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Teachers' Perceptions of Augmentative and Alternative Communication During the Pandemic in Rio Grande do Norte

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Abstract
Introduction. Grounded in Vygotsky's (1998) cultural-historical theory and linked to the principles of Augmentative and Alternative Communication in the field of Special Education, this study presents the perceptions of teachers who supported students with Complex Communication Needs in the early years of elementary school regarding the use of Augmentative and Alternative Communication during the COVID-19 pandemic in Rio Grande do Norte. **Methodology.** This is a descriptive qualitative study, involving semi-structured interviews conducted individually with 14 teachers. The data were categorized into: a) Teachers' training and knowledge regarding Augmentative and Alternative Communication; and b) Use of Augmentative and Alternative Communication and technological resources during the pandemic, following a content analysis. **Results and discussion.** The analysis revealed training gaps, difficulties, and inequalities in technological access among teachers and students, as well as the reliance on family support for interactions during this period, indicating the need for continuing education policies, equitable infrastructure, and collaborative practices to ensure inclusion.

Keywords
Augmentative and Alternative Communication; Complex Communication Needs; teachers; pandemic.

Percepções docentes sobre a Comunicação Aumentativa e Alternativa na pandemia no Rio Grande do Norte

Resumo
Introdução. Fundamentado na teoria cultural-histórico de Vygotsky (1998) com a articulação aos princípios da Comunicação Aumentativa e Alternativa no campo da Educação Especial, este estudo apresenta as percepções de docentes que apoiaram estudantes com Necessidades Complexas de Comunicação nos Anos Iniciais do Ensino Fundamental sobre o uso da Comunicação Aumentativa e Alternativa durante a pandemia da Covid-19 no Rio Grande do Norte. **Metodologia.** Trata-se de uma pesquisa qualitativa descritiva, com entrevistas semiestruturadas realizadas individualmente com 14 professores. Os dados foram categorizados em: a) Formação e conhecimentos sobre Comunicação Aumentativa e Alternativa pelos professores; e b) Uso da Comunicação Aumentativa e Alternativa e recursos tecnológicos na pandemia após uma análise de conteúdo. **Resultados e discussão.** A análise apontou lacunas formativas, dificuldades e desigualdades de acesso tecnológico por parte de professores e alunos, além da

dependência da família nas interações durante esse período, indicando a necessidade de políticas de formação continuada, infraestrutura equitativa e práticas colaborativas efetivando a inclusão.

Palavras-chave
Comunicação Aumentativa e Alternativa; Necessidades Complexas de Comunicação; professores; pandemia.

Percepciones docentes sobre la Comunicación Aumentativa y Alternativa en la pandemia en Rio Grande do Norte

Resumen
Introducción. Basado en la teoría cultural-histórica de Vygotsky (1998) con la articulación a los principios de la Comunicación Aumentativa y Alternativa en el campo de la Educación Especial, este estudio presenta las percepciones de docentes que apoyaron estudiantes con Necesidades Complejas de Comunicación en los Años Iniciales de la Enseñanza Primaria sobre el uso de la Comunicación Aumentativa y Alternativa durante la pandemia del Covid-19 en Rio Grande do Norte. **Metodología.** Se trata de una investigación cualitativa descriptiva, con entrevistas semiestructuradas realizadas individualmente con 14 profesores. Los datos fueron categorizados en: a) Formación y conocimiento sobre Comunicación Aumentativa y Alternativa por parte de los profesores; y b) Uso de la Comunicación Aumentativa y Alternativa y recursos tecnológicos en la pandemia después de un análisis de contenido. **Resultados y discusión.** El análisis señaló lagunas formativas, dificultades y desigualdades de acceso tecnológico por parte de profesores y alumnos, además de la dependencia de la familia en las interacciones durante este período, indicando la necesidad de políticas de formación continua, infraestructura equitativa y prácticas colaborativas que hagan efectiva la inclusión.

Palabras clave
Comunicación Aumentativa y Alternativa; Necesidades Complejas de Comunicación; profesores; pandemia.

