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Skills in Reading and Mathematics: Perceptions of Teachers about the Possible Impacts of Remote Teaching on Students of the Elementary School, from a Neuropsychopedagogical Perspective

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Abstract

This study analyzed impacts caused by the emergency implementation of distance education, during the COVID 19 Pandemic, through the perceptions of 6th grade teachers in public schools located in Baixada Fluminense, State of Rio de Janeiro. Teachers participated, among the subjects of Portuguese Language and Mathematics, through Google Forms, which made it possible to collect data from those who are on the front line, working directly with our students. Our data proved that the pedagogical losses that occurred during the implementation period of remote teaching are significant. Therefore, we point out paths that are already yielding excellent results through evidence shown in schools, in loco, with the inclusion of Neuropsychopedagogy protocols, the science of learning. The notes and study shown here about the impacts of remote teaching on the learning of our students in basic skills in the curricular components of reading and Mathematics, suggest a great need to intensify studies on the subject and propose a dialogue with the theoretical and methodological contributions of Neuropsychopedagogy.

Keywords: COVID-19, Pandemic, learning difficulties, neuropsychopedagogy, teacher perception

1. Introduction

On March 11, 2020, COVID-19 was characterized by the WHO as a pandemic. The term “pandemic” refers to the geographic distribution of a disease and not its severity. The designation recognized that, at that time, there were outbreaks of COVID-19 in several countries and regions of the world (PAHO, 2020).

Consequently, on March 13, 2020, as of Decree nº 46.970/2020, the main newspapers in the State of Rio de Janeiro already announced the beginning of the quarantine in the state and municipalities. At first, it was deduced that it would be for 15 days, with a forecast of extension for just another 15 days. However, the deadline was extended and the quarantine became a process of social isolation. In addition, many challenges for education were established, the school routine abruptly transitioned from face-to-face, relational, to a model called emergency remote teaching, strange to the subjects who experience the school environment.

The Government of the State of Rio de Janeiro established a partnership with Google and classes began to be taught on the Google Meet platform. However, not unlike other Brazilian realities, there were many difficulties faced by students, such as: access/internet; responsible, absent, demanded the performance of domestic tasks; need to work outside; home has become a bad environment for learning; lack of support to follow the online curriculum or its transmission; loss of family and/or friends; grief; economic crisis. (Castaman & Rodrigues, 2020).

Since the adoption of the remote emergency regime, inequality and exclusion have profoundly increased, due to the inaccessibility of students and even teachers to the internet. Therefore, it can be considered that the tensions that permeate the Brazilian educational scenario have increased and intensified during the pandemic context. (Stevanim, 2020).

As proposed by the National Common Curricular Base – BNCC (Brazil, 2018), in the final years of Elementary School, students are faced with more complex challenges, mainly due to the need to appropriate the different logics of organization of knowledge related to areas of study. knowledge. Bearing in mind this appropriation of new knowledge, it is important, in the various curricular components, to resume and re-signify the learning of Elementary School – Early Years in the

context of the different areas, aiming at deepening and expanding the students' repertoires.

In addition to the usual challenges, when we are faced with the transition series such as the 6th year, some situations are accentuated, among them we can mention: change of school, network (often from the Municipal to the State System), a greater number of specialist teachers, increase in curricular components, new class dynamics and school life.

Students in this phase are part of an age group that corresponds to the transition between childhood and adolescence, marked by intense changes resulting from biological, psychological, social and emotional transformations. During this period of life, as well pointed out in Opinion CNE/CEB nº 11/2010, social ties and affective ties, intellectual possibilities and the capacity for more abstract reasoning are expanded. Students become more capable of seeing and evaluating facts from the other's point of view, exercising the ability to decentralize, which is important in building autonomy and in acquiring moral and ethical values. (Brazil, 2010).

However, given the entire context of the pandemic, according to research carried out by the Carlos Chagas Foundation (FCC, 2020), which investigated a sample of 14,285 basic education teachers about the remote teaching scenario, in which teachers pointed to significant losses of learning during the years of isolation and, it is inferred that, our students reach the sixth year with new mitigating factors that were previously considered challenging, now, in the so-called post-pandemic period, it is necessary to wake up to this pedagogical emergency.

