ARTICLE

PROFESSIONAL TEACHING DEVELOPMENT AND BASIC EDUCATION IN THE COVID-19 PANDEMIC

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ABSTRACT: This work aims to investigate the work and professional development of Brazilian teachers during emergency remote teaching in the COVID-19 pandemic, considering aspects such as working conditions, teaching-learning, and mental health. A sample of 364 basic education teachers in Brazil was assessed using self-report instruments considering sociodemographic data, working conditions, aspects related to teaching work and teaching learning (activities, knowledge and teacher education), mental health, and meaning in life. The results showed that changes in teaching work occur amid the absence or limited experience of most teachers with online teaching and/or the use of digital technology, in addition to the lack of adequate support and working conditions. The main tasks were mediated by technology, and didactic knowledge played a fundamental role in this context. The education offered to teachers by the institutions was largely insufficient, causing the need for complementary (self)education. Experiential knowledge has been shown to be fundamental in teaching and learning. Finally, mental health was shown to play a crucial role in this professional development process, in addition to demonstrating a positive correlation with the presence of meaning in life. The implications for the professional development of teachers are discussed.
Keywords: professional development, COVID-19, Brazil, basic education teachers.

DESENVOLVIMENTO PROFISSIONAL DOCENTE E EDUCAÇÃO BÁSICA NA PANDEMIA DE COVID-19[1]

RESUMO: Este trabalho tem como objetivo investigar a atuação e desenvolvimento profissional de professores brasileiros durante o ensino remoto emergencial na pandemia de covid-19, considerando aspectos como condições de trabalho, de aprendizagem da docência e da saúde mental. Uma amostra de

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364 professores da Educação Básica no Brasil foi avaliada a partir de instrumentos de autorrelato considerando dados sociodemográficos, condições de trabalho, aspectos relativos à atuação docente e aprendizado da docência (atividades, saberes e formação docentes), saúde mental e sentido da vida. Os resultados apontaram que as mudanças no trabalho docente ocorrem em meio à ausência ou pouca experiência da maioria dos professores com ensino *on-line* e/ou com uso de tecnologia digital, além da falta de apoio e condições de trabalho adequados. As principais tarefas foram mediadas por tecnologia e os saberes didáticos tiveram um papel fundamental neste contexto. A formação oferecida aos professores pelas instituições educativas foi insuficiente em grande parte, provocando a necessidade de (auto)formações complementares. Os saberes experienciais demonstraram ser fundamentais na aprendizagem da docência. Finalmente, a saúde mental demonstrou ter um papel crucial nesse processo de desenvolvimento profissional, além de demonstrar uma correlação positiva com a presença de sentido na vida. Implicações para o desenvolvimento profissional docente são discutidas.

Palavras-chave: desenvolvimento profissional; covid-19; Brasil; professores da Educação Básica.

DESARROLLO PROFESIONAL DOCENTE Y EDUCACIÓN BÁSICA EN LA PANDEMIA DEL COVID-19

RESUMEN: Este trabajo tiene como objetivo investigar la actuación y desarrollo profesional de profesores brasileños durante la enseñanza remota de emergencia en la pandemia COVID 19, considerando aspectos como las condiciones de trabajo, aprendizajes de los docentes y su salud mental. Una muestra de 364 profesores de educación básica en Brasil fue evaluada a partir de instrumentos de autodescripción considerando datos socio demográficos, condiciones de trabajo, aspectos relativos a la actuación del docente y el aprendizaje de la docencia (actividades, saberes y formación profesional), salud mental y sentido de la vida. Los resultados indican que los cambios en el trabajo docente se dan en medio de la ausencia o poca experiencia de la mayoría de los profesores con la enseñanza online y/o uso de tecnología digital, además de la falta de apoyo y condiciones laborales adecuadas. Las principales tareas estuvieron conciliadas por la tecnología y los saberes didácticos jugó un papel fundamental en este contexto. La formación ofrecida a los profesores por parte de las instituciones educativas fue en la mayoría de los casos insuficiente, provocando la necesidad de una autocapacitación complementaria. Los saberes experienciales demostraron ser fundamentales en la enseñanza docente. Finalmente, Se ha demostrado que la salud mental juega un papel crucial un papel crucial en este proceso de desarrollo profesional, además de demostrar una correlación positiva con la presencia de sentido en la vida. Implicaciones para el desarrollo profesional docente son discutidas.

