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Digital literacy, remote teaching, and access during COVID-19 pandemic: Impacts on postgraduate female in Brazilian Amazon

Literacidad digital, enseñanza a distancia y accesibilidad durante la pandemia del COVID-19:

Impactos en las mujeres de posgrado en la Amazonia Brasileña

Letramento digital, ensino remoto e acesso durante a pandemia da COVID-19: impactos sobre as mulheres da Pós-graduação na Amazônia brasileira

Cícero da Silva¹
Fabiana Komesu²
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Abstract. *The aim of this article is to understand how digital literacies, the usage of digital technologies and emergency remote teaching during the COVID-19 pandemic have affected the life of women participating in stricto sensu Graduate Programs of Universities in the Brazilian Legal Amazon. This study is based on the perspective of digital literacies, which considers the social uses of reading and writing. This is a mixed approach, exploratory and applied research. The data has been collected during August and September, 2021, by means an online platform, based on a 30-item semi-structured questionnaire. The data set comprises 218 valid answers from female professors (n = 100) and students (n = 118) (age 18+) of the surveyed Universities. The results show that the respondents have faced many challenges in emergency remote teaching during the pandemic, in particular, work overload, scarce interaction with colleagues, limitations in the use of digital technologies, difficulties in accessing digital technologies, mental/physical health problems and lack of boundaries between academic and family activities performed in the household environment. Nonetheless, the digital technologies have enabled them to participate in events (livestreams, webinars, conferences, courses), meeting research groups and proceed with classes and research. In a geographically large and economically disadvantaged region, as is the case of the Brazilian Legal Amazon, public policies are essential in order to promote literacy events and activities.*

Keywords: digital literacy, higher education, distance education, COVID-19

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Resumen: Este artículo tiene como objetivo comprender cómo las literacidades digitales, el uso de las tecnologías digitales y la enseñanza remota de emergencia durante la pandemia del COVID-19 impactaron en la vida de las mujeres vinculadas a los Programas de Postgrado, stricto sensu, de las Universidades de la Amazonia Legal brasileña. El estudio se basa en la perspectiva de la literacidad digital, que considera los usos sociales de la lectura y la escritura. Se trata de una investigación de enfoque mixto, exploratorio y aplicado. Los datos se recopilieron en los meses de agosto y septiembre de 2021 en una plataforma online, a partir de un cuestionario semiestructurado de 30 ítems. El conjunto de datos presenta 218 respuestas válidas de profesoras ($n = 100$) y alumnas ($n = 118$) (de más de 18 años) de las universidades sondeadas. Los resultados evidencian que las personas encuestadas se enfrentaron a muchos desafíos en la enseñanza remota de emergencia durante la pandemia, especialmente por el exceso de trabajo, la poca interacción con las personas colegas de estudios, las limitaciones en el uso de las tecnologías digitales, las dificultades en el acceso a las tecnologías digitales, los problemas de salud mental/física y la falta de límites entre las actividades académicas y del hogar experimentadas en el entorno familiar. A pesar de ello, las tecnologías digitales les permitieron participar en eventos (lives, webinars, congresos, cursos), reunirse en grupos y continuar con las clases y con la investigación. Además, se constató que, en una región geográficamente extensa y económicamente desfavorecida como es la Amazonia Legal brasileña, las políticas públicas son fundamentales para la promoción de eventos y actividades de literacidad.

Palabras clave: literacidad digital, enseñanza superior, educación a distancia, COVID-19.

Resumo: Este artigo objetiva compreender como os letramentos digitais, o uso de tecnologias digitais e o ensino remoto emergencial na pandemia da COVID-19 impactaram a vida de mulheres vinculadas a Programas de Pós-graduação stricto sensu de Universidades da Amazônia Legal brasileira. O estudo está alicerçado na perspectiva dos letramentos digitais, que considera os usos sociais da leitura e da escrita. Trata-se de uma pesquisa de abordagem mista, caracterizada como um estudo exploratório e aplicado. Os dados foram coletados nos meses de agosto e setembro de 2021 em uma plataforma on-line, com base em um questionário semiestructurado de 30 itens. O conjunto de dados apresenta 218 respostas válidas de docentes ($n = 100$) e discentes ($n = 118$) do gênero feminino (+18 anos de idade) das Universidades pesquisadas. Os resultados mostram que as respondentes enfrentaram muitos desafios no ensino remoto emergencial na pandemia, especialmente, excesso de trabalho, pouca interação com colegas, limitações na utilização das tecnologias digitais, dificuldades de acesso a tecnologias digitais, problemas de saúde mental/física e ausência de limites entre atividades acadêmicas e familiares vivenciadas no ambiente doméstico. Apesar disso, as tecnologias digitais permitiram-lhes participar de eventos (lives, webinars, congressos, cursos), reunir-se em grupos de pesquisadores e dar continuidade a aulas e a pesquisas. Em uma região geograficamente extensa e economicamente desfavorecida, como é o caso da Amazônia Legal brasileira, políticas públicas são fundamentais para a promoção de eventos e atividades de letramento.

Palavras-chave: letramento digital, educação superior, educação à distância, COVID-19

1. Introduction

This paper is linked to the post-doctoral internship research project entitled “Digital literacies in the context of the pandemic (and beyond): impacts in the life of professors and students of Graduate Programs in the Northern Region of Brazil” carried out at the Universidade Estadual Paulista “Júlio de Mesquita Filho” (UNESP), São José do Rio Preto Campus, São Paulo, Brazil. This research was supported by the *National Council for Scientific and Technological Development* – CNPq, Brazil and the *Coordination for the Improvement of Higher Education Personnel* – CAPES, Brazil.

So, in this paper, we aim to discuss how the COVID-19 pandemic has affected the life of female professors and students participating in stricto sensu Graduate Programs (GPs) of 23 Universities in the Brazilian Legal Amazon, considering the demands of digital literacies, the

accessibility and the use of technological applications and devices by professors and students during this period of distance education.

The research context, Brazilian Legal Amazon (BLA), comprises nine states: Acre, Amazonas, Amapá, Pará, Rondônia, Roraima and Tocantins, in the Northern region; Mato Grosso, in the Center-West region; and part of Maranhão, in the Northeastern region. Although this research has only been performed in the seven states of the Northern region, throughout this paper, we shall use the phrase Legal Amazon referring to the research context.

This paper approaches a relevant and current theme, which is digital literacy, distance education COVID-19 pandemic, considering the impacts on the lives of postgraduate female professors and students in BLA. As we know, the COVID-19 pandemic has affected the life of all people in the world, including their access to education. While much is said about the biodiversity of the Brazilian Legal Amazon, little is discussed about higher education in this area. This research is relevant not only for addressing the impacts on the lives of postgraduate females (professors and students) during the pandemic, but also for pointing out the demands for public policies to strengthen and improve the training of masters and doctors in this Brazilian region.

The paper is divided in three sections, in addition to the Introduction. In the first section, we present the contextualization of the COVID-19 pandemic and the theoretical foundation underlying the research. In the second section, the methodological procedures applied in the study are outlined. In the last section, we shall present the data analyses and discussion, as well as the results and conclusions.