1 Introduction

This study is derived from a section of the first author's master's thesis, titled *Augmentative and Alternative Communication Systems Used by Children with Special Educational Needs in the State of Rio Grande do Norte, Brazil* (Tomaz, 2023), conducted at the University of Minho, in Portugal, focusing on the use of Augmentative and Alternative Communication (AAC) during the COVID-19 health crisis.

The Covid-19 pandemic, caused by the SARS-CoV-2 virus, which reached global proportions, forced governments to implement emergency and restrictive measures aimed

at containing the spread of the disease. In the educational sphere, schools were closed and in-person classes were suspended for several months.

[1]In this challenging scenario, remote or non-face-to-face education, implemented on an emergency basis, emerged as an alternative to ensure the continuity of educational practices following the suspension of in-person classes (Machado, 2020). Consequently, teachers and students were forced to adapt to the new reality, seeking alternative teaching methods and strategies to ensure the necessary support for students and their families, as well as implementing a communication system tailored to each student to monitor their learning, as recommended by the Organisation for Economic Cooperation and Development (OECD, 2020).

Among the most vulnerable groups are individuals with Complex Communication Needs (CCN), who were severely affected during the pandemic. “CCNs stem from developmental disorders or acquired conditions that impact speech and communication” (Bonotto *et al.,* 2020, p. 1731). These individuals may require assistance to communicate, as their skills are limited in meeting communicative demands, according to Manzini, Pelosi, and Martinez (2019).

The possibilities for teaching and learning through distance education were very limited for this population, with consequences for cognitive, affective, and psychosocial development (Tomaz, 2023). Among the challenges of distance learning for students with NCC, there are few studies and guidelines on education and communication with these students, especially regarding the use of AAC. Consequently, it has become difficult for teachers and families to monitor students’ progress (Bonotto *et al*., 2020).

AAC consists of a set of symbols, resources, techniques, strategies, aids, and technologies designed to facilitate communication for individuals who are non-verbal or have limited speech, or who have difficulties with functional reading or writing (Sapage; Cruz-Santos; Fernandes, 2018). AAC is a specific area of Assistive Technology (AT) and can benefit individuals with NCC by expanding their communication skills (Borges; Lourenço, 2023).

[1] Or remote learning, which is defined as a form of instruction or class that involves geographical separation between teachers and students at different educational levels (Moreira & Schlemmer, 2020).

To this end, individuals with NCC who use AAC resources may require support from others in the communication process, namely communication partners/interlocutors, who interpret what users wish to communicate, promote meaningful and adapted interactions, and foster the development of communication skills (Manzini; Pelosi; Martinez, 2019). According to Vygotsky (1998), learning occurs through the mediation of cultural instruments and signs. In this sense, AAC resources can be understood as mediating tools that expand the Zone of Proximal Development (ZPD) of their users, broadening and facilitating their communicative and social skills with the support of peers, family members, and teachers. Thus, the use of AAC constitutes essential symbolic mediation tools for the inclusion of people with NCC.

However, during the pandemic, limitations in teaching were observed regarding the needs of students with NCC, due to absent or insufficient initial and continuing training (Hoepers; Vanzuita; Martins, 2024; Tomaz, 2023). Furthermore, innovative strategies using technological aids, the implementation of quick solutions, curricular adaptations, and the assurance of communication and learning opportunities became central demands, especially for students with NCC. In light of this, teachers have had distinct pedagogical experiences, based on creativity and resilience, accentuated by communication difficulties and the lack of adequate strategies and technological resources (Tomaz; Cruz-Santos, 2023).

Given this context, the study was guided by the following questions: What were the perceptions of teachers who taught students with special educational needs in the early years of elementary school in the state of Rio Grande do Norte regarding AAC during the COVID-19 pandemic? What knowledge do teachers have regarding AAC? How was AAC and technology used during the pandemic by teachers and students with special educational needs? Based on these questions, this article seeks to present the perceptions of teachers who supported students with NCC in the early years of elementary school regarding the use of AAC during the Covid-19 pandemic in the state of Rio Grande do Norte. To interpret these perceptions, we adopted the ’s understanding of AAC as a mediated and situated practice: not merely as a “resource,” but as symbolic and pedagogical mediation that depends on communication partners, training, and institutional conditions to materialize in everyday school life (Borges & Lourenço, 2023;

Manzini, Pelosi, & Martinez, 2019; Vygotsky, 1998). Thus, the data are discussed by linking empirical evidence and the literature, in order to clarify how the pandemic has reshaped teachers' pedagogical practices, implementation conditions, and inequalities of access that affect communication and learning.