Palabras clave: desarrollo profesional, COVID-19, Brasil, profesores de educación básica.

INTRODUCTION

The pandemic scenario has had an unprecedented impact on the history of education. Numerous countries have suspended classes in educational institutions to curb the contamination, since these spaces bring together large numbers of people indoors. By mid-April 2020, the pandemic had already affected the educational system all over the planet. According to UNESCO (2020), on April 2nd, 2020, 172 countries had all their educational institutions closed, leaving approximately 1.5 billion students without classes, which is equivalent to 84.8% of the total number of students enrolled worldwide.

In Brazil, the National Council of Education (CNE), through Opinion No. 11/2020, recommended that the education networks, both public and private, allow flexibility around the adoption of the offer of non-presence education, in order to mitigate the educational damage caused by the suspension of classes. Therefore, many basic education institutions have implemented what has been called Emergency Remote Teaching (ERL) — or simply remote learning —, a transitional teaching experience that "[...] prioritizes pedagogical mediation through technologies and digital platforms to support teaching and learning processes" (Oliveira et al., 2020, p. 6). It is important to highlight that remote teaching is not synonymous with Distance Education (DL), because DL is a teaching modality

with its own operation and legal regulation (Brazil, 2017) while the ERT is a strategy to continue the teaching activities during the period of social isolation.

In this context, schools had to adapt, in a short period of time, their activities to continue the school year through remote teaching, since no system, either public or private, was prepared to meet the challenges imposed by the suspension of classroom classes. The implementation of remote teaching has mobilized different opinions about its effectiveness or not, as well as posed several challenges for teachers, especially given the urgency with which it was implemented. Surveys carried out among Brazilian teachers by the Fundação Carlos Chagas (2020), by the Gestrado (2020) and by Instituto Península (2020) show a portrait of the teaching profession in the pandemic context. The data reveal a work overload, the lack of teacher training to work with technologies, teachers' little or no experience with Information and Communication Technologies (ICTs), and also the effect of this period on teachers' mental health. The panorama presented by these studies indicates the need to deepen the investigations about teachers' performance during the covid-19 pandemic period. Research in this area is still scarce and/or incipient to answer so many questions imposed by the dissemination of the new coronavirus.

In light of this, this paper proposes to investigate the professional development of teachers in emergency remote teaching during the covid-19 pandemic, including working conditions, learning to teach, and mental health. Considering the Brazilian teacher in the covid-19 pandemic, this objective unfolds into the following research questions: What were the working conditions? What were the activities and knowledge teachers need in remote teaching to promote student learning? What factors contributed to teachers' learning to teach in this context? What was the influence of mental health in this professional development process?

Teacher Professional Development (TPD) here is understood from the studies of Marcelo García (2009) who states that TPD is an individual or collective process that should be contextualized in the teacher's workplace and that contributes to the development of professional competencies through diverse experiences. Imbernón (2011) advocates that the teacher develops through various factors such as salary, work climate, labor market demands, career plan, ongoing training carried out throughout the professional life, among others. These elements were strongly impacted during the pandemic (Flores et al., 2020; Fundação Carlos Chagas, 2020; GESTRADO, 2020; Penísula Institute, 2020). The teacher needed to develop competencies, skills, and knowledge to act in this new educational environment, and this attitude may favor the professional development of teachers and the strengthening of teacher learning (Darling-Hammond & Hyler, 2020).

METHODOLOGY

According to the objective of the investigation, this research is exploratory, because it seeks to familiarize with the phenomenon being investigated — in which information is lacking for a better understanding — in order to make it explicit or to build hypotheses (Gil, 2002).

Participants

The research participants were Basic Education teachers working in Brazil who worked during the covid-19 pandemic scenario in the remote teaching modality. This work adopted a non-probabilistic sampling, by convenience, which is also indicated for exploratory research (Oliveira, 2001).

The survey had 451 participating teachers, but 87 were excluded from the sample for failing the attention test in the questionnaire. Thus, there were 364 teachers, 59.3% of whom were female and 40.7% male. The average age was 39.0 years ($\pm$8.9)). Regarding employment status, 83.2% of the teachers were public servants. The participants were from the Federal District and 23 cities from 26 states of the federation. However, four states accounted for 68.3% of the sample: Bahia (32.4%), Minas Gerais (15.9%), Goiás (10.4%), and Pernambuco (9.6%).