2. Literature review

2.1 Pandemic scenario and challenges for education

In December, 2019, the new coronavirus (Severe Acute Respiratory Syndrome Coronavirus 2 - SARS-CoV-2) broke out in the city of Wuhan, in the Province of Hubei, China (Lu et al., 2020). The disease spread quickly and was declared to be a “Public Health Emergency of International Concern” by the World Health Organization (WHO) in 01/30/2020 and, in 03/11/2020, a “pandemic” (PAHO and WHO, 2020). Since then, a disease outbreak of COVID-19 has been caused by SARS-CoV-2 in various countries and regions of the world. Brazil, for instance, had a total of 35.396.191 confirmed cases and 690.229 deaths as of December 5, 2022, according to data from the Johns Hopkins University of Medicine (JHU, 2022).

The pandemic scenario led governments and health authorities to adopt decisions to contain the dissemination of the disease. Educational institutions, commercial establishments, factories were closed and people were instructed to stay at home (PAHO and WHO, 2020). In more affected areas, lockdown (full closure) was adopted. This severe health crisis had impacts and caused changes in various aspects of social, political, economic, educational life. More recently, the breakout of the omicron variant has led to a dramatic increase of the number of cases of infected people in various countries (JHU, 2022), highlighting that the reopening of universities requires a series of precautions.

Brazilian universities, in turn, are performing modifications in facilities as well as protection equipment, following health protocols to ensure the safety of the audience at in-person activities. The study by Tanus Sánchez-Tarragó (2020) reinforces the need of these changes to establish safer spaces in universities. To ensure the safety of the academic community, it is not enough to design health protocols and plan changes in the campuses; one must also takes into account the public transportation used by the community to come to the university (Caulfield et al., 2021). These mitigating measures, associated with vaccination coverage, have allowed Brazil to reach a lower risk of the disease for the population. By September 15, 2022, 79.33% of the country's population had received at least two doses of the COVID-19 vaccine, according to the consortium of media vehicles, based on data from state health secretariats (G1, 2022). In this favorable conjuncture for coexistence in universities and other locations, the challenge of the social effects of long COVID, as the set of persistent symptoms after infection with the virus has been called, must also be dealt with (Fiocruz, 2022).

At the beginning of the pandemic, the United Nations Educational, Scientific and Cultural Organization - UNESCO (2020), for instance, estimated that almost 1.6 billion students were prevented from attending classrooms in over 190 countries (90% of the global student population). This interruption of education due to COVID-19 has increased learning inequalities across the world (Cavalcante et al., 2020; Organization for Economic Co-operation and Development (OECD), 2020; UNESCO, 2020; Ives, 2021). In this scenario, social distancing and the suspension of in-person activities in schools and universities, in a country of continental size (8 510 345 km²) and structural inequality (28 million people live below the poverty line in Brazil, according to Fundação Getúlio Vargas Social, 2021), *have underscored the usage of digital technologies*. Moreover, the abrupt change from in-person to remote teaching, which until recently was an issue restricted to researchers, became a social problem, being discussed in the press, educational institutions and families (Fluckiger, 2020).

The consequences of this crisis can be noticed under various aspects in education. Upon the closure of schools and universities, calendars and in-person teaching were suspended in Brazil (Decree Nr. 343, 2020), but progressively, educational activities were resumed remotely (online), being mediated by the use of digital technologies. Education also started putting topics on debate in online events. Online remote education is understood as being different than distance learning (see Hodges et al., 2020) due to the fact that the “emergency character” presumes usage and ownership of digital technologies in a particular situation (in this case, the context of the COVID-19 pandemic) of teaching assistance where formerly in-person education existed (Arruda, 2020) - however not exempt from problems.

This situation of emergency remote teaching in the context of the COVID-19 pandemic has shown the importance of discussion and problematization of digital literacies. From the teacher’s perspective, there has been a demand for refresher courses, in the form of courses related to digital technologies in teaching. Preparing and giving remote classes, using digital platforms such as *Moodle*, *Google Classroom*, *Google Meet*, *YouTube*, *Zoom*, among others, has required and still requires engagement and learning from any teacher. Likewise, much has been required from the students, who have to access synchronous or asynchronous class materials (videos, text files, question forms and activities), watch classes and perform activities while being connected to digital platforms. In times of emergency remote teaching, knowing how to transit with easiness when it comes to reading and writing practices and their technologies is not enough; proficiency or knowledge about digital technologies is required. This subject lies in the interest of digital literacy studies (Lankshear and Knobel, 2008; Gourlay et al., 2013), when investigating conditions which enable (or not) the performance of given literate social practices.

2.2 Digital literacy, emergency remote teaching and work in the COVID-19 pandemic

The formal education system is recognized as one of the actors in charge of inserting the subjects in literate social practices. In times of COVID-19 pandemic, there is an increased expectation that these subjects, in different education levels, should develop skills and competencies in social reading and writing practices which mobilize digital technologies, in digital literacies (Assis et al., 2020; Gourlay et al., 2013; Lankshear and Knobel, 2008). Moreover, digital literacy practices emerge in the interactions of subjects with digital devices and texts (Gourlay et al., 2013). Nevertheless, we understand, along the lines of Street (1984;

2014), that literacy is neither restricted to the school literacy practice, nor neutral or exempt from interests of social groups which are directly or indirectly involved, yet it displays a plural dimension (literacIES). This dimension is not limited to the written modality, but extends to other social practices, such as orality, in the usage (or not) of other language resources, using digital technologies (or not).

Considering that the New Literacy Studies (Gee, 2000; Street, 2013) are the theoretical perspective underlying this research, we have followed the concept of literacies as practices of a social, ideological nature, “crossed” by power relations, being sociohistorically set (Street, 2014; Barton e Hamilton, 2000). The dimensions which literacies gain concerning the usage of digital technologies in emergency remote teaching reinforce the contemporariness of Street’s thoughts (2013; 2014). It is impossible to conceive reading and writing practices without a connection to the social and historical conditions of their production. Every literate social practice is conditioned to a situation, to a historical time. In the case of this investigation, the most immediate sociohistorical context is that of the COVID-19 pandemic. However, one could think that the access (or not) to digital technologies, with an impact on the life of female professors and students of graduate programs of the Brazilian Legal Amazon, dates back to long before this period, even though this is the moment taken as reference for this study.

At an international level, research works about digital literacies, emergency remote teaching during the COVID-19 pandemic, access and use of digital technologies in pedagogical practices and challenges faced in education draw attention (Flores and Gago, 2020; Jena, 2020; Tejedor et al., 2020; Cahyadi et al., 2021; Ives, 2021). Besides bringing into discussion how the educational issue was (and has been) handled in different countries of the world, these research works show pedagogical experiences and practices, impacts in people’s culture and life. Most of all, they show challenges related to the access to digital technologies and usage of digital tools in the studying and learning process.

