ISSN 2178-2229

DOI: https://doi.org/10.18764/2178-2229v33n2e28076

Teaching itinerancies in virtual learning environments: experiences with mobile devices

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Abstract: The study under analysis presents the research question: how are teaching practices formed through the experience with mobile devices during the pandemic, which are present in the classroom context after remote teaching? Thus, its main objective was to understand how teaching practices developed through the experience with mobile devices, in Emergency Remote Teaching (ERT), are present in the classroom context, considering the practical and formative journey experienced by teachers during the pandemic. This is a qualitative study. The research participants were 25 full-time teachers working in elementary education in the public network of the municipality of Jeremoabo/BA, assigned to three institutions located in the city center. The data were collected through questionnaires and semi-structured interviews and were subsequently analyzed using the Content Analysis technique, from Bardin's (2016) perspective. As a result, the study indicated a significant movement in the incorporation of mobile devices in the practice of some teachers, especially in the creation of virtual learning environments compared to previous research conducted in the region. This movement is mainly due to the experiences lived during the pandemic, resulting from the self-directed learning process required by the ERT.
Keywords: virtual learning environments; education; teaching practices; mobile technology.

1 Introduction

The COVID-19 pandemic imposed a sudden disruption on traditional educational practices, requiring teachers to rapidly adapt teachingteaching. The context of Emergency Remote Teaching (ERT) highlighted inequalities and weaknesses in teacher training, while also enhancing forms of pedagogical interaction through digital technologies. The use of mobile devices, previously commonly restricted or frowned upon in the school environment, became one of the main resources available to maintain the connection between teachers and students. This forced change raised questions about the limits and possibilities of the pedagogical use of mobile technologies, as well as about their continuity after the return to face-to-face teaching.

Regarding the concept, mobile devices are portable digital technologies, such as smartphones, tablets, notebooks, and netbooks, that connect to networks and allow communication independent of fixed locations. By integrating different languages, these technologies favor the creation of new socio-technical forms of interaction and expand the possibilities for the production and sharing of content (Lucena, 2016).

Regarding the adaptation made by teachers in the face of remote learning and considering the experiences they had during the pandemic period, we can admit that several situations, whether positive or negative, were experienced in a way that enriched their professional repertoire with skills and abilities for the use of various mobile technologies, their interfaces, and virtual elements available in cyberspace. Based on these aspects, we formulated the following research question: how are the teaching practices constituted in the experience with mobile devices during the pandemic present in the context of the classroom after remote teaching?

This study starts from the teaching experience, considering the changes brought about by the context experienced during the pandemic. We seek to understand how teaching practices developed with the use of mobile devices in remote teaching are reflected in the daily life of the classroom (post-pandemic). The practical and formative journey of teachers during this period therefore serves as a reference to analyze the transformations in their practices, considering the learning processes, adaptations and continuities that emerge from this unique context.

The professional routine – which may involve working in different classes, schools and even municipalities – is what we define as teacher itinerancy. In this dynamic, the teacher faces the challenges of the classroom and the conditions of their profession on a daily basis. It is a journey that goes beyond simple physical displacement, as it contributes significantly to the identity formation and professional development of the educator. Thus, the challengagements, discoveries, cultural exchanges, and experiences "[...] prepare them even more for the exercise of teaching" (Teixeira; Amorim, 2023, p. 153).

The research was carried out with teachers from the municipality of Jeremoabo/BA. The motivation for carrying out this study stems from the fact that, in the period before the pandemic, the education network of the aforementioned municipality showed resistance to the use of mobile technologies in school spaces, even going so far as to impose legal restrictions (Jeremoabo, 2018).

With the advent of the pandemic, teachers needed to adapt their pedagogical practices in the face of the need for physical distancing — a measure adopted to contain the spread of COVID-19, caused by the SARS-CoV-2 virus — and the consequent mandatory implementation of ERE. This modality was configured as na alternative to minimize the impacts of physical distancing on education in Brazil (Santos; Ferrete; Alves, 2021).

Considering the subjectivity of the participants as a source of relevant data for the study, the research adopts a qualitative approach (Flick, 2009). Thus, it was conducted in accordance with ethical principles, ensuring the confidentiality and anonymity of the participants. The project received approval from the Research Ethics Committee of the Federal University of Sergipe (CEP/UFS), under the Certificate of Presentation of Ethical Appraisal (CAAE) No. 63784122.5.0000.5546 and Substantiated Opinion No. 5,793,430.

The operationalization of the research, about data collection and production in the field, took place through the application of a semi-structured questionnaire, to identify the profile of the participants, and the carrying out of semi-structured interviews with teachers who declared that they use mobile devices in their teaching practices. The selection of teachers to compose the research sample followed the following criteria: (i) being a tenured teacher; (ii) working in the final years of Elementary School; (iii) working in one of the three largest institutions in the municipality.

Considering the criteria established for sample selection, we arrived at a total of 57 participating teachers, distributed among the municipal schools São João Batista (CMSJB), Reunidas Cel. João Sá (EMRCJS), and Evaristo Cardoso Varjão (EMECV), which gave greater representativeness to the study.

Of the 57 teachers initially identified, eight were on leave and therefore absent from their teaching duties. Thus, 49 teachers were eligible to participate in the research, and all were invited to contribute. Of these, 25 agreed to participate in the study, which corresponds to 51% of the sample effectively achievable, after excluding teachers who were not active in the institutions.

The data collected were organized and analyzed based on the content analysis technique, according to Bardin's perspective (2016). In general, this is a procedure that takes the message as a starting point, promoting the systematization of data and its grouping into categories, with inference as the main objective to be achieved.

Methodologically, the technique is structured in three fundamental stages for its execution and for the success of the research: pre-analysis, exploration of the material, and treatment of the results. During the analyses, we opted to use the Iramuteq software to improve this stage of the research.

2 **Teachers and the process of adopting technology:** knowledge developed through experience

To speak of teaching practice in the classroom is to recognize a teacher's know-how permeated by nuances and meanings. It is na activity that involves decisions, interpretations, and actions constructed in the concrete context of pedagogical practice. In this sense, understanding teaching implies recognizing that teachers mobilize plural professional knowledge, which manifests itself and is re-signified within the scope of their daily tasks (Tardif, 2014).

In the theoretical field of teacher training, teaching practice is configured as a broad concept that goes beyond the simple idea of "giving a class." It is fundamentally na articulated set of actions, decisions, knowledge, values, and reflections that the teacher mobilizes in the daily school routine, to promote teaching and learning processes (Gomes, 2012).

Given this scenario, in this study, we conceive of experience as a strong element for the composition and construction of knowledge geared towards teaching practice. Thus, we proposed to think about it based on the assumptions presented by Tardif (2014), who, in outlining the fundamental principles and knowledge that guide and build the teaching profession, emphasizes experiential knowledge – which is that which comes from everyday life and is capable of underpinning professional practice and skills.