Instruments

For the production of empirical data were used:

1) sociodemographic questionnaire (own preparation) containing 14 items, with the purpose of getting to know the teacher's workspace, as well as obtaining professional information related to teaching;

2) questionnaire on working conditions and learning in teaching (own development) with 24 items to identify working conditions and assess issues related to teaching knowledge. Briefly, these items address: workload, salary conditions, work equipment, quality of *Internet* connection, institutional support, professional activities performed, perception of the work in remote teaching and the preparation for such activity, teacher training and self-training, didactic-pedagogical knowledge used, social sources of acquisition of teaching knowledge, teaching role in remote teaching;

3) Mental Health Continuum Short Form — MHC-SF (Source et al., 2020; Machado & Bandeira, 2015). It has 14 items of six points distributed in three factors of well-being: emotional, psychological and social. The score of the questionnaire can result in three states of the person: 1) *flourishing*, considered with a high level of emotional, social and psychological well-being; 2) languishing, conceived as a stagnation and silent despair, in which the people see themselves, and life, with an "emptiness". It is considered a lack of mental health; 3) moderate, when the person is neither flourishing nor *languishing*, and can also be interpreted as someone who does not have high levels of well-being (Fonte et al., 2020; Keyes, 2007). Following the example of other research with different populations and cultures (Allen et al., 2020; Tardif, 2014; UNESCO, 2020), the sample of this study also demonstrated good internal consistency, measured by *Cronbach's alpha,* both for the 14 items of the scale ($\alpha = 0{,}916$), as well as for its subscales: emotional well-being, $\alpha = 0.854$, social well-being $\alpha = 0.842$, and psychological well-being, $\alpha = 0.876$ (Fonte et al., 2020);

4) Meaning of Life questionnaire — MLQ (Aquino et al., 2015), composed of 10 items to be evaluated on a seven-point scale, from one (totally false) to seven (totally true). It has two factors, with five items each: search for meaning and presence of meaning. The sample of this study also obtained a significant internal consistency with *Cronbach's Alpha* calculated at 0.86 in both sub-factors.

Procedures

All questionnaires were prepared using *Google Forms* platform and applied online. The dissemination took place through *e-mails*, social networks, and other digital communication platforms, in the period from October 14 to November 9, 2020, and the average response time was 15 minutes. As for the ethical aspects of the research, all regulations regarding research with human beings were considered, and the project was submitted and approved by the Ethics Committee and Research with Human Beings of the State University of Feira de Santana (UEFS), protocol CAAE no. 35503220.1.0000.0053.

Analysis

The data generated by *Google Forms* were imported and analyzed in Excel and SPSS 20.0, using descriptive statistics. Inferential statistics were also used to check the correlation between the factors present in the Mental Health Continuum Short Form and Meaning of Life Questionnaire, using Pearson's correlation test. To check for differences between the three groups of mental health status (flourishing, moderate, languishing), the Kruskal-Wallis test was run to compare items of themes of learning to teach present in the questionnaire (role of the teacher, didactic-pedagogical knowledge, self-training, social sources of teaching knowledge, perception of the use of digital technologies, and preparation for acting in remote teaching). Only the questions that it was possible to convert the answers into a numeric ordinal scale were considered. Chi-square was also performed to analyze the presence of differences in the three groups mentioned in relation to sociodemographic data.

RESULTS

A Table 1 shows the characterization of the research sample. We highlight teachers from the federal education network, who work in secondary education (vocational) and are public servants. These

teachers are also composed, in their great majority, of masters and doctors. As for the teaching network, only 5.5% work in more than one network.

Table 1: Characterization of the research participants

	%
Educational level of performance	
Early Childhood Education	2.7%
Elementary School	22.0%
High School	65.7%
More than one level of education	9.6%
Education	
High School	0.3%
Undergraduate	8.2%
Specialization	27.5%
Master's Degree	33.5%
PhD	30.5%
Education Network	
Private Network	11.8%
Municipal Network	17.3%
State Network	17.1%
Federal Network	59.3%
Employment relationship	
Public Servant	84.3%
Temporary contract	10.5%
Consolidated Labor Laws	8.3%
Other	0.3%
More than one link	3.4%
Time of service in teaching	
1 to 10 years	43.7%
11 to 20 years old	36.8%
21 to 30 years old	14.8%
31 to 40 years old	4.7%

In the following, each subsection addresses one research question so that the presentation of the resulting data is better organized.