Likewise, studies have been carried out concerning the impacts of the pandemic in the life of women in the context of education (Jiménez-Cortés e Aires, 2021; Iqbal et al., 2022). These studies allow us to reflect about gender equality and effects of the pandemic in the life of women, establishing a dialog with the present research. Jiménez-Cortés and Aires (2021, p. 4), based on Lazou e Bainbridge (2019), underline that, even though studies argue that remote education could have an influence on female empowerment, there are factors impairing women in online higher education, namely: “(a) the conflict of roles; (b) investment of time; (c) domestic affairs and relationships; and (d) the design of the learning and tutoring structure.” From our

point of view, these factors make evident how reading and writing practices depend on power and authority relations which, apparently, would be “outside” the texts, yet are constitutive to them. For Lazou and Bainbridge (2019), these impediments can be overcome through a feminist pedagogy capable of promoting teaching and learning, by offering support and encouragement, based on a constructivist approach with emphasis on the female student.

In Brazil, studies on digital literacies related to teaching in virtual environments or the usage of digital technologies as a means of support in the educational context are developed mainly in the second decade of the 21st century (Freitas, 2010; Ribeiro, 2016; Silva and Gonçalves, 2021). More recently, digital literacies, teaching in the context of the COVID-19 pandemic and challenges for professors and students have been the topic of many research works in the country (Arruda, 2020; Assis et al., 2020; Mendonça, 2021). These research works discuss the access and usage of digital resources, highlighting pedagogical experiences and practices performed using digital technologies in Brazilian education. During the health crisis caused by SARS-CoV-2, studies have been carried out in Brazil concerning the impacts of the pandemic in the life of women both in the context of education and of work and social life (GN-SOF, 2020; Candido et al., 2021; Lucas et al., 2021).

For workers such as female professors and students, home office has led to intense working days; the professor’s/student’s pedagogical/scientific work changed from the classroom and laboratory to their home. Consequently, in addition to being required to face the challenges imposed by emergency remote teaching and the demands of digital literacy practices, this kind of work result in conflicts between personal, household, and professional activities, affecting the family interaction, especially from the perspective of the women (Martins et al., 2020). The need to combine or alternate the performance of household chores (such as, for instance, taking care of children, elderly people, and the home) with professional tasks in the family environment has excessively increased the workload of women, causing physical, emotional, and psychological problems (Pérez-Nebra et al., 2020).

The study by Lucas et al. (2021, p. 3) points out that the lack of resources for remote teaching and for the safe return to in-person teaching is worsened “... by the patriarchal sexual division of labor, which assigns to women the main responsibilities for taking care of children, elderly and people who have gotten sick in that time.” The authors remind the fact that, in Brazil, women account for 80% of the teaching staff in elementary education. Data from Unesco’s Institute for Statistics show that the rate of women working in elementary education is 83% worldwide, a rate close to that seen in Latin America and Caribbean, at 84%. This information

was published in June 2022, based on data from 2020 and 2019, respectively. The statistics show the prevalence of women in education, which were exposed to an even greater work overload in the pandemic, not only restricted to Brazil (The World Bank, 2022).

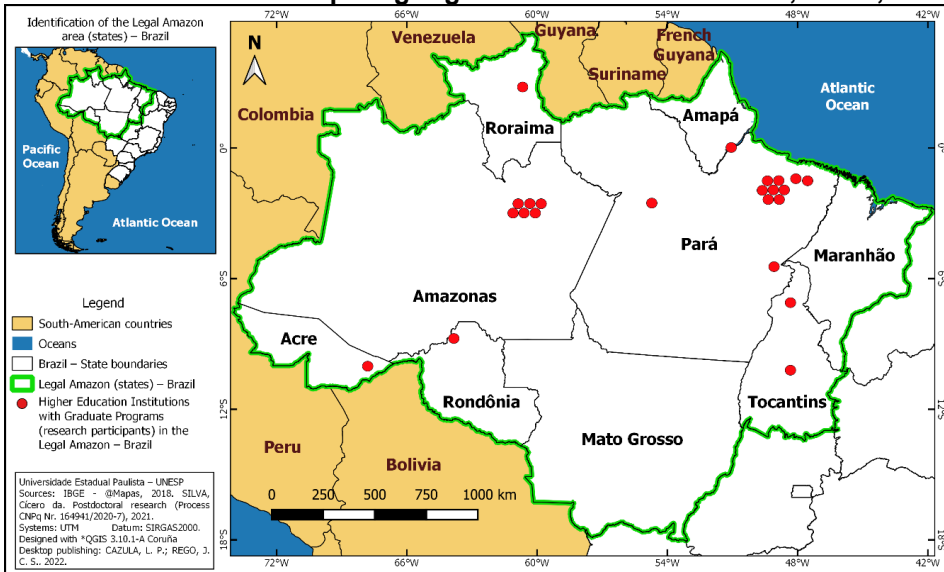
Candido et al. (2021) assess the impacts of the COVID-19 pandemic in the academic work of Brazilian scientists in the field of social sciences, considering different gender and race profiles. According to the authors, gender and race have a greater effect on the dimensions analyzed in the research work. Women, in particular Black women, have been the most affected by the increase in work demands during the pandemic. White men were less overburdened in their labor activities, although they have also suffered losses arising from the health crisis. Despite this harsh scenario, professors were able to maintain high productivity levels, which suggests increase in workload as well as in physical and mental health problems. Furthermore, the authors note that “graduate students experience the health crisis under the insecurity of how the career opportunities will turn out” (Candido et al., 2021, p. 57). It can be said that this unfavorable context to higher education in Brazil is prior to the COVID-19 pandemic. It has been intensified in recent years, due to the drastic reduction in subvention means for scientific research and graduate scholarships, which is reflected in the dismantling of education, science, and technology in the country (Saviani, 2020).

2.3 Research context

The Brazilian territory is divided into five macro-regions: North, Northeast, Center-West, Southeast and South. The Northern region, the locus of this study, where the Legal Amazon is located, is the country’s largest region, with approximately 3.9 million km², and is divided into 07 states: Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, and Tocantins (IBGE, 2011). The North is known for its natural resources, such as rivers and the Amazon forest. According to estimations of the Brazilian Institute of Geography and Statistics (IBGE, 2020), the population in this region totaled 18.6 million inhabitants in 2020. Despite having a low demographic density, there are numerous social problems in dimensions such as education, health, sanitation and housing. The Demographic Census of 2010 shows that, in that year, 9.6% of the Brazilian population of age 15+ was illiterate; in the Northern region, this index was of 11.2% (IBGE, 2011).

In the Figure 1, we present a map of the research context (Brazilian Legal Amazon), where all participating professors and students, linked to the stricto sensu Graduate Programs (GPs) of 23 higher education institutions of this region, are:

Figure 1
Research context: Participating Higher Education Institutions, Brazil, 2018



Sources: Creation based on IBGE - @Mapas, 2018, and Silva, C. Postdoctoral research (Process CNPq Nr. 164941/2020-7), 2021.