It is through experience that we appropriate our teaching action, considering everything that affects us, motivates us, and even bothers us, whether negatively or positively. Experience is something that takes us out of our comfort zone and makes us reflect critically on our practice and that of others. The author also emphasizes that the knowledge of experience is unique to each teacher, as it is shaped by their personal characteristics, professional trajectories, and specific contexts in which they work.

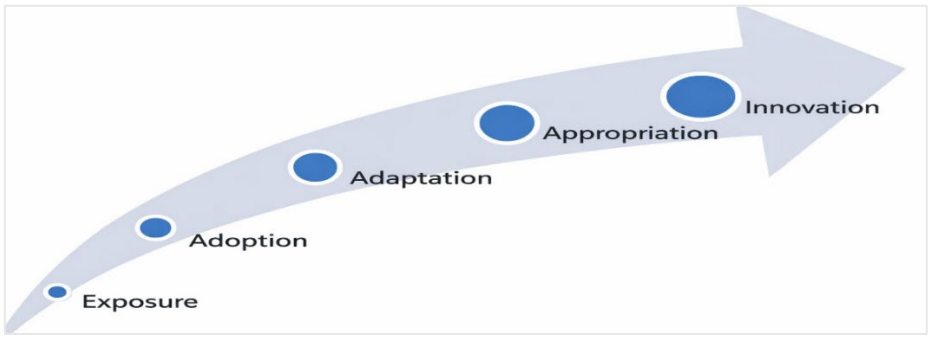
Tardif (2014) points out that addressing teaching knowledge means considering that this knowledge is socially constructed/produced, in action, in the

teacher's practice, being a knowledge that is in constant movement. We consider that this movement has been significantly influenced and reconfigured by the digital transformations in which society is immersed. But how does the teacher appropriate digital technologies based on the experiences lived in their teaching practice?

When studying the process of technological appropriation, Borges (2009) highlighted that the term "appropriation" can signify a continuous movement in which individuals, in this case teachers/trainers, can take possession of things (artifacts, instruments, devices) to subsequently transform them into something greater. The teacher, upon learning to use a mobile device, can, throughout this process, integrate it into various tasks of their daily routine and, consequently, into their teaching activities.

Each individual has their own learning pace, and in this sense, we emphasize that teacher training focused on the use and integration of digital mobile technologies must consider the different contexts and assimilation times. This care becomes even more necessary when it comes to technological appropriation by teachers, since this process does not occur immediately, but requires encouragement, dedication, and constant practice with the devices. In this context, the Apple Classrooms of Tomorrow (ACOT) research, conducted in 1991, identified five stages that comprise the process of teacher technological appropriation, from the initial stage to the most advanced, as illustrated in figure 1.

Figure 1 – Stages of technological appropriation by the teacher



Source: Apple (1991).

In the initial stage, as described in the Apple Classrooms of Tomorrow (ACOT) research, the teacher is directly exposed to the use of mobile technology, beginning a process of exploring the resource, understanding the techniques, and recognizing its possible pedagogical functions. At this stage, it is common for discomfort and difficulties related to handling the devices to arise. The next stage, called "adoption,"

is characterized by the moment when the teacher begins to feel more confident and comfortable with the use of certain technological resources, incorporating them, albeit in a limited way, into some pedagogical practices. Following this, adaptation occurs, a phase in which the teacher identifies more effective ways to integrate mobile devices into teaching activities, seeking to promote more meaningful learning (Bacich, 2018).

In the appropriation stage, the teacher begins to develop a more critical stance towards the use of technologies, intentionally selecting the most appropriate resources and functions to address a particular content or problem. At this stage, their teaching practice progressively improves as they evaluate the didactic-pedagogical potential of mobile devices and recognize their possibilities in the educational process. Finally, in the innovation stage, the teacher creatively and meaningfully integrates digital mobile technologies into their pedagogical actions, demonstrating in their practices the contributions that this integration offers to the teaching and learning process (Bacich, 2018).

Table 1, developed by Marcondes (2021) based on the elements presented in the Apple research (1991), shows the teacher's behavior in each stage of the technological appropriation process.

Table 1 – Teacher behavior regarding the use of digital technologies

STAGES	Teacher Behavior
I – Exposure	Teacher learning about Digital Information and Communication Technologies (DICT) is in its early stages, and the exploration of technological resources is a major concern.
II – Adoption	The teacher focuses less time on technical aspects, demonstrates greater autonomy with ICTs, and begins to use them in some teaching practices.
III – Adapting	ICTs are frequently integrated into traditional classroom practices, improving productivity and student participation in activities and learning.
IV – Appropriation	The teacher masters and incorporates ICTs into their daily practices, changing their approach beyond traditional practices and replacing old habits with new ones. They act more critically and begin an evaluation process of digital resources.
V - Innovation	ICTs are widely integrated into the development of new learning environments and conduct experiments that indicate new patterns and conceptions of more efficient practices.

Source: Marcondes (2021, p. 88), adaptaded from *Apple* (1991).

Considering all these stages, we understand that the continuous movement of technological appropriation involves multiple processes. It manifests itself from the production and construction of senses and meanings by teachers to the mobilization of knowledge and techniques in the face of the flow of interaction with technological

devices. This movement stems both from communicational and informational action and from the practical handling of mobile technology itself.

3 **Teachers and digital mobile technologies in teaching practice:** evidence from field research

The first stage of the study refers to the application of a semi-structured questionnaire. The initial objective of this stage was to understand the profile of the teachers, considering their initial and continuing education. In addition, we sought to identify whether there was internet access in schools and whether teachers used mobile devices in their pedagogical practices.

Of the 25 teachers who agreed to participate in the research, 19 are female and six are male. Among the participants, there is a predominance of training in Pedagogy (11 teachers) and Letters (six teachers). We also emphasize that five teachers have training in more than one area, due to the completion of a second degree or pedagogical complementation, covering fields such as Sociology, Geography, History, Mathematics and Physical Education, among others.

In the context of continuing education, we observed that most participants have some type of specialization. Among them, 15 teachers are specialists and three have a master's degree. Seven teachers still only have a bachelor's degree as their highest qualification.

Regarding length of service, three teachers stated that they have been teaching for between 10 and 15 years, while the majority (22 teachers) declared having more than 15 years of professional experience. In relation to working hours, we found that four teachers perform their activities on a 20-hour weekly schedule, twenty work 40 hours, and only one exceeds this workload, as they maintain na employment relationship with both the municipality and the state.