What are the working conditions?

In this axis of analysis, data concerning the teaching workload, physical conditions (space and equipment) and connectivity to perform remote work stand out. Regarding the workload, for 83.2% of the respondents, there was an increase in the number of hours dedicated to the preparation of remote classes compared to face-to-face classes. Regarding the space for remote work, the most used were the bedroom and the living room. It was observed that 32.1% used a different bedroom than the one they sleep in, 19.8% used the same bedroom, and 29.5% used the living room for work purposes. As for the equipment used for work, 71.4% had *laptops* and 35.3% had desktop computers. It is worth mentioning that 64.6% of the teachers used more than one device, 62.5% used a cell phone together with other equipment, and 23.6% shared the work equipment with other people in the family. As for the quality of the *Internet* connection, 60.4% of teachers rated it as reasonably good.

When questioned about the availability of structural/material support, it was found that 89.6% of the teachers did not receive any support from schools and/or Education Departments, such as devices and *Internet*. The proportion of teachers in the municipal education networks who did not have any kind of support for non-face-to-face activities was the highest, 95.3%, when compared to other

education networks. The highest percentage of teachers who received this support were those who worked in the private and federal networks, with 18.6% and 14.1%, respectively.

What are the activities and teaching skills needed in remote teaching to promote student learning?

Among the main activities performed daily by the teachers remotely, the most relevant or very relevant were in Chart 1. Class preparation, 46.2%; use of the virtual learning environment (VLE), 45.9%; and out-of-class interaction with students through digital resources, 44.8%, were the tasks most performed every day. Another notable fact is that the practice of live classes was more frequent than recorded classes.