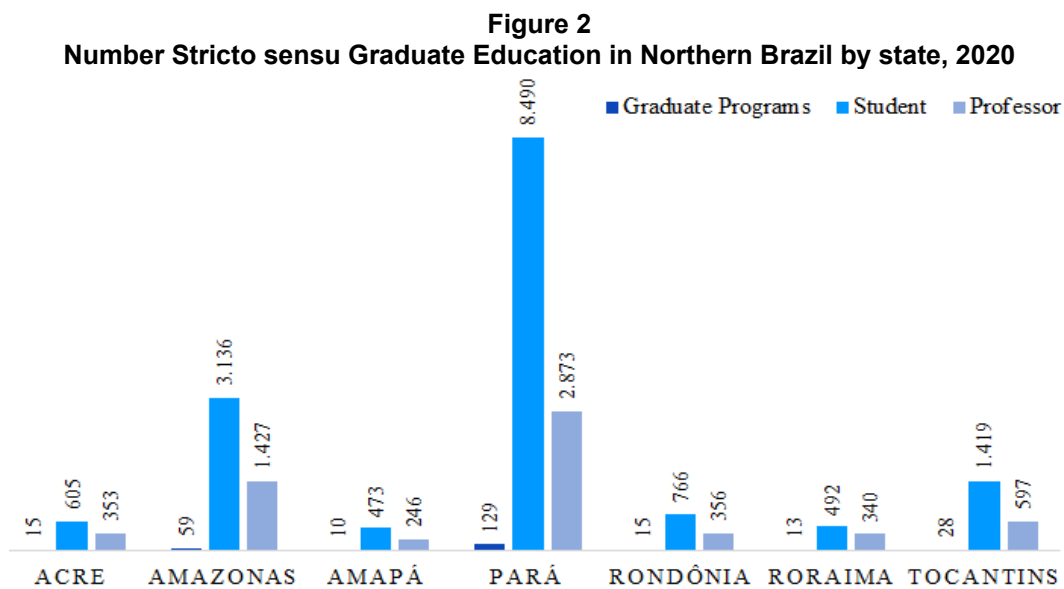
According to data from research about the use of digital information and communication technologies in Brazilian households in the year of 2019, carried out by the Brazilian Internet Steering Committee (CGI.br, 2020), the proportion of households with internet connection in the five regions of the country was, respectively, 75% in the Southeast, 73% in the South, 72% in the North, 70% in the Center-West, while the lowest proportion was found in the Northeast, with 65%. The same survey by the CGI.br (2020) reveals that the percentage of households with computer access in Brazil was 46% in the Southeast, 44% in the South, 36% in the Center-West, 30% in the Northeast and 29% in the North. Thus, the survey suggests that, although in the Northern region, 70% of the households have internet access, most of the network connections are established by cellphone and not by computer, which indicates a more restricted access to certain devices.

Although it is stated that "... the implementation of emergency remote education finds a significantly reduced amount of people without access to digital technologies (Arruda, 2020, p. 266), it is important to point out that research works show that there are 2% of the universe of higher education students; 10% of the total of high school students, 16% of elementary and secondary education and 14% to 15% of pre-school without home internet access (Nascimento et al., 2020). In the case of this study, even though it deals with graduate course students, thus, with adults, it is not possible to state that all of them are able to follow and participate in remote classes and perform academic tasks, given the restrictions to indeed favorable conditions.

In particular, the results of our research in Graduate Courses in the Legal Amazon show that 1.5% of the students have occasional access to WiFi internet of third parties or by borrowing devices. In other words, “occasional access” does not mean “full access”. Therefore, access inequality also affects Master and Doctorate students of this Brazilian region. If we consider that Master and Doctorate Graduate Courses have a reduced number of students, in comparison to the universe of students, that is a significant amount. Data from a study by the Center for Strategic Studies and Management (CGEE, 2019) shows that, in the year of 2017, Brazil granted 30 master’s degrees per group of 100 thousand inhabitants. Turkey and Mexico had twice as high indicators compared to Brazil; the United States displayed a ten times higher proportion. Brazil granted 10 doctoral degrees per group of 100 thousand Brazilians. It is more than Mexico, Turkey and Chile; four to five times less than the United Kingdom, Spain and Switzerland.

The lack of full access to technological devices brings negative impacts not only for the productivity of the activities performed in the remote online classes in university, but also for research required for the production of theses and dissertations of graduate students affected by the access problem to WiFi or 3G/4G Internet.

Thus, to outline the research locus, we have conducted a mapping in 11/18/2020 in the Portal of the Georeferenced Information System - GeoCAPES (CAPES, 2020) to check the numbers of the stricto sensu Graduate Programs in the Northern region of Brazil, as shown in Figure 2:



Source: Own elaboration based on data from GeoCAPES (CAPES, 2020).

The data shown in Figure 2, regarding the year of 2019, shows that, in that year, the seven states located in the Northern region of Brazil had 269 Graduate Programs (GPs) which offered master's and/or doctoral degrees (academic and professional), 15 381 enrolled students and 6 192 professors (permanent and auxiliary). In total, the students and professors of these GPs amount to 21 573 people. The states of Pará, Amazonas and Tocantins feature, respectively, the highest number of programs, students and professors of the region.

3. Methodology

3.1 Approach

This study conforms to the paradigm of research with qualitative and quantitative approach (Flick, 2018). It should be highlighted that this convergence stresses the need to adopt different methodologies within the same study, as well as the purpose of overcoming an antagonistic view of quantity and quality. In the case of this study, given the character of the object of study and the analyzed data, these two approaches are complementary.

Considering that the research was performed at different Universities with a particular object, from the point of view of its goals, it is an exploratory study. In regard to the procedures, it is a field research. Data has been collected electronically from August 1st to September 30th, 2021, by a semi-structured online questionnaire with professors and students linked to the stricto sensu Graduate Programs (GP) of 23 higher education institutions located in the seven states of the Northern region of Brazil. Concerning the mode of funding for the overall research data (involving all participants), 97.7% of the investigated educational institutions are public (federal and state) and only 2.3% are private.

3.2 Units of analysis

The identification of existing GPs in the Northern region of Brazil and of the target audience (professors and students) of the research took place by referring to the official website of GeoCAPES (CAPES, 2020). GeoCapes is a georeferential data tool created by one of the most important funding agencies for higher education training in Brazil, CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior/ Coordination for Improvement for Higher Education Personnel). In 2019, there were 269 graduate programs in this Brazilian region, with 6 192 professors and 15 381 students, totaling 21 573 people. Hence, the survey followed population sampling criteria in surveys (Fink, 2003).

The population of the research are professors ($n = 196$) and students ($n = 200$) linked to the GPs of educational institutions ($n = 23$) located in seven states of the Brazilian Legal Amazon (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima and Tocantins). Out of these 396 participants, 218 (55,1%) are female and 178 (44,9%) are male (age 18+). The data interpretation was be made based on the notion of gender and not of (biological) sex. Considering the interest of this paper, we have chosen to analyze only data from female respondents ($n = 218$).