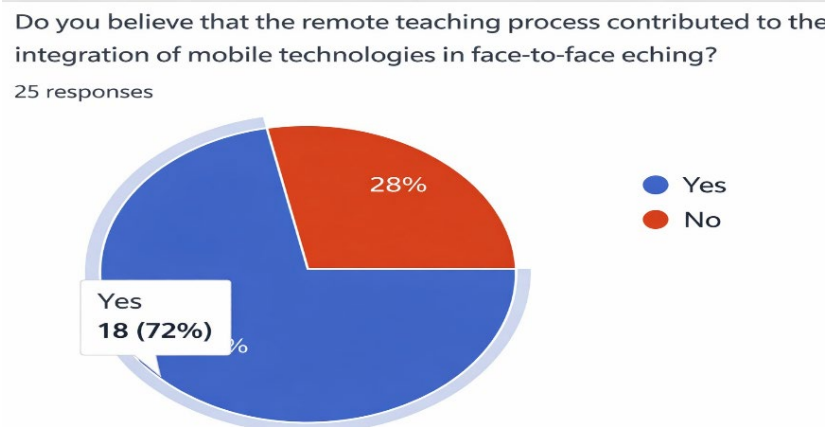
During the analysis of the questionnaires answered by the participating teachers, we identified a significant gap in the continuing education offered by the municipal education network. The majority of teachers, corresponding to 88% of respondents (22 participants), stated that they had not received training promoted by the administration for the use or integration of mobile digital technologies in their teaching practices.

According to Professor Manoel Messias[1]'s account, "the municipal education system did not invest in continuing education for teachers, something necessary in remote teaching. I provided training using my own resources." This statement highlights the absence of institutional policies aimed at teacher professional development during this period, reinforcing the idea that the pursuit of training and improvement was largely driven by individual initiative.

Regarding the difficulties faced, most participants — about 88% (22 teachers) — stated that they had encountered obstacles in adapting their teaching practices to the use of digital technologies. This limitation is illustrated in the statement of teacher Aline Dortas, who highlighted feeling "a lack of support and encouragement in this area (use of technology), because I don't know how to use the internet in the classroom as I should. The school needs to organize itself and acquire sufficient material for these practices."

In this scenario, it was possible to identify that despite the difficulties faced by teachers, most research participants (72% of the sample) believe that Emergency Remote Teaching (ERT) contributed to the use and/or integration of mobile technologies into teaching practice. This result indicates that, even in a context marked by challenges and rapid adaptations, the experience with remote teaching favored the expansion of teachers' contact with technological resources. Thus, it is observed that such technologies have come to occupy a more significant space also in the context of face-to-face teaching (see graph 1).

Graph 1 – Contribution of ERE to the use of mobile devices



Source: Data from the doctoral thesis (Santos, 2025).

[1] Fictitious name used to preserve the teacher's anonymity. This strategy was adopted in all the accounts presented in the text.

Regarding the presence and functioning of the network within the school environment, 84% of the sample (21 participants) responded that they are able to connect within the classroom, a large part using mobile data from their own phone plan. However, even with most of them having internet access in the classroom, using their own technological resources and recognizing the contribution of ERE (Emergency Remote Education) to improving practices with mobile devices in face-to-face teaching, only eight teachers – representing 32% of the sample – are actually using digital mobile technologies and virtual scenarios in their classes.

Based on the data obtained through the questionnaire, we decided to continue the research only with this group of eight teachers who employ these technologies in their classes. These participants were selected to participate in the next stage, which involved conducting semi-structured interviews. The objective was to understand, in a more in-depth way, the process of technological appropriation and the use of mobile devices by teachers.

The conversation with the teachers, which took place in isolation, that is, at separate times and individually, began with a question that prompted them to reflect on whether or not they felt difficulty in planning lessons that involved the use of mobile devices in practice. Table 2 presents some narrative excerpts that were given by the participants.

Table 2 – From planning to the applicability of mobile devices

Do you find it difficult to plan lessons that involve the use of mobile devices for educational purposes?	
Joana Dias	"I can use it perfectly for planning activities. But when it comes to practical application at school, I've had difficulty connecting to the internet. Some students have internet from their provider and share it with their classmates at times."
Rosana Torres	"Look, planning actions is easier, but putting them into practice is the complicated part. The biggest challenge is the internet connection at our school. The classrooms that are furthest from the router are the ones where it's impossible to use. I also miss the resources; not all students have a cell phone or laptop. (I do activities in pairs/groups)."
Manoel Messias	"So, the initial difficulty in using it was due to the demand. But today I don't have difficulty 'using' it; the challenge is putting it into practice, because the reality of public schools is quite complicated. The lack of resources, the poor signal."
Mariana Reis	"In my planning, I use it a lot to research and come up with new ideas on how to work with the content. I also look for ways to bring technology into the classroom, through research and questionnaires. But always with group activities, because the internet is terrible here at school."
André Ricardo	"I don't have difficulty planning. The biggest challenge is actually putting it into practice. Sometimes we even lose a lot of class time trying to do something because the internet isn't cooperating."

Juliana Ventura	“After the pandemic, everyone had to learn how to use technology. That was the challenge; little by little, I became familiar with many technological tools. I do use them for planning, and I can also think of ways to put them into practice. I use Padlet and WhatsApp quite a lot. Sometimes what has been challenging is the issue of access, because the internet fluctuates a lot here; depending on the room, the signal doesn’t even work.”
Hevely Anjos	“I learned to use some things during the pandemic. But the students often ask for quizzes or Kahoot in class, or for them to do research on their cell phones in the classroom, but you have to keep na eye on them to guide them, otherwise they just wander around doing other things, looking at social media. Depending on the tool, I can include it in the lesson plan, and if the signal is good, it’s possible to use it, that’s the key, always having a backup plan.”
Daniela de Jesus	“The biggest challenge is not planning, but execution. Thinking about the tools, the applications, and whether the internet will be accessible and good enough to run the activity."

Source: compiled by the author based on teacher narratives (2024).

It is noticeable in the teachers' narratives how they use technological devices to plan lessons at home, using their own resources. In the classroom context, the problem is executing lessons according to the plan, since the quality of the internet and its expansion throughout the school environment do not meet the real needs of teachers and students. Even so, at times, the teachers report using it in specific situations when the network allows connection.

Another point addressed in the interviews with the teachers concerns the use/integration of mobile devices into teaching practice. Table 3 presents some excerpts narrated by the participants when discussing how they use mobile technology for educational purposes in the classroom.