Chart 1: Main activities performed daily in remote teaching evaluated as relevant or very relevant by teachers (in %)
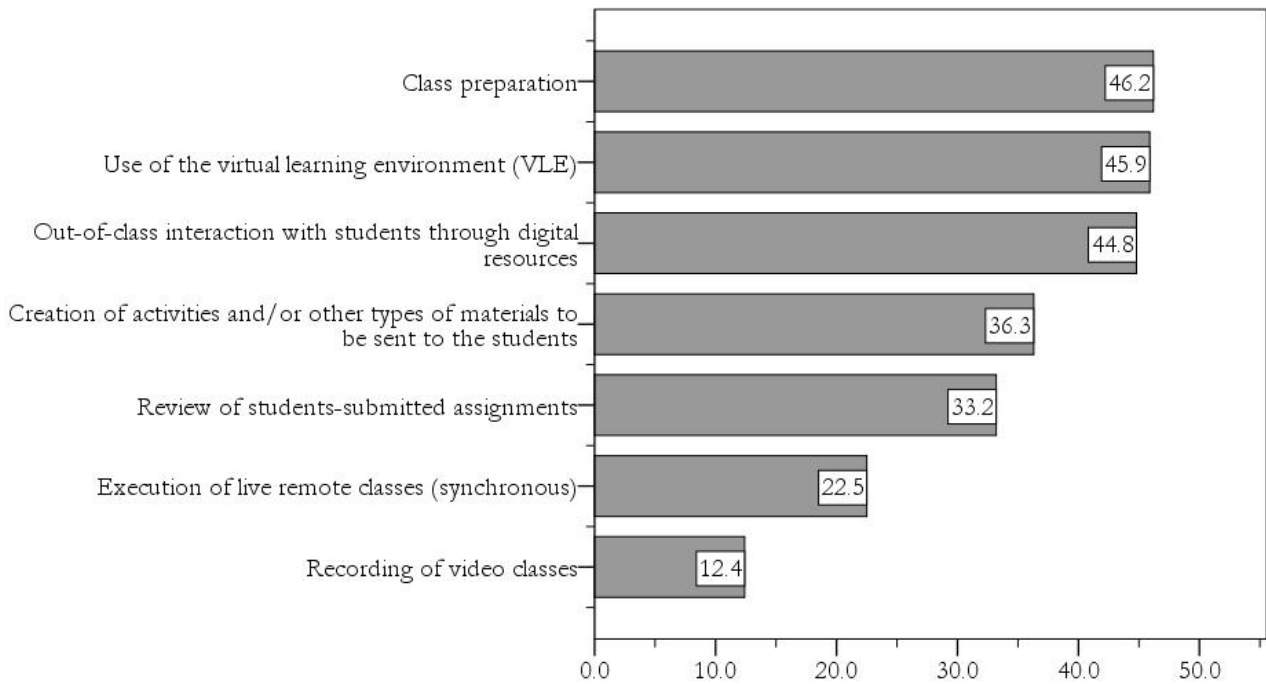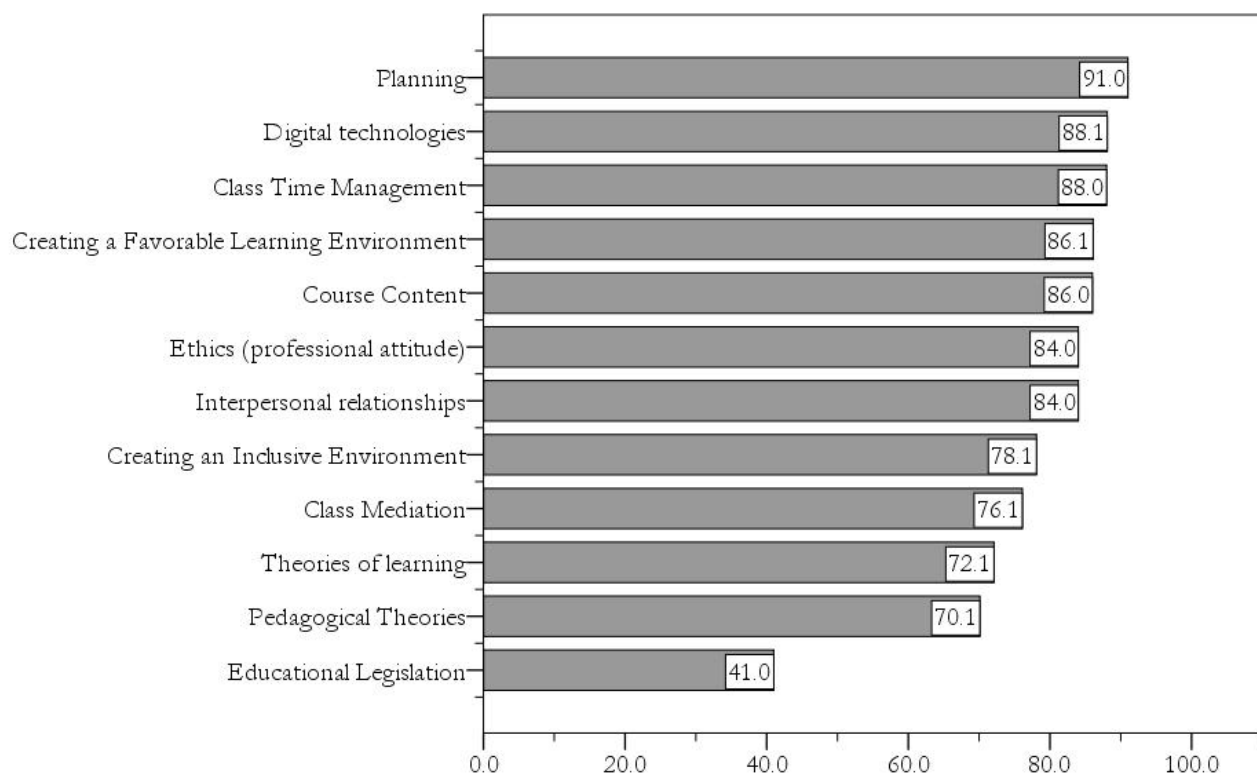