Before the participants were recruited, in observance of the Brazilian legal standards controlling the development of academic-scientific research involving human beings, this research was approved by the Ethics Committee of Universidade Estadual Paulista “Júlio de Mesquita Filho”, according to the CAAE 45399321.2.0000.5466, decision Nr.4.876.131, of July 30, 2021. To perform the investigation, initially, a document was sent (per email) to the Coordination of all GPs of Universities located in the Northern region, introducing the research and aiming to gain support from the staff (coordinators and technicians) of these institutions in order to develop the study. The second step was carried out by mapping potential research participants (professors and students).

As a requirement to participate in the study, the professors should be employed as professors of any *stricto sensu* GP in the Northern region of Brazil. The students, in turn, must be properly enrolled in a Master or Doctorate course (academic or professional) of a GP in this region. The minimum age of the participants is 18 years, yet there is no maximum age. The educational level of the participants is: master's degree, doctoral and postdoctoral degree.

The semi-structured online questionnaire was made available to participants in the electronic platform *Google Forms*. To participate in the study, teachers or students would initially have to read the Informed Consent Form, with information about the research and its ethical implications. If they agreed, they should click on "I accept" at the bottom of the page in order to proceed to the questions. If the person did not want to take part in the survey, he or she could simply click on 'I do not accept'. By choosing "I do not accept", it would not be possible to view the research questions and participate in the study. By marking the "I accept" option, in addition to the name (optional), an email was requested from the participant, through which it would be possible to receive a copy of the completed questionnaire and the Informed Consent Form, with the contact information of the researcher in charge. The sending of the questionnaire to the researcher assumes, therefore, the free and informed consent of the participating subject.

3.3 Data collection technique

After the online questionnaire was finished, seven volunteers (four professors and three graduate students) were invited to perform a pre-test. The questions sought to assess aspects such as digital literacies of professors and students, accessibility and use of digital technologies in remote classes, educational background and perception of professors and students regarding the use of digital devices in education, emergency remote teaching in the GPs of the Northern region during the COVID-19 pandemic, as well as impacts in the life of professors and students. The semi-structured questionnaire featured 30 items and was hosted on the *Google Forms* platform. The questions set was organized according to the Table 1 below:

Table 1
Organization of the questions set (items= 30), Brazil, 2021

Section	Theme	Quantity in each section
1	Research presentation and Informed Consent Form	-
2	Participants' initial information	10
3	Reading and writing practices, and digital technologies	14
4	Digital technologies in hist/her Graduate Program - GP	02
5	Vision on digital education in Graduate Program	04

Source: Own elaboration, 2021.

The researcher could contact the participants exclusively by email or by phone. In observance of the social distancing health measures adopted due to the COVID-19 pandemic we chose to apply an online questionnaire to protect the participants and the researcher. As explained above, the data was electronically collected after at least one year since the official beginning of the pandemic in Brazil. The dataset analyzed in this paper comprises 218 valid answers from participating women ((professors ($n = 100$) and students ($n = 118$)).

3.4 Analysis procedure

In the first step, a bibliographic search was performed and a theoretical study of authors of the investigation field of language in general and of literacy in particular, more specifically, of digital literacies at the interface with teaching in an online environment, was conducted, consistent with the objective of this paper.

In the second step, the data of the semi-structured questionnaire received the following treatment: i) the analysis of the set of closed questions was performed with the help of figures and tables created on the software MAXQDA and *Microsoft Excel*; (ii) the analysis of the set of

open questions was performed using the software MAXQDA, which can be applied both in quantitative and in qualitative research, as in the case of content analysis.

4. Results and data discussion

Table 2 presents the global number of research participants, limiting itself to the issue of gender (male and female). Considering the fact that the IBGE (2011) calls the indicator which relates the number of men to the number of women in a given population the sex ratio, out of the 396 research participants, 55.1% are of the female sex and 44.9% are of the male sex. According to data from the Brazilian Demographic Census of 2010 (IBGE, 2011, p.27) - the most recent available for reference in the year of 2022 - the sex ratio "indicates that there were 96.0 men for every 100.0 women in the country. In the Northern region, the concentration of men is higher, with 101.9 men for every 100.0 women." Hence, the female population is not predominant in the Northern region, i.e. in the Brazilian Legal Amazon. However, in our investigation, the number of women is approximately 10% higher than that of men, according to data from Table 2. This percentage of female subjects participating in the survey is consistent with the proportion of women in graduate education in Brazil, according to the previously mentioned study by the CGEE (2019) referring to the year of 2017. In the case of women, the proportion among those who have received a master's degree is approximately 55%, and of those with a doctoral degree, 54%, therefore representing the majority of this audience.

Table 2
Frequency and percentage of research participants by gender ($n = 396$), Brazil, 2021

Characteristics	Frequency	Percentage
Gender		
Female	218	55.10
Male	178	44.90

Source: Own elaboration based on participant's answers, 2021.

In the sequence, considering the scope of this paper, Table 3 shows only data about the profile of the participating women ($n = 218$), namely professors ($n = 100$) and students ($n = 118$). In this table, we have chosen to gather data related to: age, marital status, Brazilian state of residence, occupation, educational level and kind of educational institution where they work/study, outlining the universe of the participants.

The participation by age range is widely spread, the participants aged 31-40 ($n = 68$) being the majority, representing 31.19%. There were also participants aged over 60 years ($n = 11$). As to the marital status, over 80% of the participants declared themselves married ($n =$

108) or single ($n = 72$). About 16% of the professors and students are divorced, separated or widowed, which suggests that they might live alone, having to work and study, tend the household and children, experiencing a work overload. The data in Table 3 also shows that most of the participants (80%) lives, respectively, in the states of Pará ($n = 74$), Tocantins ($n = 70$) and Amazonas ($n = 35$). Pará and Amazonas, besides being the most populated states of the Brazilian Legal Amazon, also have the largest number of universities, graduate programs, professors and students of that region (CAPES, 2020).

Regarding the participants' occupation, there is a certain balance between professors ($n = 100$) and students ($n = 118$), taking into account that the proportion of the number of students in regard to the number of professors in educational institutions is higher. The indicators allow us to state that both groups are well represented in the research. The participants holding a master's degree amount to 50.92%. It is noteworthy that 18.35% of the participants have done postdoctoral research, a high index which points to the specialized qualification of the GP professors in the Brazilian Legal Amazon.