Table 3 – Use/integration of mobile technologies into teaching practice

How has the integration of mobile digital technologies into your teaching practice been occurring?	
Joana Dias	"Cell phones are often used for reference in Portuguese classes, to find the meaning of words, and to use synonyms in students' written work. In religious education classes, since we don't have printed materials provided by the school, we don't have books, so we rely heavily on information from the internet. Students contribute to this regard by searching for material that is also shared in class through WhatsApp groups.
Rosana Torres	“I bring my laptop to watch movies; I use my speaker connected to my smartphone. On WhatsApp, I have groups with the students, and in that group, we maintain communication, I send materials, links, and videos. I also work a lot with parodies, I've even made parodies with the students with the help of an artificial intelligence tool, I think the name is Luzia, and the students are using it. They taught me how to use Luzia.”
Manoel Messias	"I've used it for many things: planning, interactive activities, communication, and even as a place to store and send materials. [...] I can enrich my geography classes with my cell phone and laptop using 3D images in some apps and websites. This captures the students' attention and is much better than reading maps in the traditional way, which they find boring.
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Mariana Reis	my cell phone and laptop using 3D images in some apps and websites. This captures the students' attention and is much better than reading maps in the traditional way, which they find boring.
André Ricardo	“I connect my cell phone to the speaker and play music to energize the class. I create activities using Google Forms, and the students answer them in class when the internet is working, or they answer them at home. I've tried using online games in the classroom, but it didn't work because of the internet.”
Juliana Ventura	"Unfortunately, it's difficult to integrate and put into practice at school because of what I've already mentioned; the internet isn't good. When we have online classes, it's much easier to integrate other tools. Recently, I held a preparatory math class with the students, a kind of reinforcement session. I wish it were possible to use more technology, but here it's limited — access, resources, signal — all of that interferes.".
Hevely Anjos	“It’s not every day, but I usually take my laptop to the living room, and with my own internet connection from my provider, I can play videos, download maps, and project the screen with a projector. I try to align the media material with what’s in the textbook so that we use the book less. At home, sometimes we use Padlet to create a mural related to the content.”
Daniela de Jesus	“The biggest challenge isn't planning, but execution. Thinking about the tools, the applications, and whether the internet will be accessible and reliable enough to run the activity.

Source: compiled by the author based on teacher narratives (2024).

The narratives of the teachers reveal how the integration of mobile devices into classroom practices has been occurring. This process is accompanied by the challenges imposed by the reality and social context of the municipal public schools of Jeremoabo, especially regarding technological infrastructure and connectivity. Even in the face of these limitations, the teachers collaborating in the study implement some cybercultural practices focused on teaching and learning, using their own digital resources.

By cybercultural practices, we understand those mediated by digital mobile technologies connected to cyberspace. Such practices are characterized by interactivity, collaboration, sharing, authorship, and remixing, in addition to favoring the active participation of subjects in the production and circulation of information and knowledge. In this sense, cyberculture expresses new forms of interaction and collective construction of knowledge in the digital environment (Veloso; Bonilla, 2017).

The interaction, collaboration, and sharing of materials and experiences between students and teachers have been enhanced in the network. These practices occur in different digital spaces, such as WhatsApp groups, Google Classroom classrooms, and collaborative boards on Padlet. Such initiatives exemplify how collaborating teachers have been incorporating the use of technologies into their pedagogical practices.

The implementation of mobile devices in the classroom has become increasingly present in the daily lives of teachers. This change was driven by the experience with remote teaching, which enabled the development of new perceptions, skills, and digital abilities. This scenario differs from the period preceding the pandemic, when many teachers in the municipality of Jeremoabo still showed resistance to the use of smartphones by students in the classroom (Santos, 2021).

Table 4 presents some of the teachers' narratives that portray how remote teaching during the pandemic contributed to the development and improvement of digital skills. The statements show that this period was crucial in expanding teachers' mastery of the pedagogical use of digital technologies.

Table 4 – Contributions of ERE to digital skills

How has remote learning contributed to improving your skills with mobile digital technologies?	
Joana Dias	“The pandemic reality forced me, at that moment, to learn how to use digital tools. We had already been discussing this because of the BNCC (National Common Core Curriculum) and digital culture, but it wasn't progressing in practice. It was only with online teaching during the pandemic that this became possible. Much of what I know today about technology in education is due to my learning through remote work.”.
Rosana Torres	“Before the pandemic, the only digital technology I used in the classroom was a laptop and an overhead projector to project slides. With everything I experienced during remote and online teaching, I learned how to use Canva, Google Forms, Google Meet, and Padlet. Before, I didn't even know these platforms existed. Even with the BNCC (Brazilian National Curriculum Base), we weren't instructed on how to use digital tools.”
Manoel Messias	"With remote learning, starting with online classes, I got to know some platforms, learned how to use them, and nowadays I can use them whenever possible, such as Padlet, Meet, Kahoot, and Classroom.".
Mariana Reis	"I learned the hard way in the remote learning environment. I never imagined we would be able to incorporate digital technologies into the classroom, but with the pandemic that changed a bit; I learned to do things I didn't know how to do before, using my own personal cell phone.
André Ricardo	"It contributed to the continuation of classes through digital platforms and applications. It allowed us to experience online teaching in basic education and also put us to the test in our profession. Since we were not prepared to work in these contexts, we had to adapt and, in a short time, learn to deal with digital tools.".
Juliana Ventura	"Remote learning brought many new things to my practice; I didn't use these platforms before. Due to the imposed necessity, I had to learn how to use Classroom and Padlet. Despite the fact that most classes took place via WhatsApp in group chats with the classes, I felt the need to use other strategies."
Hevely Anjos	"Despite the context of social inequality, and the fact that not all students had access, remote learning brought a new perspective, in the sense of innovating, of bringing new digital elements and resources to my professional practice."
Daniela de Jesus	"The pandemic, the way everything happened, the imposition of online classes, brought a kind of obligation for us teachers to try to keep up with technological evolution, adapt and innovate in teaching. We learned from the imposed necessity."

Source: compiled by the author based on teacher narratives (2024).

Throughout the narratives presented, we observed that remote learning (ERE) provided teachers with contact with a reality for which they had not been prepared: teaching and learning mediated by digital technologies. The pandemic scenario brought teachers closer to the digital world and favored the experimentation of new pedagogical practices. Within the possibilities of access and use, each teacher experienced a transformative experience, according to their involvement with the interfaces and student engagement online.

Furthermore, in the narratives, the teachers emphasize that, before remote teaching, they did not make didactic-pedagogical use of technologies. Digital devices were only used in planning activities. After the pandemic experience, some of these teachers appropriated technological resources and began using applications and interfaces on their own mobile devices during in-person classes. However, this integration process still faces challenges related to connectivity and the infrastructure of school institutions.

Technological appropriation supports the conscious and critical use of mobile devices in teaching practice. This approach contributes to enhancing new ways of learning, capable of meeting the different learning styles of students. Thus, teaching becomes more personalized and aligned with contemporary social demands, characteristic of an increasingly technological society immersed in cyberspace.