2 Methodology

This study followed the ethical procedures approved on September 16, 2022, by the National Research Ethics Commission, under Opinion No. 5,634,011, based on the standards defined by Resolution No. 466, dated December 12, 2012, of the National Health Council (CNS) of the Ministry of Health (MS), which guides research involving human subjects in Brazil.

Thus, a descriptive qualitative approach was adopted. In the qualitative approach, behaviors and situations are investigated, as it focuses on the different meanings of human relationships, based on different opinions, through the interaction between the researcher and the research subjects (Stake, 2011). In the descriptive methodology, results are analyzed in light of their importance within a specific context, where details are studied but cannot be generalized, according to Bell (2016).

Participants were recruited through a broad invitation directed at teachers who taught in the early years of elementary school in Rio Grande do Norte during 2020 and 2021, disseminated via social media, WhatsApp, and *email*. The invitation consisted of a text introducing the authors, followed by the study's theme, objectives, relevance, participation guidelines, and assurances of confidentiality and anonymity, with the approval of the Rio Grande do Norte State Department of Education. Subsequently, individual contact was made with the teachers who volunteered to participate, in order to verify that they met the following criteria: a) that they taught in the state of Rio Grande do Norte in 2020 and 2021; b) who supported students with NCC in 2020 and 2021; and c) whose students were enrolled in the first five years of elementary school. Based on the initial screening of teachers, those who assisted students with communication difficulties were identified to compose the study sample.

Thus, 14 teachers aged between 25 and 45 years old, as described in Table 1, participated in this study.

Table 1 – Profile of participating teachers

(continued)

Participant	Education	Current position	Scope of work	Support for students aged 6 to 10
Camila	Education	Regular classroom teacher	Public school	Cerebral palsy
Margarida	Education and Specialization in Early Childhood Education	Multigrade classroom teacher	Public school	Intellectual disability/Dyslexia
Marta	Education, specialization in Portuguese Language, and Master's degree in Mathematics	Special Education Teacher	Educational Support Center for People with Visual Impairments – (CAP-RN)	Visual Impairment/Low Vision/Intellectual Disability/Autism
Camila	Education and Specialization in Early Childhood Education	Regular classroom teacher	Public school	Nonverbal autism
Rosa	Education	Regular classroom teacher	Public school, rural area	Intellectual disability
Bia	Education	Multi-grade classroom teacher	Public school	Dyslexia/Autism
Maria	Education, undergraduate student in Psychology, and specialization in Educational Psychology and Neuropsychology	Regular classroom teacher	Private school	Nonverbal autism/Hearing impairment/Down syndrome/Cerebral palsy
Paulo	Education and Specialization in Educational Psychology	Institutional Educational Psychologist	Private school	Autism/Down Syndrome/Physical Disabilities
Ana	Education and Specialization in School Administration	Regular classroom teacher	Public school, rural area	Intellectual disability
Glória	Education and Specialization in Literacy and Early Childhood Education	Regular classroom teacher	Charitable school	Autism/Intellectual disability/Cerebral palsy
Laura	Education and Business Administration	Regular classroom teacher and educational support	Public school	Down syndrome

Table 1 – Profile of participating teachers

(conclusion)

Participant	Education	Current position	Scope of work	Support for students aged 6 to 10
João	Education and Specialization in Specialized Educational Services and Inclusive Education	Special Education Teacher	Public school	Down Syndrome/Dyslexia/Intellectual Disability
Patrícia	Education	Regular classroom teacher	Private school	Autism
Ester	Education and Specialist in Psychopedagogy, Neuroscience, and Literacy	Educational Coordinator	Private school	Motor disability/Autism

Source: Prepared by the authors (2025).