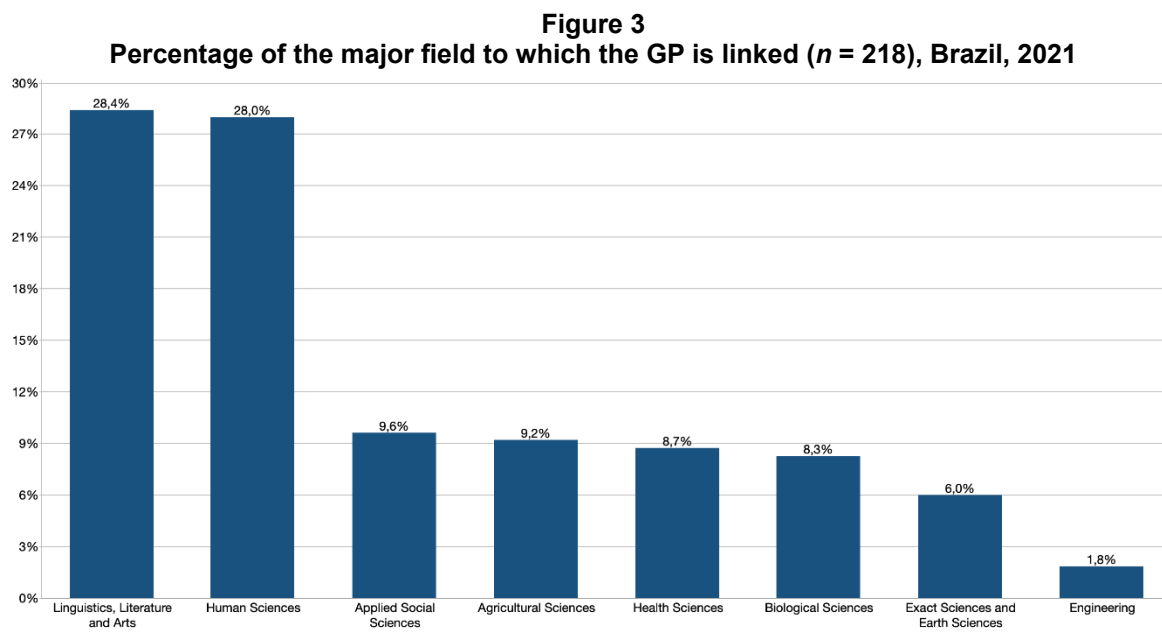
Regarding the kind of educational institution to which the participants (female professors and students) are linked, 98.62% are public (Federal and State) and only 1.38% come from private institutions. Yet, in the year of 2020, 82.1% of the Brazilian stricto sensu GPs were of public educational institutions (58.5% federal, 22.7% state and 0.9% municipal) and only 17.9% were of private institutions (CAPES, 2020). In the Brazilian scenario, public universities concentrate most of the GP with the best rankings in national assessments, being also the main responsible for productivity in scientific research in the country (Candido et al., 2021). Therefore, the research findings reinforce the social importance of the public universities in Brazil, in particular in the Legal Amazon.

Table 3
Frequency and percentage of the profile of the female respondents (n = 218), Brazil, 2021

Characteristics	Frequency	Percentage
Gender		
Female	218	100.00
Age		
18 to 30 years	39	17.89
31 to 40 years	68	31.19
41 to 50 years	54	24.77
51 to 60 years	46	21.10
Above 60 years	11	5.05
Prefer not to answer	0	0.00
Marital status		
Married	108	49.54
Single	72	33.03
Divorced	28	12.84
Separated	6	2.75
Widowed	2	0.92
Prefer not to answer	2	0.92
State of residence		
Pará (PA)	74	33.94
Tocantins (TO)	70	32.11
Amazonas (AM)	35	16.06
Rondônia (RO)	11	5.05
Roraima (RR)	9	4.13
Acre (AC)	7	3.21
Amapá (AP)	1	0.46
Other	11	5.05
Occupation		
Stricto sensu graduate student	118	54.13
Stricto sensu graduate course professor	100	45.87
Educational level		
Master's degree	111	50.92
Doctoral	67	30.73
Postdoctoral	40	18.35
Kind of Higher Education Institution (HEI)		
Public	215	98.62
Private	3	1.38

Source: Own elaboration based on participant's answers, 2021.

Concerning the major field of activity or employment of female professors and students ($n = 218$), Figure 3 shows that 66% of them are in the major field of Humanities: Linguistics, Literature and Arts (28.4%), Human Sciences (28%) and Applied Social Sciences (9.6%). They are followed by Agricultural Sciences (9.2%), Health Sciences (8.7%), Biological Sciences (8.3%), Exact Sciences and Earth Sciences (6.0%) and Engineering (1.8%). The Multidisciplinary field was not included in the research. The higher percentages in the fields of Linguistics, Literature and Arts and Human Science are consistent with the form of women's participation among title holder per major field of knowledge. According to the study by the CGEE (2019), the degrees in Linguistics, Literature and Arts amount to 65.6% of women holding master's degrees, and 64.7% of women holding doctoral degrees. The degrees in Human Sciences, in turn, amount to 61.6% of women holding master's degrees, and 56.8% of women holding doctoral degrees. The higher engagement of participants in these fields could be explained by the proximity of the participants' field of activity/employment and the research topic, at the same time as there is a lower representativeness of women in other fields of knowledge, such as Engineering (36.7% for master's degrees and of 34.2% for doctoral degrees). The participation percentage of women among the degree holders per major field of knowledge amounts to 55.8% of women holding master's degrees, and 54.4% of women holding doctoral degrees (CGEE, 2019). See Figure 3:



Source: Own elaboration based on participant's answers, 2021.

Regarding internet access by female professors and students in online classes, on one hand, 80.3% of them had good quality broadband Internet at home, and 1.8% used good quality mobile data (smartphone). On the other hand, 16.1% had poor quality broadband Internet at home, 0.9% accessed it via poor quality mobile data (smartphone) and 0.9% had occasional access to WiFi internet of third parties or by borrowing devices. Among the female professors, 87.3% of them had good quality broadband Internet at home, while the percentage of them having poor quality broadband Internet at home was 10.8%. Among the female students, these rates were respectively 74.1% and 20.7%. The data suggests, on one hand, investment of personal resources to obtain access to good quality internet. Social class, related to the economic aspect of having or not an employment as a professor, is also a factor to be considered in the access of good quality broadband Internet at home. On the other hand, the requirement of digital technologies to proceed with studies and research, without institutional infrastructure and offer, is a factor of exclusion of almost 1% of women. Overall, the results show that 1.5% of the male and female professors and students of Graduate Courses in the Legal Amazon have occasional access to WiFi internet of third parties or by borrowing devices. Therefore, this is the group without full Internet access, a key aspect for inclusion in emergency remote teaching in higher education. In Brazil, 2% of higher education students do not have this form of access (Nascimento et al., 2020). Thus, it is not possible to conceive reading and writing practices without a connection to the social and historical conditions of their production.

Emergency remote teaching in the context of the COVID-19 pandemic has had primarily negative impacts in the life of female professors and students ($n = 218$) of Graduate Courses in the Brazilian Legal Amazon. In reply to the open question, "Which were the main impacts on your academic life caused by emergency remote teaching in the context of the COVID-19 pandemic?", the participating women pointed to: (i) excess of work and activities (22.9%); (ii) lack/difficulty of interaction/contact with colleagues and the supervisor (22.9%); (iii) mental health problems (stress, anxiety, depression, fatigue, death) (18.8%); (iv) difficulty in dealing with technology and 100% online activity (15.6%); (v) difficulty in balancing the study/work/home routine (13.7%).