Through what has been narrated, it is also possible to perceive the interfaces and apps most used among teachers. Among those mentioned are Padlet, WhatsApp, Google Meet, Google Forms, Wordwall, Canva, and Kahoot. In general, these interfaces, aligned with the didactic-pedagogical objectives of the teachers, make classes more dynamic, collaborative, and interactive, through mediation in the classroom or on screens. Therefore, in the opinion of the collaborating teachers, students need guidance to use these digital resources, as presented in the narratives of table 5, which deals with the contributions of mobile technologies and their interfaces to teaching and learning processes.

Table 5 – Educational contributions of mobile devices

Are mobile devices contributing to the teaching and learning process? In what way?	
Joana Dias	"I believe so, as long as it's used well by the students. I use it to teach classes, but it's difficult to get students to use it for learning purposes, considering they open other screens and even play games during class."

Rosana Torres	"The device can be an ally or a villain; it helps a lot, but it also hinders in some ways. For example, I have students who get distracted using their cell phones and doing other things. I have to monitor what they access and how they access it, to guide them to their proper use."
Manoel Messias	"It's something that depends a lot on how it's used; students really need guidance."
Mariana Reis	“I use it a lot, but I also realize that many students only see the fun side, social media and games. They see the device as entertainment and not as a place for learning, and it's a bit complicated to make them realize that. We need to educate them for a more critical and conscious use.”
André Ricardo	“They do contribute, if their use is conscious. I need to align the technological device with the objectives I want to develop in the classroom; it's not just about using it for the sake of using it. Students need support and guidance; they live on screens, but they don't use their cell phones critically.”
Juliana Ventura	“Despite the culture of prohibition that is very present here in the municipality, regarding students not being allowed to have cell phones in the classroom, I strongly believe that this tool does contribute to teaching and learning. Now, we need training to align it with the content, objectives, and methodologies. Students already live connected, they do activities online, they research, but they need to be more critical, and we need to guide, orient, and help them make good use of applications and cell phones as a powerful tool for knowledge construction.”
Hevely Anjos	"Students need more maturity to use devices more consciously, beyond just having fun, playing games, and taking selfies. The challenge for teachers is to compete with the screens when students lack that maturity”.
Daniela de Jesus	“I've come to believe that yes, it contributes, so I use it within what is possible in our reality, with what we have available. Students are connected, they do many things in their daily lives with their cell phones, but here at school, getting them to use them in activities depends on several factors, such as the connection, which isn't always good. And also, the issue of maturity; some spend more time on social media, taking photos, or on other pages seeing things unrelated to the activity or content. The teacher needs to supervise to know what they are accessing; sometimes it's even embarrassing.”

Source: compiled by the author based on teacher narratives (2024).

Despite supporting and utilizing mobile devices in the classroom, teachers warn of the need for better student guidance to promote critical use. In the words of Professor Rosana Torres, "the smartphone can be an ally or a villain for learning," it all depends on how it is used in the classroom. Indeed, it is challenging, considering that students, most of the time, seek the entertainment that such a resource can provide. This issue, centered on students' immaturity regarding the conscious use of smartphones, was the main reason for the prohibition of cell phone use in Jeremoabo's municipal schools since 2018, through the municipality's own legislation.

On the other hand, we emphasize that it is the teacher's role to create conditions for students to develop critical thinking and make conscious use of digital resources. This commitment is even more relevant in the case of smartphones, which are widely present in daily school life. Through this use, students can transform information into knowledge and enhance their learning styles, exploring the diversity of mechanisms that mobile devices offer.

Still focusing on the cultural changes resulting from the integration of mobile technologies into daily social life, we analyzed the various forms of use and their purposes. In this context, we sought to understand how digital culture is present in the Jeremoabo school curriculum, considering the implementation of public policies and normative documents, such as the National Common Curriculum Base (BNCC) and the competencies aimed at developing technological skills that this reference document lists. Table 6 presents some narratives that highlight this relationship between digital culture and curriculum in public schools in the municipality of Jeremoabo/BA.

Table 6 – Digital Culture in the school curriculum of the municipality of Jeremoabo

Regarding education in the municipality of Jeremoabo, has the municipal curriculum included approaches focused on competency 5 of the BNCC (National Common Core Curriculum), which involves the development of digital culture in the school environment?	
Joana Dias	"Absolutely not. Not as it should be, or as society expects. Our teaching materials, the most up-to-date books, are very interactive; some even have QR codes, video links, and website suggestions. However, teachers are not motivated to explore these possibilities. Reality limits us. No strategies have been devised so far to achieve this competency 5 of the BNCC (Brazilian National Curriculum Base). Some teachers use technology in the classroom, but most people do not. That's the truth. Many people here are against the use of cell phones in class. It's a very problematic discussion, and many still use the 2018 resolution to prohibit it, even in this post-pandemic era."
Rosana Torres	The curriculum doesn't address these demands of competency 5. There were some mentions and even initiatives, but there were few. Before and after the pandemic, there were discussions. If I'm not mistaken, it was during the municipality's pedagogical workshops. But it's something superficial; you can't implement something without preparing the teachers. What we learned about technology was because of the pandemic; it wasn't something focused on building a contemporary curriculum. That's why I believe our curriculum has gaps; it doesn't cover them.
Manoel Messias	"To tell you the truth, our curriculum doesn't address it. Discussions are scarce. Bureaucratically, there are teachers who include it in the lesson plans but don't implement it, just to pretend they're implementing the curriculum. Unfortunately, it has been configured this way. This digital literacy competency is not working in a meaningful way; there are teachers who include it, but they are very few."
Mariana Reis	"I think it doesn't address it, or at least I don't see any movement on these issues. I think everything that has been said about competency 5, digital culture, so far in training sessions and workshops has always been superficial. The context doesn't help, the reality of schools, the lack of resources for students, and also the lack of resources in schools, and teacher training."
André Ricardo	"From what I've observed, our curriculum addresses the topic, but it doesn't guarantee its development. The problem is broad, because it involves the preparation of the professional, the teacher, but there are also demands for resources, so that digital tools are available in schools and are accessible. These limitations that we experience here are what prevent us from further developing digital culture."
Juliana Ventura	“Our curriculum follows the Bahia Curriculum, which is an adaptation of the BNCC (National Common Core Curriculum) adopted by our state. It is our reference document. However, in practice, in day-to-day life, these discussions don't truly enter the classroom due to limitations.”.

Hevely Anjos	"It doesn't address this, and we don't even have relevant discussions on this topic. The exclusion of smartphones was discussed during the period when the resolution was in effect. But regarding their use, that discussion is happening in a mild way."
Daniela de Jesus	“I wouldn’t like to touch on that point. Our curriculum issues are very broad, in many ways, not just in the digital realm. But to be quite honest, the curriculum doesn’t address that at all.”