The semi-structured interview was adopted as the data collection instrument, which was developed by the authors themselves. The interview script consisted of 18 questions, organized into thematic blocks: Thematic Block I — Sociodemographic Characteristics; and Thematic Block II — Identification and Description of AAC in the Context of the COVID-19 Pandemic.

The interviews were conducted individually with the first author via videoconference using the Google Meet platform, lasting between 40 minutes and one and a half hours each, at predetermined times and locations. All interviews were recorded using an audio recording application after obtaining the participants' authorization. The Informed Consent Form (ICF) in a virtual format was made available to all interviewees and explained at the beginning of each interview.

Content analysis was employed to process the collected data, aiming to systematically describe the content derived from speech and texts using indicators (quantitative or otherwise) that allow for the inference of knowledge regarding the production/reception (inferred variables) of these messages (Bardin, 2016). After transcribing the interviews, a preliminary analysis framework was created to systematize the material and subsequently categorize the indicators, grouped by context and theme in accordance with the research objectives and discussed in light of the literature. The organization and presentation of the transcripts of the participants' statements are

arranged in a descriptive manner. To re ly respect the participants' identity and confidentiality, fictitious names were used to identify the subjects.

3 Results and Discussion

This section is dedicated to discussing and cross-referencing participants' responses, organized into thematic areas and sub-areas. In this regard, we highlight the convergent aspects and significant discrepancies between the findings collected for comparison with the reviewed literature. Thus, the following thematic areas will be used to discuss the findings: 1) Teachers' training and knowledge of AAC; and 2) Use of AAC and technological resources during the pandemic.

3.1 Teachers' training and knowledge regarding AAC

Regarding the concept of AAC, various responses were found: a model for Inclusive Education; a differentiated strategy to serve individuals with SEN; making speech accessible; non-standard forms of communication; communication strategies; resources that enhance communication with the student; a set of tools that accommodate various means of communication to facilitate learning, as well as a method that supports the communication process through speech and writing, characterized as communication supported by *the Picture Exchange Communication System* (PECS) and unsupported by the use of gestures and body language.

In general, the responses revealed aspects consistent with the definition of the AAC System (Pullin *et al*., 2017; Sapage; Cruz-Santos; Fernandes, 2018; Schirmer; Nunes, 2020; Tomaz; Cruz-Santos, 2023); however, a recurring tension was observed: (a) recognizing AAC as a "strategy" or "resource"; and (b) mastering its use as a planned pedagogical practice, with functional vocabulary and communicative intent. This tension is relevant because, when AAC is understood solely as an "alternative to speech," there is a risk of reducing it to a one-off school tool, rather th ly to the expansion of participation and learning (Borges; Lourenço, 2023; Schirmer; Nunes, 2020).

It was observed that all participants stated they had limited knowledge of the concept of AAC, as evidenced by the statements of participants Patrícia (regular

classroom teacher, private school [PSR, priv. sch.]) and João (Special Education Teacher, public school [PEE, pub. sch. public school]): *"Well, I don't really know much about* that" and *"I heard something about this topic at a lecture, but it was very superficial, so my knowledge is minimal*." Four interviewees stated that the topic was completely unfamiliar to them, as reported by teacher Maria (PSR, priv. sch.): *"I had never heard anything about this topic. I heard about it for the first time from you, and I was actually going to ask about* [the concept]." These accounts indicate that the barrier is not only informational but structural: the lack of initial and continuing training tends to create an "operational gap," in which the teacher recognizes the relevance of AAC but lacks the criteria to decide which resources to select, how to organize the communicative environment, and how to maintain meaningful interactions.

However, they still offered insights through hypotheses regarding the term "AAC," as seen in the statement by Teacher Camila (regular classroom teacher, public school [PSR, public school]): *"I think they would be non-standard forms of communication that can expand communication—that's what comes to mind*." Thus, regarding the definition, the interviewees considered AAC as a facilitator in the communicative process, although some teachers admitted not knowing in which situations to use this system with the student.

With regard to training, all teachers reported that they had never participated in a specific AAC training program during their initial teacher training. This is particularly concerning, considering that the 7th Brazilian Congress on Alternative Communication—*International Society for Augmentative and Alternative Communication* (ISAAC-Brazil)—was held in Natal, Rio Grande do Norte, in 2017, suggesting low participation by teachers in training initiatives even when such opportunities are available in the academic setting.