What we have is an alarming number of school dropouts, resulting from inequality and exclusion. With the arrival of the pandemic, in November 2020, more than 5 million girls and boys aged 6 to 7 did not have access to Education in Brazil, therefore, our country runs the risk of regressing more than two decades in pedagogical aspects. Thus, Brazil needs to think about new educational alternatives, strategies and dynamics, collectively and systematically, with the effective participation of evidence-based educational public policies. (UNICEF, 2021)

Dezutter, Verschueren, & Wouters (2020) highlight the importance of mediation in learning. According to the authors, dialogue and social interaction are essential for the construction of knowledge and for the formation of cognitive skills. They emphasize that mediation must be social, in which relationships, meanings and activities develop, with which consciousnesses interact. Therefore, involving two brains: student and teacher ?

According to Reis et al. (2022), Quines, Ferreira& Souza (2021) it is important for teachers to understand the process of neuronal plasticity, which is the brain's ability to adapt and modify its structure and function in response to environmental stimuli. Thus, the teacher-student interaction can directly influence the organization and reorganization of neuronal connections, favoring or harming the learning process.

Authors such as Russo et al (2020) state that the teacher's knowledge of the functioning of the nervous system in relation to learning must be associated with knowledge of evidence-based intervention strategies, in order to provide an inclusive environment that values the multiple processes perceptive and that establishes learning possibilities for all individuals. According to Costa et al. (2021), it is essential that the educator understands the complexity of learning and how it is related to different aspects of human development, such as cognitive, social, emotional and biological. Thus, it is necessary that the teacher has knowledge in areas such as Psychology, Neuroscience and Learning Theories, so that he can create an educational environment that takes into account the integrality of the student and its multiple dimensions.

According to Ribeiro e Bertagna (2020), it is essential that teachers understand their role as mediators in the learning process, given that social interaction and coexistence with peers are essential elements for students' cognitive and socio-emotional development. In addition, the authors highlight the importance of knowledge about learning theories and pedagogical approaches that take into account the integrality of the student as a biopsychosocial being. Therefore, we listed the following question as a problem of this research: What are the possible impacts of remote teaching on the development of reading, writing and math skills in students entering the 6th year of elementary school, in the perception of their teachers?

2. Materials and Methods

2.1 Study Typology

This study used the context assessment methodology, which is a fundamental form of assessment. Its aim is to define the relevant environment, describe the current and ideal conditions in relation to that environment, identify unmet gaps and therefore diagnose problems which provide the essential basis for developing objectives to solve these problems. The achievement of these objectives should contribute to improving the evaluated environment.

2.2 Universe of the Study

This study had the participation of teachers who teach the curricular components of Portuguese Language and Mathematics in basic education. To be included in the study, teachers had to be working in final year classes, specifically in the 6th year, during the period of social isolation and in the process of returning to face-to-face classes. A total of 22

(twenty-two) teachers answered the questionnaires, 16 (sixteen) of Portuguese and 6 (six) of Mathematics.

Participants are all residents of the State of Rio de Janeiro and work in public schools located in specific municipalities, such as Nova Iguaçu, Belford Roxo, Duque de Caxias, Nilópolis and Mesquita. Statistical analysis of the collected data did not offer risks to the participants in relation to their professional activities or the institutions to which they are linked. It is important to point out that more than 60% of the professors interviewed have a postgraduate degree and are public servants.

All research participants were informed about the nature of the study and about the collective treatment of the collected data, guaranteeing the anonymity of the respondents. Furthermore, it is important to highlight that, due to the nature of the disciplines under analysis, the analysis was carried out separately for the groups of Portuguese Language and Mathematics teachers, in order to allow a more precise analysis of the results.

2.3 Assessment Procedures

To make the research viable, the participating teachers were invited to respond to an instrument consisting of an electronic form. The questionnaire contained sessions with questions on the Likert scale (1932), which is a psychometric technique that, according to Mcclelland (1976), allows researchers to investigate the frequencies of responses and the degrees of agreement or disagreement of the participants in relation to the object of study.

Before starting the questionnaire, teachers received a term of free clarification and consent. The questionnaire contained mandatory and non-mandatory questions, aiming to maintain the reliability of the research and guarantee the anonymity of the participants. The questions addressed the teachers' perceptions about the process of resuming face-to-face classes and possible losses or learning difficulties resulting from the period of social isolation.

In addition, the questionnaire included research instruments to investigate signs of learning difficulties used in the neuropsychopedagogical survey. These instruments were the Neuropsychopedagogical Screening Scale for Schoolchildren's Working Memory (Padilha & Cardoso, 2023) and the Neuropsychopedagogical Study on Essential Skills for Mathematics Learning in Primary School Children (Cardoso, Moraes and Lopes, 2023).