Almost always, there is more than one factor listed in the evaluation. In: "Stress, activity buildup and overload, loss of privacy, communication difficulty with students, work overload, health problems." (Professor, age 31 to 40, single, Exact Sciences and Earth Sciences, Rondônia), the professor highlights physical and mental health problems as well as work and activity overload and difficulty in balancing different routines. A similar impression is shared by

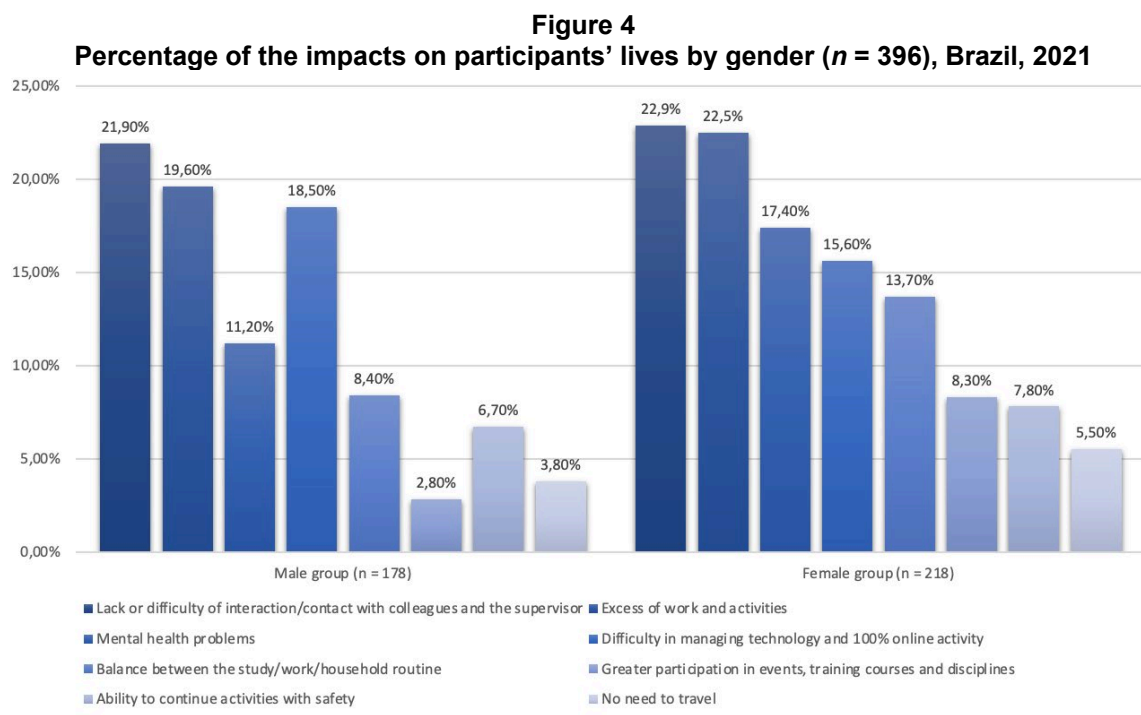
a master's student: "Dissociating the social family space from the video classes, having a room without noise, interventions; slowing down the activities; isolation increases reading and productions, and we forget about physical and mental health; lack of interaction and meetings to talk about the research; visual, mental and physical fatigue due to the hours exposed to the notebook; lack of motivation, feeling of discontinuity in my academic life narrative." (student/master's degree, age 51 to 60, married, Linguistics, Literature and Arts, Tocantins). A superposition of excessive work and activities occurs, in combination with physical and mental health problems, difficulty in having face-to-face interactions, lack of motivation, with an evident loss of study and research performance.

The statement that "it isn't possible to separate work, childcare, household chores" (Professor, age 41 to 50, married, Agricultural Sciences, Tocantins) is frequent in the assessment of the participating women, professors and students, married, single and divorced, linked to different fields of knowledge, in different states of the Brazilian Legal Amazon. Time management issues are intensified in the case of mothers: "I had to make a few decisions at the family level to ensure the attendance and participation in the master's activities, such as: wean my daughter and find a placement for her in a nursery, giving up professional promotions and moving close to the University, all in the beginning of 2020." (student/master's degree, age 31 to 40, married, Human Sciences, Pará). Furthermore: "I didn't have time to study, considering that I am a mother and do not have a support network - my daughter's school was closed." (student/master's degree, Linguistics, Literature and Arts, Tocantins).

This work overload among women in the academy, in the missing distinction between the professional work environment and the household environment, and in the lack of equal conditions of sexual division of labor (Biroli, 2018) dates back to long before the pandemic, although it has been sharpened during this period (Candido et al., 2021). The impact of COVID-19 on the research dimension was raised for discussion in studies such as the working paper by Cui et al. (2020). According to the authors, the need to move to the household setting, due to the enforcement of social distancing, has affected mainly the productivity of women, across various countries of the world. Cui et al. (2020) assessed publications in the *Social Science Research Network* (SSRN), the largest repository of preprints of the field of Social Sciences and noticed an increase of 35% in paper submissions by men, with a decrease of 13.2% in the case of women. 41 858 research preprints were analyzed in 18 disciplines, produced by 76 832 authors in 25 countries in the period of 2018 to 2020. Thus, although there are challenges shared by academic-scientific community, "in a social work deeply marked by gender, race and

class hierarchies, it is predictable that times of adversity eventually hit some parts of society more strongly than others” (Candido et al., 2021, p. 33).

There were also some participants who highlighted positive aspects of the impact of COVID-19 on academic life, such as greater participation in events, training courses and disciplines (8.7%), ability to continue activities with safety (8.2%) and no need to travel (5.5%). The use of digital platforms during this period was highlighted: “The possibility of holding and participating in international and national specialized congresses and courses, with the same quality of in-person events.” was highlighted (student/master’s degree, age 31 to 40, married, Applied Social Sciences, Tocantins). In addition, “As a positive aspect, the meetings, events and courses became more accessible and we could shorten the distances.”, assesses a professor (Professor, age 31 to 40, married, Human Sciences, Pará). Figure 4 presents data about impacts on male and female professors and students:



Source: Own elaboration based on participant’s answers, 2021.

In comparison, according to Figure 4, for male professors and students (n = 178), negative aspects were also mentioned: lack or difficulty of interaction/contact with colleagues and the supervisor (21.9%; in the female group, 22.9%); excess of work and activities (19.6%; in the female group, 22.5%); difficulty in managing technology and 100% online activity (18.5%;

in the female group, 15.6%). Men show to have been less affected than women regarding mental health problems (stress, anxiety, depression, fatigue, death) (11.2% compared to 17,4% of the female group) and the balance between the study/work/household routine (8,4% compared to 13.7% of the female group). In regard to positive aspects, the participating men highlighted the ability to continue activities with safety (6.7% compared to 7,8% of the female group), no need to travel (3.8% compared to 5.5% of the female group) and greater participation in events, training courses and disciplines (2.8%, compared to 8.3% of the female group).