Nine interviewees (five of whom belonged to the public school system) stated that the topic of AAC was covered only briefly in short-term courses and in on -continuing education programs that covered various topics in Special Education or focused on other assistive technology resources, such as Braille. According to Professor João (PEE, public school), training took place upon joining the Special Education faculty, but the volume of information made it difficult to fully grasp AAC.

According to Silva and Carvalho (2017), there is still a lack of training on inclusion and methods for working with students with SEN, whether in initial or continuing education. From this perspective, few higher education institutions offer, in their curricula, specific courses that address topics related to Special Education and, notably, AT and AAC (Schirmer *et al.*, 2011 *cited in* Schirmer; Nunes, 2020). From the perspective of training policies, this points to the need for institutionalized strategies (with course hours, monitoring, and pedagogical applicability of AAC, and not just one-off training initiatives).

Although the participants had initial training in Education, all emphasized the importance of more diverse training on AAC, whether in initial or continuing education. This observation is evident in the statement by participant Rosa (regular classroom teacher, public school, rural area [PSR, public school, rural area]): *"I think all knowledge is welcome. It is very important to know teaching and communication strategies to help the student in some* way" and from participant Camila (PSR, public school): *"In my view, having training on different ways to communicate is very important, because that way I will be able to convey the content to my student in the best possible way*." In addition, all interviewees expressed interest in participating in specific training activities on AAC, as they realized that their existing knowledge and training were insufficient to meet the demands and challenges of supporting children with communication needs.

According to Schirmer and Nunes (2017), to ensure that students with SEN and communication difficulties have access to knowledge, physical space, interactions, and communication, it is essential that teachers, communication partners, and role models have knowledge of assistive technology (AT) and, especially, AAC. This knowledge requires teachers to reflect on their own practice and share their experiences with other professionals in order to develop collaborative work that fosters communication-rich interactions.

As for motivation, the participants Ester (educational coordinator, private school [CP, private school]), Camila (PSR, public school), Rosa (PSR, public school, ZR), Bia (multi-grade classroom teacher, public school [PSM, public school]), and Maria (PSR, private school) stated that they sought training in AAC on their own initiative, whether out of curiosity or due to the need to intervene with a student. However, teachers Paulo (institutional educational psychologist, private school [PI, private school]), Ana (PSR,

public school, ZR), and Glória (regular classroom teacher, philanthropic school [PSR, philanthropic school]) revealed that they had never sought training or information on the subject.

In this context, some studies (Manzini, 2013; Pelosi, 2008; Schirmer; Nunes, 2020; Schirmer; Nunes; Silva, 2017) have indicated that teachers in Multifunctional Resource Rooms and regular classrooms are not always prepared or familiar with resources and equipment related to AT (Manzini, 2013).

The results reported by the interviewees in this subcategory were consistent with the statements by Schirmer, Nunes, and Silva (2017) and Tomaz and Cruz-Santos (2023), who consider that the lack of adequate initial and continuing training is a factor that can hinder the inclusion process. In this sense, training in AAC and AT can provide teachers with theoretical and practical knowledge to adequately develop the teaching-learning process and explore the potential of each student with NCC. Indeed, it is emphasized that training in AAC can support the inclusion of students with NCC; however, without basic knowledge of the teaching-learning processes for this population, AAC resources, techniques, and materials alone will be ineffective for successful learning.

Regarding specific AAC training to adequately support the children who required its use during the pandemic (16 children), all respondents stated that such training was nonexistent. Furthermore, all participants agreed that there was a lack of AAC training, which highlighted a barrier to differentiated and appropriate interventions with children with NCC. Furthermore, all participants considered AAC training during the pandemic to be crucial and urgent, as this would have enabled them to develop more effective interventions, as noted by Teacher Rosa (PSR, public school, ZR): *"It would have been ideal if we had received training on communication methods during the pandemic to achieve better results with the students*."

These considerations align with the findings of Silva *et al*. (2021) and Tomaz and Cruz-Santos (2023) that, in the remote learning context, training in the use of different technologies and AAC became necessary. This would enable the implementation of more appropriate and effective practices with children with NCC, taking into account their unique needs.