Source: compiled by the author based on teacher narratives (2024).

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The teachers, when describing the educational curriculum of the Jeremoabo municipal school system, highlighted the gaps that still exist in the development of digital culture in the school context. According to most participants, the curriculum does not address the real needs of students regarding the use of mobile digital technology.

Throughout the narratives, the distinction between planning with technology and executing with technology becomes evident. Teachers state that they do not have significant difficulties in planning, but report structural obstacles – especially the precariousness of the internet and the lack of resources – that make its application in the classroom unfeasible. This dissociation reveals that the challenge is not only pedagogical, but also structural and political. Digital culture, as foreseen in the BNCC (Competency 5), encounters insufficient material conditions, which highlights a contradiction between normative discourse and school reality.

In this regard, teacher Joana reports that the available teaching materials are constantly updated and that the books present interactive resources. Despite this, she states that teachers are not encouraged to use them in their practices. She emphasizes that there is still a need for preparation and specific training for the pedagogical use of these resources to be effective.

The teachers' narratives reveal the absence of more in-depth discussions about the fifth competency of the BNCC (National Common Core Curriculum). Although the curricular framework of the municipality of Jeremoabo is an "adjusted copy" of the Bahia curriculum – which presents several competencies and skills focused on the use of digital Technologies – this orientation is not yet realized in pedagogical practice. Most teachers do not implement teaching strategies aligned with mobile devices, which is closely related to a lack of training, insufficient technological resources, and limitations in school infrastructure.

Regarding infrastructure, although we evidenced the existence of projects and public policies that sought to mitigate the digital divide, such as "Digital City" and "Connected School," it was possible to perceive, through the teachers' narratives, that

such initiatives were insufficient. The schools studied still face structural problems regarding internet connectivity, with very poor quality Wi-Fi signal offered to teachers and students, in addition to a lack of technological resources.

Despite the challenges related to infrastructure and access conditions, it is important to highlight that teaching practices with mobile devices occur within the possibilities of each institution. We observed that, most of the time, activities requiring the use of digital technological resources were carried out outside the face-to-face school environment, that is, during times when classes were held online. This practice became common in the post-pandemic period in the municipality of Jeremoabo.

4 Emerging categories from content analysis

The categories presented in this section emerged during the application of the content analysis process (Bardin, 2016). According to the author, categories can be predefined by the researcher – a priori – and listed based on the initial objectives of the investigation, or emerge from the analysis experience – a posteriori – based on the facts.

Because this research focuses on teachers' experiences with mobile devices, it was decided to work with a posteriori categories. This methodological choice allowed the categories to emerge from the data obtained, respecting the particularities of the teachers' narratives.

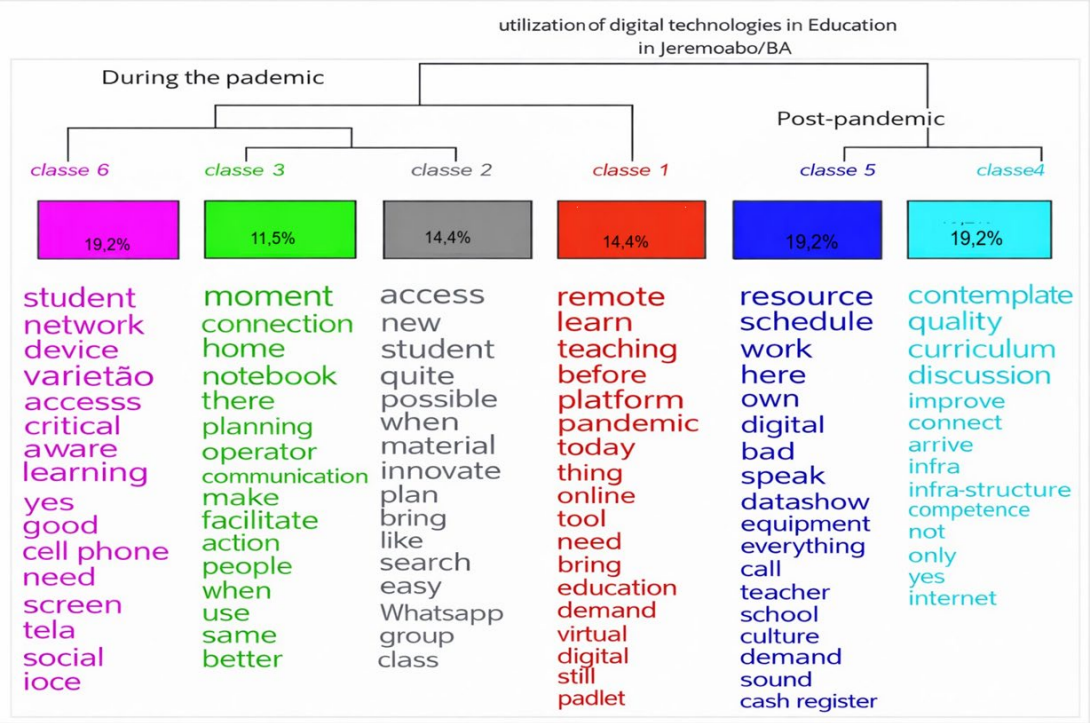
The IRaMuTeQ[2] software was used to facilitate the analysis process. Upon analyzing the textual corpus, the software resulted in the grouping of two major categories. The first involves the "use of digital technology in teaching and learning during the pandemic," and is distributed into four subcategories. The second category focuses on the “challenges of using digital technology in post-pandemic teaching and learning,” encompassing two subcategories, as can be seen in Figure 2.

As illustrated in the infographic, it is possible to observe the emphasis teachers placed on the period experienced during the pandemic. Therefore, the category dealing with teaching and learning during the pandemic generated the most interrelated subcategories, encompassing discussions involving the scenarios used, teaching

[2] Free software used for statistical analysis of texts. It is used in academic research in the fields of education, health, social sciences, and humanities to analyze qualitative data, such as interviews, open-ended questionnaire responses, documents, articles, etc.

actions in remote learning, and the need to “guide” students towards the “proper use” of technology.

Figure 2 – Emerging categories of the study



Source: infographic generated by IRaMuTeQ.

Category 1: Use of digital technology in teaching and learning during the pandemic. This first category focuses primarily on digital technology in the school context during the COVID-19 pandemic. It was the most widely evidenced in teachers' narratives, due to the emergency nature of the educational scenario. With the implementation of ERE (Emergency Remote Education) throughout the country, teachers faced the challenge of online teaching, including the need to use virtual environments and, at the same time, deal with their own technological learning and that of their students. In this context, attempts also emerged to innovate teaching practices to meet a differentiated educational model, largely mediated by screens, often accessed via smartphones.