2.4 Results Analysis

Descriptive Statistics was used to analyze the results through absolute and relative frequency distributions. The use of Descriptive Statistics tools took place through the construction of frequency distributions, for the description of the variables contained in the referred scales in relation to the perceptions of the Portuguese Language and Mathematics teachers. Such distributions were represented graphically in tables.

3. Results and Discussion

Observing Table 1, it is noted that the research participants are regent and active teachers in the classroom, all teaching in public schools in the municipalities of Nova Iguaçu, Belford Roxo, Duque de Caxias, Nilópolis and Mesquita, an urban area in their entirety. Among these, the predominance of age of teachers was 36 to 45 years old and with experience of 11 to 20 years of teaching in the majority. It should be noted that the age group of the Portuguese Language teachers shows that half of the teachers are between 36 and 45 years old. Regarding the age of mathematics teachers, there is a predominance of teachers aged between 26 and 45 years.

Table 1. Profile of teachers: Age range

Age group	Absolute frequency (n)		Relative frequency (%)	
	Portuguese Language	Mathematics	Portuguese Language	Mathematics
26-35 years	1	0	6,25	0,00
36-45 years	8	5	50,00	83,33
46-55 years	5	1	31,25	16,67
56-60 years	2	0	12,50	0,00
Total	16	6	100,00	100,00

Table 2. Profile of professors: Length of experience

Years of experience	Absolute frequency (n)		Relative frequency (%)	
	Portuguese Language	Mathematics	Portuguese Language	Mathematics
6-10 years	2	2	12,50	33,33
11 a 20 years	7	4	43,75	66,67
21 a 30 years	6	0	37,50	0,00
31 and above	1	0	6,25	0,00
Total	16	6	100.00	100,00

Table 2 shows the working time of Portuguese Language teachers, most have at least 10 years of teaching, which denotes a lot of experience for the records. It can be seen that all Mathematics teachers have up to 20 years of teaching. Which expresses a certain inferior experience, compared to Portuguese language teachers.

Table 3. Profile of professors: Academic background

Education level	Absolute frequency (n)		Relative frequency (%)	
	Portuguese Language	Mathematics	Portuguese Language	Mathematics
Graduation	3	3	18,75	50,00
Lato Sensu Specialization	11	3	68,75	50,00
Master's degree	3	0	18,75	0,00
Doctorate degree	3	0	18,75	0,00
Total	16	6	100,00	100,00

From the table it is possible to perceive the data on the academic training of Portuguese language teachers. It is relevant to note that most of them obtained at least a specialization or postgraduate degree. Thus, the concern with continuing education is pointed out. As for the Mathematics curriculum component teachers, there are no notes about Stricto-senso training. Predominating specialization in the public.

There are several difficulties in basic skills signaled by teachers in the Reading category, but we can highlight the most prevalent ones, which are slowness in reading and the ability to tell a story better than they can write it, both presented by 68.8% of students, according to the teachers who participated in the study. The next difficulty refers to reading comprehension and appears in 62.5%, followed by handwriting problems in 56.3%. The difficulty of finding the right word to name things and memorizing lists or sequences, such as multiplication tables, months of the year and days of the week, were noticed by 50% of the students. The other difficulties demonstrated by the students are below 50%, as we can see in Table 4 below.

Table 4. Basic skills flagged as items of greater difficulty in the Reading category

Items	Relative frequency (%))
Slowness in Reading	68,8
Ability to tell a story better than writing it	68,8
Difficulty in reading comprehensionDifficulty in reading comprehension	62,5
Handwriting problems	56,3
Difficulty finding the right word to name things and memorizing lists or sequences such as multiplication tables, months of the year and days of the week	50
Letter Exchange	43,8
“Invention”, “guessing” or “guessing” of words	43,8
Difficulty putting ideas down on paper	43,8
Simple texts lacking in ideas and details	37,5

In the same way, teachers of the Mathematics curricular component, signaled the basic skills not yet consolidated by teachers due to remote teaching. Fact ratified through this research.