3.2 Use of AAC systems and technological resources during the pandemic

With regard to the use of AAC and technological resources implemented during the pandemic, it was found that, in 2020, gestures, smiles, winks, pointing, tactile symbols, drawings, picture cards, images, and text in *PowerPoint* were used via computers, *tablets*, and *smartphones* (through the WhatsApp app), particularly by respondents from private schools and the philanthropic school. From an analytical perspective, some of these resources correspond to general communication strategies and visual aids, approaching the field of AAC when organized as a functional system/vocabulary and used intentionally for the expression and comprehension of students with NCC.

Five participants — Rosa (PSR, public school, ZR); Margarida (PSM, public school); Laura (regular classroom teacher and educational support specialist, public school [PSR and SP, public school]); Bia (PSM, public school); and Ana (PSR, public school, ZR) — who taught in public schools stated that, during this period, they had not used any AAC to communicate with the children, since contact had been primarily with the families; thus, they reported having no knowledge of which AACs the children used, as revealed by Laura (PSR and SP, public school): *"I didn't use any resources to communicate with my student, and I also don't know if she used any, because I only had contact with her mother. I would send the activities via WhatsApp for the mother to do with her*." João (PEE, public school), on the other hand, stated: *"I didn't think about using* [...]*, because I have trouble knowing when to use AAC. That's why my contact with them was minimal. I didn't have anyone to guide me*."

The interviewees' statements revealed a gap in teacher training: specifically, the knowledge and practical application of AT resources and AAC in schools, which became particularly evident during the pandemic. For these to be implemented effectively, it is essential that teachers, family members, and other professionals be able to identify and use the appropriate resources given the specific needs of the student. Indeed, opportunities for students with NCC to access knowledge, interactions, and communication will be integral to inclusion in the school environment.

In the 2021 scenario, 11 teachers stated that they had found it easier to use AAC resources, as most schools had returned to in-person instruction. Maria (PSR, private

school) noted: *"In the classroom, it was easier to use some form of communication because I was close to the student without relying directly on technology*." Thus, participants cited picture boards, illustrative drawings depicting social rules and school dynamics, communication cards, images and text in PowerPoint presentations accessed via computer or *tablet*, sensory notebooks, and concrete materials. The responses mentioned by the participants are consistent with the definitions of Beukelman and Light (2020), Bonotto *et al.* (2020), and Silva *et al.* (2021), in recognizing that AAC consists of representational units in which the user engages body parts to perform common or combined gestures, uses photographs, objects, communication boards, speech synthesizers, images, or sounds that represent words or messages, although some elements are general visual supports/pedagogical resources for organizing the environment (e.g., routines, rules, and signs), and not AAC, unless they are part of an individualized communication system with functional vocabulary and a direct communicative purpose (expression/comprehension) for the student with NCC.

It was found that 13 of the interviewees cited the family as a key factor in communication with students, as it supported and facilitated interactions — whether in classroom dynamics, proposed activities, or discussions regarding the children's needs — especially during remote classes, according to the statements of interviewees Ana (PSR, elementary school ZR), *"Communication was complicated; we were very limited because dialogue with families was really just via WhatsApp*," and Glória (PSR, private school), *"The interactions were very quick! During the Google Meet video conference, the student would respond with smiles, winks, and point when her mother or I showed the pictures*." Based on this, it can be observed that, during the pandemic, there was a reframing of family roles, in which the mediation of communication and socialization for people with communication difficulties or NCC often occurred with the help of families, especially in the educational setting. The centrality of the family, reiterated in the statements, revealed an ambivalent effect: on the one hand, it supports communicative mediation in a remote context; on the other, it produced a "functional substitution" of the teacher, when pedagogical interaction was reduced to sending activities and to dialogue almost exclusively with guardians.