The four subcategories derived from the main category encompass: the virtual scenarios used; self-training and teaching practice; home schooling; and "being a student" in the context of screens, as detailed below.

Subcategory class 1: Of the virtual scenarios used. The first subcategory presented highlights the platforms and applications used by some teachers during remote teaching in the pandemic. Based on the teachers' narratives, it was possible to

perceive the virtual learning scenarios, which were constituted through the use of interfaces such as Padlet, YouTube, Classroom, WhatsApp, Google Meet, and Kahoot.

Subcategory 2: Self-training and teaching practice. In this subcategory, we identified that the pandemic scenario and the implementation of remote learning demanded a self-training itinerary on the part of the teachers in the Jeremoabo municipal education network. Given the limited training actions funded by the public administration, teachers were responsible for managing their own training process. This initiative was essential for them to face the reality imposed by physical distancing and the need to adapt to the use of digital technologies.

This self-training process did not occur in isolation. We share Galvani's (2002) ideas, emphasizing that self-formation is driven by three interdependent processes: self (self-formation), others (hetero-formation), and things (eco-formation). In this way, we understand that teacher development results from the interaction between individual reflection, exchanges with the collective, and experiences mediated by the environment, configuring a continuous process of learning and transformation.

The concept of hetero-formation encompasses education and the social influences we receive from family, the social and cultural environment, as well as initial and ongoing training activities. In eco-formation, the focus is on the environment and its influence on social relations. Self-formation, in turn, symbolizes the subject's awareness of their own functioning. It is a paradoxical process that feeds on its dependencies, that is, it is the result of needs, experiences, and life experiences (Galvani, 2002).

During emergency remote teaching, self-formation gained prominence due to the need to adapt teaching practices from the face-to-face environment to the virtual one. This requirement led many teachers to seek improvement through courses and training focused on the use of digital technologies and mobile applications, in addition to resorting to support from colleagues in virtual communities and tutorials available on the internet, demonstrating autonomy and initiative in the face of the challenges imposed by the new educational scenario.

Subcategory class 3: The challenge of teaching “at home”. Throughout the narratives, teachers relate their experience during remote teaching to the need to learn how to use mobile devices for didactic-pedagogical purposes. This adaptation, imposed by circumstances, revealed the absence of prior preparation and the lack of

investment by school management in the continuing education of teachers for the use of digital resources. Thus, the pandemic context highlighted not only training gaps but also the urgency of rethinking institutional policies aimed at integrating technologies into the teaching and learning process.

Without specific training focused on the use of mobile devices in teaching practice, teachers had to adapt their methodologies, migrating from the physical classroom to virtual environments. Many of them never imagined that, in the middle of elementary school, they would have to teach remote classes via internet-connected applications, using their own resources and directly from their homes.

In this context, it is worth reinforcing that:

> [...] despite the difficulties and the lack of training for the use of digital technologies, the greatest challenge to be faced by the educational system in the municipality concerns the unavailability of resources and stable internet connection for a large part of the students enrolled in the municipal and state network of Jeremoabo, especially those who reside in rural areas and those who belong to low-income families (Santos; Ferrete; Alves, 2021, p. 23).

In other words, several factors directly influenced the teaching and learning process during the pandemic, ranging from the need for teacher training to the lack of internet access and technological resources for students. These interconnected elements highlight the structural inequalities that marked the educational experience in this context, revealing how much the absence of material and training conditions impacted the effectiveness of remote teaching.

Subcategory class 6: The “being a student” amidst the sliding screens. In several narratives presented by teachers, it was possible to identify a “certain problematic obstacle” related to the use and/or integration of mobile technologies into the classroom, especially smartphones, by students.

The inappropriate use of digital technologies has been responsible for the movement to prohibit these resources in schools, a situation that is aggravated by the lack of teacher training to deal with such tools. Among the main obstacles identified are students' distraction in front of screens, taking selfies at inappropriate times, plagiarism in assignments, and the use of "cheat sheets" during summative assessments. More recently, we have also observed the excessive use of generative artificial intelligence applications for solving tasks, such as ChatGPT and the Luzia assistant, popularly accessed via WhatsApp.

Students, on the scrolling screens of their smartphones, slip through the misuse of interfaces, in a way that self-sabotages their own knowledge construction. For this reason, teachers' narratives highlight the need for "guidance for students" on the proper use of technology, in a reflective way, instead of them being active only in "copy and paste" mode.

Faced with this problem, didactic-pedagogical interventions capable of awakening students' critical thinking become necessary. These actions should encourage them to question and analyze, autonomously, and reflectively, the information they consume on screens. In this way, it will be possible to promote the development of a critical and conscious understanding of one's relationship with the world. In the words of Freire (1979, p. 15), it is clear that "[...] conscientization cannot exist outside of praxis, or rather, without the act of action-reflection".

In this sense, it is fundamental that teachers and students understand the influence of mobile devices on the teaching and learning process, considering the social context in which they are embedded. This understanding should guide pedagogical practices aimed at developing critical and reflective awareness, allowing the use of technologies to transcend mere instrumentality and truly contribute to the integral formation of individuals.

Category 2: Challenges of using digital technology in teaching and learning in the post-pandemic context. The current educational scenario in Jeremaba, post-remote learning, has been marked by several challenges related to the teaching and learning process, many of which already existed but were intensified by the physical distancing imposed during the pandemic. Among the main problems faced are difficulties in literacy, reading comprehension, text production, and the development of students' critical and creative thinking.

Given the above, it is essential that teachers adopt different pedagogical approaches, using innovative methodologies capable of stimulating student protagonism and motivating them in the learning process. In this context, mobile devices, when integrated into learning objectives and teaching practices, can become fundamental allies, promoting more dynamic, interactive teaching aligned with the demands of the contemporary world. However, pedagogical and infrastructural limitations in schools still prevent this work from occurring in a meaningful way, as we will see in the next two subcategories that emerged in the teachers' narratives.

Subcategory class 4: Curricular limitations. When addressing the inclusion of digital culture in the school curriculum, the teachers' narratives reveal the existence of certain restrictions related to "study programs," which are defined and transmitted by school management, usually at the beginning of the school year. These programs are usually adapted throughout the process (whether bimonthly, quarterly, or by unit), according to the organization of the pedagogical work developed in each institution.

The teachers highlighted that discussions on the topic are scarce and, even when they occur, do not adequately address the fifth general competency of the BNCC (digital culture), nor the skills expected to be developed by students. Although the formal curriculum mentions digital culture, it does not delve into it or ensure the use and/or integration of technological devices by teachers in their pedagogical practices—something that creates a contradiction, considering that the BNCC is a normative document that guides the construction of curricula, yet ignores the different social contexts regarding access to devices and the internet.