The results show that, in the case of women, the negative assessment of excess of work and activities might be related to the difficulty in finding a balance between study, work and household routines. There are more severe implications for academic-scientific productivity and in mental health problems, due to the imposition of having to deal with multitasking. Specifically concerning the demands of digital literacies, 31.2% of the participating women did not take any course on the use of new technologies, compared to 42.7% of male participants. The lack of time is a factor to be considered in the availability to carry out these courses during the pandemic.

The percentage of women who declared having difficulties in handling technology and 100% online activities is 15.6%, as opposed to 18.5% of men. This difference may be related to the level of schooling. According to IBGE statistics, at least until 2019 (therefore in a period before the circulation of the new coronavirus), there was a general trend in Brazil of an increase in women's schooling (in higher education) compared to men. Although we do not have available statistical data related to postgraduate training in the country, among men aged 25 to 34 years, 18.3% have completed their higher education. This rate is 25.1% among women of the same age (a 6.8 point difference). Among men aged 35 to 44 years, 17.3% completed their higher education, while among women in the same age group this percentage is 24.4% (a 7.1 point difference). Among men aged 45 to 54, 13.8% completed their higher education. Among women of the same age, 19.4% completed their higher education (a 5.6 point difference). These are the concentrated age groups that have the largest number of participants in this research with female professors and students. This difference in the level of schooling may have helped women to deal better with online activities during the pandemic. Still in the case of women, the reason for the negative assessment is partly connected to others which have already been commented, such as productivity, lack of a proper workplace, physical and mental health problems, as stated by a graduate student: "Low academic performance due to factors such as: lack of a proper environment to perform academic activities, emotional and physical

problems, lack of familiarity with digital technologies.” (student/master’s degree, age 18 to 30, single, Linguistics, Literature and Arts, Acre).

The complexity of the factors puts into evidence that the occurrence of literacy events and activities depends on an “exteriority” constituting the text, of social and ideological nature. This constitution is “crossed” by power and authority relations which are sociohistorically set, apart from which it is not possible to project social reading and writing practices in different areas of knowledge. Additionally, the challenges posed to the academic-scientific community affect in particular certain groups, such as women (or even of poor and Black women, an issue not discussed in this paper, but of interest for an agenda dealing with literacy studies).

5. Conclusions

The research aimed to understand how digital literacies, usage of digital technologies and emergency remote teaching during the COVID-19 pandemic have affected especially the life of women participating in *stricto sensu* Graduate Programs of Universities in the Brazilian Legal Amazon. On one hand, data shows that women, professors and students, of various ages and marital statuses, coming from different fields of knowledge, have been impacted by problems in emergency remote teaching during the pandemic. Excessive work and activities, scarce interaction with colleagues, mental/physical health problems, difficulty in handling digital technologies and difficulty in balancing study/work/household routines are mentioned. On the other hand, using digital technologies has enabled them to participate in various kinds of events, such as conferences, livestreams/webinars, training courses and online disciplines, allowing them to proceed with academic/scientific activities, without having to physically move around.

The negative impacts on the life of women, especially those related to excessive work and activities, mental/physical health problems and difficulty in balancing different routines, are also shown in the studies by Martins et al. (2020) and Pérez-Nebra et al. (2020). As previously mentioned, this is not a situation which emerged in the COVID-19 pandemic, although it has been reinforced during this period. The problematization of lack of proper infrastructure to perform reading and writing activities, by using high-quality digital technologies, is also relevant for discussion. Indeed, without access to technological devices and high-quality Internet, it is impossible to conceive the inclusion process of women (and likewise, of men). This material access cannot be attached to personal financial resources, in a geographically large and

economically disadvantaged region, as is the case of the Brazilian Legal Amazon. Public policies are essential in order to promote literacy events and activities.

The closure of educational institutions (such as schools and universities) was a policy adopted in different countries to contain the spread of SARS-CoV-2. However, to mitigate the negative effects on education, government actions were fundamental to promote programs and support emergency remote teaching, such as teacher training, distribution of digital devices, and internet packages for those students without access. In Brazil, due to the Ministry of Education's lack of guidance in the first months of the pandemic, lack of resources, delays in program implementation, and also by not considering inequalities in access to education during the pandemic, existing educational inequalities were exacerbated (Barberia et al., 2021). Therefore, the "future of the nation is compromised when access to education is limited due to lack of resources and adequate public policies" (Lucas et al., 2021, p. 2).

Regarding Brazilian federal public universities, important actions have been taken, such as the distribution of digital devices and internet packages to students, for example, in the COVID-19 pandemic (Castioni et al., 2021). However, this has not benefited all those without access, because the current government is in the process of weakening such universities due to the vertiginous reduction of investments. As a result, those without access were excluded during the emergency remote teaching in the pandemic. Therefore, the negative effects impacted the lives of female professors and students of Graduate Programs in the Brazilian Legal Amazon.

Additionally, the inclusion of women in an effectively democratic process depends on other aspects, as discussed by Biroli (2018). According to this author, social gender relations, in the household and family sphere and in the sphere of work outside the home, impose historical inequalities. There are exploitation effects recognized within various social groups (by race, class, and income) – not yet very visible in groups such as professors and graduate students, with a high education level. "... this decision has a deep impact on contemporary democracies, since the balance between paid and unpaid work and the differentiated access to occupations have an effect on hierarchies which define the possibilities of political participation...", in its various forms of engagement (Biroli, 2018, p. 27). Reflecting about digital literacies in this time of COVID-19 pandemic and beyond requires a view directed towards other possible futures, in which the unequal position of women could be resignified.

As a limitation of this research, we highlighted the challenge of recruiting the participants in a period when the education facilities were closed due to the pandemic of COVID-19. The

activities in that period were overloaded, with electronic applications of surveys on different subjects, over a broad area, the previous mentioned was an aspect that may have influenced the choice of professors and students to participate (or not) in this research. The fact that the survey had 30 items; some of them with open answers, may also have influenced the length of the responses sent by the participants.

Since the survey was conducted online, it probably did not allow reaching potential participants who did not have technological resources. Thus, this limitation in access may have led to part of the population not being represented in the sample, reflecting a limitation of this research.

Despite these constraints, we were able to generate a significant dataset and corpus. We also highlighted the fact that the volume of data generated imposed a challenge at the moment of analysis. The use of qualitative data analysis software demands delimited questions from the researcher a lot. In terms of qualitative analysis what is apprehensible by the tool are units of the text. A broader analysis that takes the text into account and its relation to other texts in a socio-historical context, that demands more than a tool like this can offer.

This is original research in mapping and discussing the specific context of the Brazilian Legal Amazon, considering how the lives of women (professors and students in Graduate Programs) were affected during the COVID-19 pandemic. While studies like Candido et al.'s (2021) evaluate the impacts of the COVID-19 pandemic in the academic work of Brazilian scientists in the field of social sciences. This study considered professors and students from all areas of knowledge, in a geographical region that is recognized worldwide for its natural resources. However, the problems in a dimension as education are barely discussed. Although with limitations we hope that this study can help further investigations, about educational policies, for instance, on the appropriation of digital literacies in Brazil.

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