Regarding the technological resources made available by schools to teachers and students, it was noted in most of the interviewees' statements — particularly those from the public school system and the philanthropic school — that no equipment or devices were provided during remote classes. This finding is reflected in the following statements: *"The school did not provide any technological resources, neither for teachers nor for students during the* pandemic" (Bia, PSM, public school) and *"None! We teachers had to figure out a way to teach, and the students to learn!*" (Rosa, PSR, public school, ZR). Participants were unanimous in stating that schools did not provide subsidies for internet access for teachers and students. Furthermore, interviewees also judged that the available resources were insufficient and inadequate for developing effective pedagogical practices with students with NCC, particularly during remote classes. According to Nunes and Zancanaro (2024), access to and use of technological and digital resources should be understood as fundamental rights in light of the social changes brought about by the pandemic.

In private schools, however, technologies, innovative equipment, and resources on digital communication platforms were allocated, though focused on typical students, according to the interviewees who worked in that context. In turn, no technological resources were directed toward supporting methodologies and strategies tailored to atypical students based on their specificities and needs. This finding was confirmed in the following excerpt:

> *When the school closed, the administration ordered the entire school's internet network to be replaced with a better one. For typical students, it was perfect! The school thought of everything. They made it happen! Whatever was needed, they brought in the latest innovations. They offered everything they needed, except the internet! They spared no effort, but for students with Special Needs, nothing was considered. They didn't follow through—so much so that I only succeeded because I went around it on my own* (Maria, PSR, private school).

These differences aren't just "technological": they determine the possibility of pedagogical and communicational continuity. Without internet and devices, AAC mediated by digital platforms becomes unfeasible; with infrastructure, the school manages to maintain routines, but may still fail to make specific strategies accessible to students with NCC; therefore, the empirical data suggests two layers of exclusion: (1) exclusion due to lack of infrastructure (especially in the public school system); and (2)

exclusion due to the absence of an inclusive design, even in contexts with technology (when the school prioritizes typical students).

These results reaffirm the data from the 2020 School Census (Brazil, 2021), in which the municipal school system had the fewest technological resources available, such as desktop computers (38.3%), *tablets* (6.0%), or laptops (23.8%) for students, or even internet access available for their use (23.8%). Private schools, on the other hand, were better equipped, specifically: desktop computers (65.5%), *tablets* (25.8%), or laptops (46.6%), and 49.6% had internet available for students. According to this Census, internet access for teaching and learning available in elementary schools in 2020 stood at 33.7% at the municipal level and 65.3% in the private sector. In 2021, there was a 39.8% increase at the municipal level and a 70.6% increase in the private sector (Brazil, 2023). It should be noted that, although there was greater internet availability on school premises between 2020 and 2021, investments were insufficient to fully support remote learning through *online* modalities and synchronous transmission, particularly for students with special educational needs in the public school system. It is worth noting that the data presented above do not reflect the realities of the participants in this study.

Regarding students' access to technology during the pandemic, based on participants' statements, it was found that there were disparities among the different realities and contexts reported, as the resources available to students in the capital's public school system, the metropolitan area, rural areas, and the philanthropic school were very limited. In many cases, the only technological device accessible in the learning context was the *smartphone*, which was sometimes shared with other family members, as reported by teachers Camila (PSR, public school), *"She only had her mother's cell phone, which was a very basic model, and the student had to share it with her older brother. They didn't have* a computer," and by Margarida (PSM, public school, ZR), *"All communication and submission of assignments were done via the student's mother's WhatsApp. Only her cell phone was available, because the father spent the week working and they didn't have a computer*".

It was found that there were also limitations regarding internet access, since the families' financial conditions were precarious, notably among public school students. According to participant Bia (PSM, public school), *"Most of them had a very complicated*

internet situation, with very limited mobile data usage." This finding is consistent with the results of Machado's (2020) study, which found that the *smartphone* was the only inclusive and democratic tool for conducting interventions during remote classes during the pandemic, due to its wide reach and practicality. On the other hand, in the context of private schools, full availability of computers, *smartphones*, *tablets*, and broadband internet access was identified.

According to the teachers interviewed, students who did not have access to these resources did not remain in school, since the *tablet* was a mandatory item in the student's school supplies (Maria, PSR, private school priv.). When comparing students from public schools with those from private schools, a stark contrast was observed in the technological resources available to these two groups of students, possibly related to the better financial status of families, availability of access to technological interfaces, and fewer requests for assistance in private schools.

