview with students (and, if relevant, with teachers), aimed at identifying perceptions about reading difficulties and problem-solving.

Data collection occurred in stages. Initially, a diagnostic reading assessment was applied, followed by mathematical activities. Subsequently, pedagogical interventions were developed that integrated reading and mathematics, such as collective reading of problems, linguistic analysis of statements, exploration of mathematical vocabulary, and oral discussion of interpretation strategies. These interventions made it possible to observe changes in how students understand and solve problem situations.

The qualitative data analysis was performed using content analysis techniques, with the prior and emerging definition of analytical categories, such as:

- difficulties in literal comprehension;
- difficulties in inferential comprehension;
- Misinterpretations of statements;
- Reading strategies used (anticipation, rereading, identification of keywords);
- Types of resolution adopted (adequate understanding, mechanical attempt, lack of strategy);
- The relationship between text comprehension and accuracy/incorrectness in mathematical problem-solving.

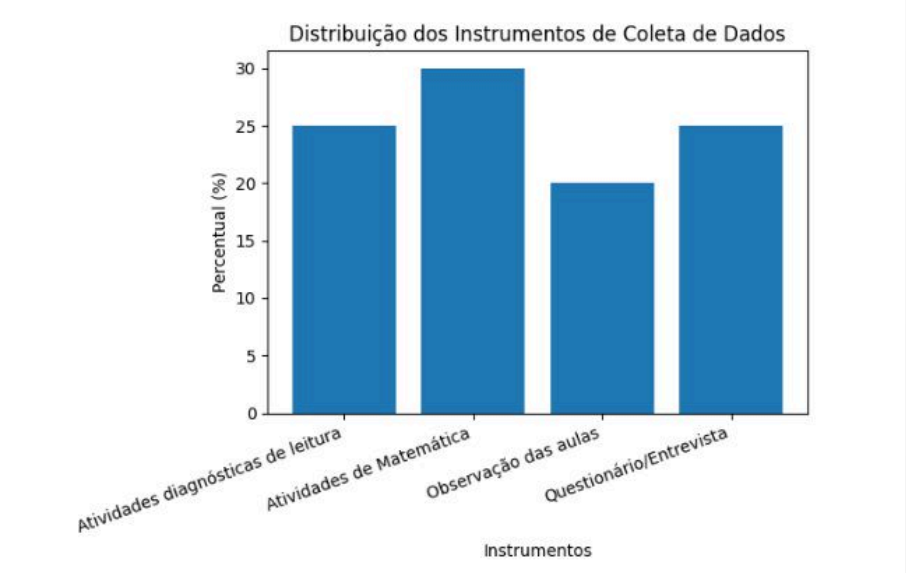
The quantitative data (number of correct answers, types of errors, and performance levels) were organized into tables and graphs, allowing for the identification of patterns and possible correlations between reading comprehension and mathematical performance.

Regarding ethical aspects, the research respected the principles of confidentiality and anonymity of the participants, using free and informed consent forms signed by the legal guardians of the students and by the school institution.

It is expected that the methodology adopted will make it possible to understand, in an integrated way, how reading competence interferes with mathematical learning, offering support for interdisciplinary pedagogical practices that favor the improvement of student performance.

PRESENTATION AND ANALYSIS OF THE RESULTS

The data analysis revealed a significant relationship between students' reading comprehension skills and their performance in mathematical activities involving problem-solving. It was observed that students who performed better in text comprehension activities also demonstrated greater success in interpreting mathematical statements, selecting relevant information, and developing problem-solving strategies. On the other hand, students with reading difficulties showed a higher incidence of errors related to interpretation, even when they demonstrated mastery of basic operations, as shown in the following graph.



Source: Prepared by the authors (2026)

The research was conducted with a class of 27 students; however, for a more in-depth approach to the proposed activity, a group of 10 students was selected. This selection allowed for a more detailed monitoring of the learning process, favoring a qualitative analysis of the difficulties and strategies employed by the students, especially regarding the relationship between reading comprehension and performance in mathematics.