It became evident from the narratives that many teachers are not encouraged to use and/or integrate digital technologies in the classroom. Although textbooks include various elements that allow exploration of the virtual world, such as links to websites, Quick Response Codes (QR codes) for videos and music, as well as curiosities, teachers reported that they do not receive encouragement to incorporate these tools. Those who use them are, for the most part, those who take risks on their own, based on experiences gained during remote learning.

In this context, authors such as Santos (2021), Alves (2023), and Marcondes (2021) highlight that, in the context of cybercultural education, it is fundamental to consider not only the availability of basic technological resources – such as internet access, computers, smartphones, and projectors – but also the importance of promoting continuous training processes for teachers and administrators. This training should aim to effectively integrate digital technologies into the school curriculum, overcoming the logic of merely instrumental use of devices, and promoting more meaningful and innovative pedagogical practices.

Subcategory 5: School Infrastructure. Throughout this text, we have discussed infrastructural issues in public schools in the municipality of Jeremoabo. Although social media posts present a favorable outlook for the use and/or integration of mobile technologies into school environments, teachers' accounts highlight factors

that still hinder better working conditions with digital tools in teaching practice, particularly within the physical classroom.

The biggest complaints concern access, both to digital resources and the availability of a quality internet signal. Even with the installation of antennas in schools, resulting from the Connected School Project, the connection provided does not reach all classrooms, and even when it does, a large portion of the students still lack access to the resource.

Given this scenario, pedagogical activities that require internet access and the use of smartphones, for example, are carried out in pairs – in pairs, trios, or small groups – as a way to ensure the participation of all students in activities involving the use and integration of digital mobile technologies. This strategy has proven relevant in minimizing the effects of digital exclusion, since it enables cooperation among students and promotes the collective construction of knowledge, even in the face of existing structural limitations in the municipality's schools.

The study was conducted in the three largest elementary schools in the municipality, characterized as large schools with a high number of teachers and students. In these units, the available technological resources are not sufficient to meet everyone's needs, requiring prior scheduling by teachers. This limitation was evident in the participants' narratives, who reported resorting to personal equipment – such as smartphones, laptops, and overhead projectors – to meet school demands.

Given the scenario reported by teachers and observed during field research, a disconnect is evident between what is said about the integration of technologies in education and what is actually done to make this integration happen. We found that the normative documents and public policies implemented so far in the municipality of Jeremoabo have shown slow and sporadic progress, resulting in few concrete effects regarding the expansion of accessibility and infrastructure necessary for the development of digital culture in schools.

In this context, we agree with Costa *et al*. (2024) and Lemos (2021) in highlighting that the lack of infrastructure, especially regarding technological resources and internet access, significantly contributes to the worsening of the digital divide. This reality becomes even more worrying in a social and educational context increasingly mediated by technology, where digital exclusion not only limits access to information but also restricts learning opportunities and civic participation.

Therefore, it is essential that public policies and investments be directed towards improving the infrastructure of school institutions, as well as expanding access to mobile digital technologies. Such measures are fundamental to reducing digital disparities and improving teaching practices, enabling teachers to integrate technological devices into teaching and learning actions more effectively. However, the narratives show that this integration is not yet effectively realized in the municipality of Jeremoabo/BA, revealing a mismatch between the policies implemented and the reality experienced in schools.

5 Final Considerations

Throughout this work, we sought to understand how teaching practices, constituted in the experience with mobile devices during the pandemic, are present in the context of the classroom after remote teaching. That is, whether or not teachers are integrating, in practice, teaching methodologies that were "learned" from contact with mobile devices in the context of remote teaching.

The first point to highlight is that the pandemic experience was lived in distinct ways by each participant, even within a generalized and collective context. The teachers' narratives demonstrate the importance of the relationships maintained on networks, especially regarding sociability and the continuous sharing of materials among those who were connected. At the same time, it is necessary to emphasize an aggravating factor that significantly impacted emergency remote learning (ERE): the exclusion of many students due to lack of access to the internet or adequate technological devices. This limitation remained evident both during the pandemic and in the subsequent period, revealing that, even in moments of online classes after the emergency remote teaching period, the participation of some of these students was not guaranteed.

The teachers experienced the digital world online, with limitations in access and technological infrastructure, as well as a lack of training focused on teaching and learning processes integrated through smartphone, notebook, tablet, etc. screens. However, even with these limitations, the experience constitutes know-how, something that contributed to the implementation of teaching practices with mobile devices after the emergency remote teaching period. The statements demonstrate that remote

teaching functioned as a formative milestone. Many teachers affirm that they learned "the hard way," imposed by circumstances.

Regarding the use of mobile devices in teaching practices in the current scenario, we would like to highlight that it has been happening in different ways, depending on the level of technological appropriation of the teacher, since some managed to better manage their own formative itinerary and sought to improve their practices through free courses, tutorials, online training, etc. Others only use the apps they learned to handle in the context of the pandemic.

The technological appropriation process of the teachers participating in this study occurred through experience intertwined with the self-training process, which did not occur in isolation, considering that the context imposed the conditions with remote teaching during the pandemic. Following this came the recognition of the role of mobile technologies in physical distancing, along with the demands of adaptation, stemming from the need for mobile learning and the challenge of "learning to deal with teaching on screens."

In this context, teachers' accounts show that peer learning (with fellow teachers) proves to be an efficient strategy, since, by being connected online, they were able to share anxieties, practices, and experiences, learning from each other. This collaborative way of learning proved essential during remote teaching, as it strengthened the feeling of belonging and promoted the collective construction of knowledge amidst the uncertainties of the pandemic period.

This finding shows that more intense contact with digital technologies not only broadened teachers' methodological repertoire but also promoted a shift in perception regarding the role of mobile devices in education. Previously seen, often, as elements of distraction or difficult to control in the school environment, these devices have come to be understood as powerful pedagogical resources, capable of fostering interactivity, personalized teaching, and student engagement, although there is still an extreme need for student guidance on the conscious use of devices, as observed in most teachers' narratives. In this sense, teachers reveal an ambivalence: they recognize the pedagogical potential of mobile devices, but express concern about distraction, inappropriate use, and the constant need for supervision.

Furthermore, the experience with remote teaching proved relevant for the development of digital skills among teachers. In some cases, this spurred a redefinition

of teaching practice, since these skills began to contribute to the creation of more innovative and creative lessons, in order to engage student participation. This movement also reinforced the need for continuous investment in teacher training focused on the critical and creative use of digital mobile technologies and their interfaces (scenarios) in education. Finally, we emphasize the need to rethink public policies that guarantee equity in access to the internet and technological devices, allowing more and more students in the public school system to have the same opportunities to access knowledge.

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Received in december 2025 | Approved in march 2026

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