Regarding teachers' resources during 2020 and 2021, there was unanimity in the interviewees' responses, as they stated that the internet acc d at their own expense, particularly during 2020. However, participants Paulo (PI, private school), Ana (PSR, public school, ZR), and Bia (PSM, public school) noted that this situation persisted into 2021 during hybrid classes.

In most accounts, it was found that the resources used during the period of remote classes were funded by the respondents themselves, especially regarding the purchase of computers and mobile devices, as revealed by interviewee João (PEE, public school): *"I only used my cell phone to communicate and send lessons to the students. I didn't get any help with equipment, internet, or mobile data*." He added: *"In 2020, my cell phone broke, and I went weeks without access; then I bought a new one. That's when I regained access and contact with the families. It was really tough!*" In the case of teacher Patrícia (PSR, private school), an exception was noted: *"The school provided a microphone and a package with unlimited Drive storage so we could do everything. For teachers who didn't have a computer, they said: you can take one from the school! They also sent a large whiteboard to each teacher*." Thus, there are divergent realities among the interviewees. According to Tomaz (2023), the pandemic has exacerbated

educational, socioeconomic, and cultural disparities in Brazil, particularly due to the differences between students and teachers in public and private school systems.

It is worth noting that these results correlate with the research by Ceccim and Correa (2022), Dias and Pinto (2021), Lima, Novato, and Carvalho (2022), Secundino and Santos (2022), Vieira and Seco (2020), and Tomaz (2023), who identified serious educational challenges during the pandemic, especially for the most disadvantaged students and teachers, many of whom come from the outskirts of large cities or rural areas. For these individuals, the lack of computers and mobile devices, the absence or limited access to the internet and mobile data, the financial inability to purchase a computer and internet service at home, and inequalities in internet access and use in urban peripheries and rural areas represented barriers to education. Thus, these limitations in acquiring, accessing, and using the internet and other technological resources significantly impacted students from the most disadvantaged socioeconomic classes, as these resources were fundamental for teaching and learning during the pandemic.

According to Tomaz (2023), with the advent of the internet, information and communication tools have been developed and improved, enabling people to interact, create, and strengthen social relationships. The author further argues that Digital Information and Communication Technologies, among other factors, are also responsible for facilitating new learning experiences, as they incorporate and present countless possibilities. Thus, it is emphasized that social media and digital platforms can be used as mediators for the use of AAC in support of children with NCC, since digital interfaces, *software*, and applications prove to be fast, playful, and accessible means for communication and learning opportunities, provided there is adequate training and technological resources.

4 Final Considerations

The results indicate that AAC, although recognized by teachers as relevant, was often viewed as a “resource” rather than as systematic pedagogical mediation. This gap between recognition and implementation was exacerbated by a training deficit (both initial

and ongoing) and by insufficient institutional conditions, such as emergency remote learning, reducing opportunities for communicative participation and learning for students with NCC.

Three aspects deserve emphasis: 1) the gap between knowing how to conceptualize AAC and knowing how to apply it, reinforcing the need for applied and supported training; 2) the pandemic intensified family participation as a communicative partner, sustaining interactions, but also exposing inequalities in time, digital access, and material conditions, with impacts on equity; 3) disparities between school systems (public/private) and regions (urban/rural) demonstrated that infrastructure and connectivity are critical to the viability of technology-mediated communication practices, directly affecting the right to communication and learning.

As a contribution, the study reinforces the understanding of AAC as a situated practice that requires coordination between teacher training, communicative partnership, and institutional support to achieve effective inclusion. Furthermore, by distinguishing general visual aids from effective AAC practices, the study contributes to greater conceptual rigor in the analysis of school interventions.

Among the limitations, the following stand out: a) the territorial scope and the number of participants, which do not allow for generalizations; b) the self-reported nature of the interviews, subject to memory biases; and c) the absence of direct observation of interactions and the materials used, which could refine the analysis of the quality and systematic nature of AAC strategies. For future research, it is suggested to combine interviews, documentary analysis of materials, and observation/recording of practices to more accurately assess the implementation of AAC in hybrid and face-to-face contexts.

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