The graph presents the distribution of data collection instruments used in the research, highlighting a relative methodological diversity. It can be observed that mathematics activities account for the largest share (30%), indicating a significant focus on the direct analysis of student performance in specific situations within the subject. Next are diagnostic reading activities and questionnaires/ interviews, both at 25%, demonstrating a concern with understanding both reading skills and the

perceptions of the subjects involved in the educational process. Classroom observation represents 20%, configuring itself as a complementary, yet relevant, instrument, as it allows for the analysis of the pedagogical context and teaching practices in real-world situations. This distribution suggests a balance between quantitative and qualitative instruments, reinforcing the research's intention to understand the investigated phenomenon in a broad and integrated way, articulating performance, processes, and perceptions.

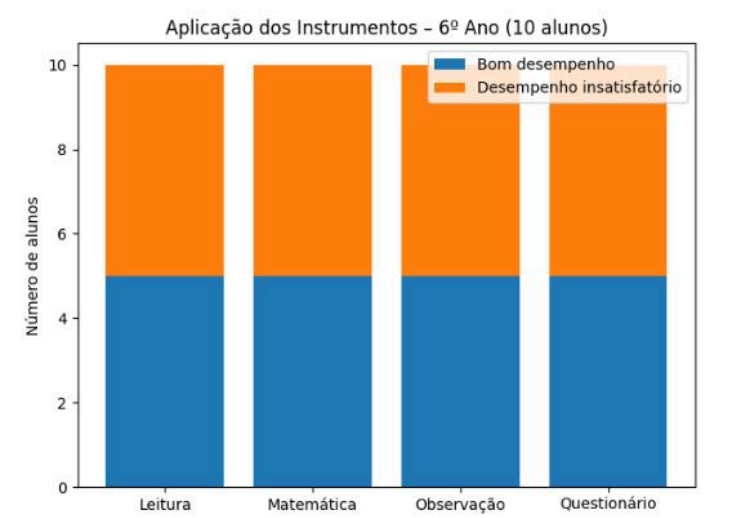
Therefore, the result presented in the graph above directly relates to the studies of Smole and Diniz (2001), who affirm that reading, writing, and problem-solving are inseparable skills in the process of learning mathematics. According to the authors, difficulty in mathematics is frequently associated with an inability to understand the problem statement, and not necessarily with a lack of mathematical knowledge. Along the same lines, Fonseca (2013) highlights that language in mathematics is not merely a support, but a constitutive element in the production of meaning, which reinforces the centrality of reading competence in student performance.

In the diagnostic reading assessment, weaknesses were identified mainly at the inferential and interpretive levels. Many students were able to locate explicit information, but had difficulty establishing relationships between data, understanding implicit meanings, and identifying the text's intention. These same difficulties appeared in mathematical activities, especially in contextualized problems, where the student needed to understand the described situation before applying any procedure.

This finding can be understood in light of the contributions of Solé (1998), who emphasizes that effective reading involves active processes of meaning-making, including inference, anticipation, and hypothesis testing. When these strategies are not employed, textual comprehension becomes superficial, compromising problem-solving in different areas of knowledge.

Furthermore, the BNCC (2018) reinforces that reading competence involves the ability to interpret, analyze, and use information in different contexts, being essential for the development of school learning. During classroom observation, it was found that, when faced with written problems, some students immediately sought to perform calculations without carefully reading the problem statement.

This behavior resulted in answers inconsistent with the question posed, revealing that the obstacle was not in the mathematical operation itself, but in understanding the problem situation. This data reinforces the idea that many errors attributed to mathematics originate from reading failures, as indicated by studies in the field and the following graph.



Source: Prepared by the authors (2026)

The graph presents the results of applying data collection instruments to a sample of 10 sixth-grade students, highlighting the distribution between "good performance" and "unsatisfactory performance" in the different dimensions evaluated: reading, mathematics, observation, and questionnaire. It is observed that, in all instruments, there is a balanced division, with 5 students showing good performance and 5 with unsatisfactory performance. This pattern suggests the existence of a heterogeneous group, in which half of the students demonstrate mastery of the assessed skills, while the other half still faces significant difficulties. This balance reinforces the hypothesis that the challenges are not restricted to a single area, but cross different aspects of the learning process, including reading competence and its relationship with performance in mathematics. Furthermore, the data indicate the need for targeted pedagogical interventions that consider this diversity of levels and promote integrated teaching strategies aimed at improving the overall performance of the students.