The basic skills signaled by the teachers as items of greater difficulty in mathematics are diverse, but we highlight here

the most prevalent one, which was the difficulty in solving addition in the group, where 80% of the students accounted for. Then there are 7 more items presented at 60% and the others are below 50% of all students who participated in the survey. What can we see in

Table 5. Basic skills flagged as items of greater difficulty in Mathematics

Items	Relative frequency (%))
A lot of difficulty or not performing exercises involving bimonthly, quarterly and semester	80,0
Solving questions involving logic	60,0
Difficulty identifying odd and even numbers	60,0
Difficulties naming spatial and flat geometric figures and solving exercises involving them	60,0
Execution of multiplication with difficulties	60,0
Non-execution of exercises involving week and month	60,0
Introduce mathematical ideas of quantity: more/less, equal and total	60,0
Difficulties solving subtraction with 3-digit regrouping	60,0
Not performing division with equal parts	40,0
Length measurement unit domain (centimeter and meter)	40,0
calculator use	20,0
Interpretation of graphs, execution of tables and column graphs, transfer of data from tables, bar graphs or column graphs to solve problems	20,0
Difficulties in solving addition without grouping	20,0
A lot of difficulty or not performing exercises involving bimonthly, quarterly and semester	20,0
Solving questions involving logic	20,0
Difficulty identifying odd and even numbers	20,0
Difficulties naming spatial and flat geometric figures and solving exercises involving them	80,0

Regarding the scenario of resuming face-to-face teaching, 56.3% of Portuguese Language teachers believe that the remote teaching model and social isolation have generated stressors for students, which made them alternate in different ways. abrupt difference between engagement and apathy (highs and lows) in relation to the subject(s) they teach and 87.5% realized that the remote teaching period and the various social tensions contributed to the teaching process and students' learning.

A priori, the data from this research dialogue with other studies that investigate the perceptions of teachers about the educational scenario during emergency remote teaching. Thus, surveys such as the one carried out by Loureiro and Cardoso (2022) indicate that 44.27% of basic education teachers partially state that the remote teaching context made it impossible or impossible to identify students' learning difficulties, while 29.68% indicate total agreement on the problem.

In view of the results presented here, regarding the possible impacts of the practice of remote teaching, it leads us to reflect on the needs of new methodologies, as well as to advance and methodologically contextualize the practice in the classroom.

Possibly the insertion of active methodologies, as a pedagogical resource through gamification, will certainly be the alternative that will enable significant advances. This does not mean that resources such as a whiteboard and pen have become obsolete or unnecessary for teaching. However, reflection on practices that dialogue with the current generation of learners is necessary (Silva, Sales and Castro, 2019; Costa et al, 2020).

According to Moran (2015), methodologies need to follow the intended objectives. That is, teachers need to dare with resources, strategies and diversified methodologies with a single purpose: intentionally encouraging students to participate in classes in an assertive and productive way.

According to Bergmann & Sams (2016), the classroom should seek an active learning methodology in which students recognize the competence of their own knowledge. That is, through the game, the exercise of rules, routine, sense of team, self-esteem as a team member, the student will learn in an active and participative way, appropriating the school space. Therefore, it is not appropriate here not to mention the Executive Functions. These are responsible for the capacity for self-regulation or self-management, and their development represents an important adaptive milestone in the human species (Fuentes, Malloy-Diniz, Camargo & Cozensa, 2008).

In this aspect, the performance of the Neuropsychopedagogue becomes essential, with its expertise, it will support the entire school community, because through its multidisciplinary action it will carry out early interventions of institutional and clinical conditions that will possibly trigger support to mitigate and even solve the issue of learning difficulties.

4. Final Considerations

The present research aimed to analyze the possible delay of students in the 6th year of Elementary School in the curricular components of Portuguese Language and Mathematics, due to the period of remote teaching during social isolation. The results indicated that the students showed impairments in basic skills for the development of skills in reading and mathematics, as pointed out by the teachers participating in the research. It is important to point out that the lack of interventions aimed at minimizing the impacts of remote education can increase the risks of lag in subsequent grades, in secondary education and, consequently, in access to higher education and future jobs.

From this analysis, the need for methodological change and renewal in institutions is highlighted, as well as the implementation of public policies that significantly meet the real needs of the school during the pandemic period. In addition, it is suggested that Neuropsychopedagogy can be an alternative to mitigate the damage caused by remote teaching, considering its transdisciplinary and scientific character by proposing a dialogue between the knowledge of neurosciences applied to education, psychology with a cognitive approach and learning theories . In this way, it is possible to propose evidence-based practices that enhance the learning of students with or without learning difficulties.

In this sense, it is important to highlight that the use of Neuropsychopedagogy in education is a consolidated practice with satisfactory results. Several studies point to the effectiveness of this approach in developing cognitive skills and promoting meaningful learning. Therefore, given the current situation, it is essential that pedagogical practices are adopted that include Neuropsychopedagogy, in order to minimize the damage caused by remote teaching and contribute to quality education.

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