This behavior can be interpreted from the reflections of Onuchic and Allevato (2011), who advocate problem-solving as a process that requires understanding, planning, and reflection, and not just the mechanical application of procedures. When the student ignores the reading and interpretation stage, they reduce mathematical activity to an operational exercise, emptying its formative potential.

The data collection instruments were applied to a 6th-grade class of 28 students. For analytical purposes, 10 students were selected, 5 with higher reading performance and 5 with lower performance. The results indicated that students with higher reading proficiency performed better on the proposed activities, while those with difficulties demonstrated limitations in both reading and solving mathematical problems.

These data highlight the need for pedagogical interventions focused on developing reading and interpretive skills, since these abilities directly impact the understanding of mathematical statements and the development of problem-solving strategies. In this perspective, Vygotsky (1998) contributes by stating that language plays a fundamental role in the organization of thought, mediating higher cognitive processes. Thus, strengthening language also implies enhancing mathematical learning.

The pedagogical interventions carried out throughout the research—such as collective reading of problems, oral discussion of the statements, highlighting of keywords, and analysis of mathematical vocabulary—showed a positive impact on student participation and the quality of their solutions. More time was spent understanding the text before calculations, and there was an increase in the exchange of strategies among students. These practices favored the construction of meaning and reduced interpretation errors.

This result aligns with Freire's (1996) perspective, which argues that reading the world precedes reading the word, indicating that comprehension is not limited to decoding, but involves critical interpretation and meaning-making. By promoting dialogical and reflective practices, the teacher enables the student to understand the problem before solving it, making learning more meaningful.

Another relevant result relates to the different forms of representation. When the problems were accompanied by tables, diagrams, or graphs, some students demonstrated greater comprehension, while others revealed difficulty in articulating these representations with the verbal text. This confirms that mathematical learning involves the coordination between different languages, as Dante (2010) and Fonseca (2013) point out, highlighting that mathematics teaching should include multiple forms of representation to favor the construction of meaning.

The discussion of the results therefore indicates that reading comprehension skills serve as a foundation for learning mathematics with understanding. The data corroborate the literature by showing that reading a problem involves interpreting, inferring, selecting information, and assigning

meaning to the language used. Thus, school mathematics requires guided reading practices, teacher mediation, and integration between language and content.

Thus, the results of this research point to the need for interdisciplinary pedagogical practices that value reading in mathematics classes, not as an accessory activity, but as a constitutive part of the learning process. In this context, reading ceases to be merely a support and becomes a structuring element of mathematical thinking, contributing to the improvement of student learning in a holistic way.

CONCLUSION

The analysis of reading comprehension as a determining factor in mathematical performance reveals that students' difficulties in this area cannot be attributed solely to limitations in logical reasoning or procedural skills. The results show that reading plays a central role in problem-solving, as it is through reading that students understand the problem statement, select relevant information, and develop response strategies.

It has been observed that many errors considered mathematical actually originate from misinterpretations, such as difficulties in understanding terms, identifying what is essential in the problem, and relating the presented data. This reveals that learning mathematics also requires knowing how to read, interpret, and attribute meaning to information, reinforcing the presence and importance of language as a structuring element of this process.

The research also shows that pedagogical practices that link reading and mathematics—such as guided analysis of statements, work with specific vocabulary, and group discussion—contribute to more meaningful learning. When students understand what they read, they become more engaged, participate with greater confidence, and expand their problem-solving possibilities.

In this context, it becomes essential to rethink teaching, methodologies, and practices, recognizing that reading should be present in all areas of knowledge. Promoting reading competence is not just a task for the Portuguese Language department, but a commitment of the entire school, especially when seeking to reduce learning inequalities.

Furthermore, it is necessary to invest in more reflective teaching practices that consider language as an essential part of mathematics education. Teaching is not limited to the transmission of content, but involves creating conditions for the student to understand, question, and construct meaning.

In short, reading comprehension is an indispensable condition for meaningful mathematical learning. Strengthening this relationship through integrated and intentional practices—that is, working in an interdisciplinary way—is an important path to improving student performance and making learning more accessible, critical, and effective.

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