Chart 2 shows the didactic-pedagogical knowledge assessed as relevant, or very relevant, by the teachers for their pedagogical practices during emergency remote teaching. Some of this knowledge was taken from the list of knowledge inventoried by Cristina D'Àvila and Lúcia Ferreira (2019) and, although it had higher education as a parameter, it is used here in order to establish a panorama, albeit with this limitation, of the reality in question.
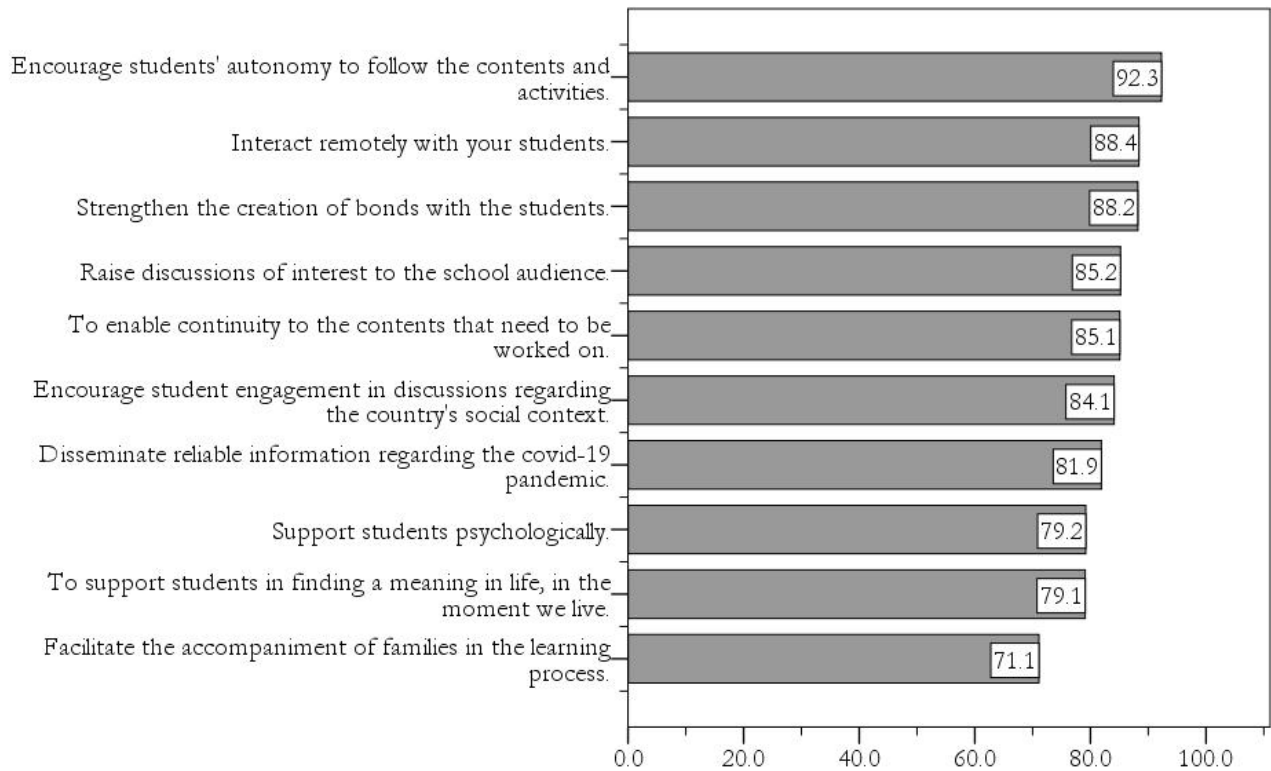
Chart 2: Didactic-pedagogical knowledge evaluated as relevant or very relevant for working in the remote teaching context (in %)

Planning	91.0
Digital technologies	88.1
Class Time Management	88.0
Creating a Favorable Learning Environment	86.1
Course Content	86.0
Ethics (professional attitude)	84.0
Interpersonal relationships	84.0
Creating an Inclusive Environment	78.1
Class Mediation	76.1
Theories of learning	72.1
Pedagogical Theories	70.1
Educational Legislation	41.0

When the data on didactic-pedagogical knowledge is intersected with the main activities performed by teachers (Chart 1), a relationship between these informational sets can be seen, since the most relevant didactic knowledge for teachers, such as planning and managing class time, is articulated with the main activity performed by teachers: preparing classes. There is also a link between the mobilization of digital technologies, as important knowledge for remote teaching, and some of the activities most frequently performed by teachers, such as the preparation of classes for the digital medium, the use of virtual learning environments, and interaction with students through digital resources.

The teachers also evaluated their role in the pandemic context. Chart 3 shows which roles, from a previously defined list, the teachers considered relevant or very relevant in the remote teaching scenario. Despite the concern in maintaining the continuity of the disciplinary contents, even in view of the activities performed and the didactic-pedagogical knowledge mobilized presented here, it can be seen that these teachers did not see themselves only as mediators between the student and the content in this educational context, but they also perceived themselves as professionals with multiple roles, reaching affective, psychological, and existential aspects, in which communication, empathy, and adaptability are indispensable requirements for their teaching performance.

Chart 3: Teacher roles in the pandemic context considered relevant or very relevant (in %)
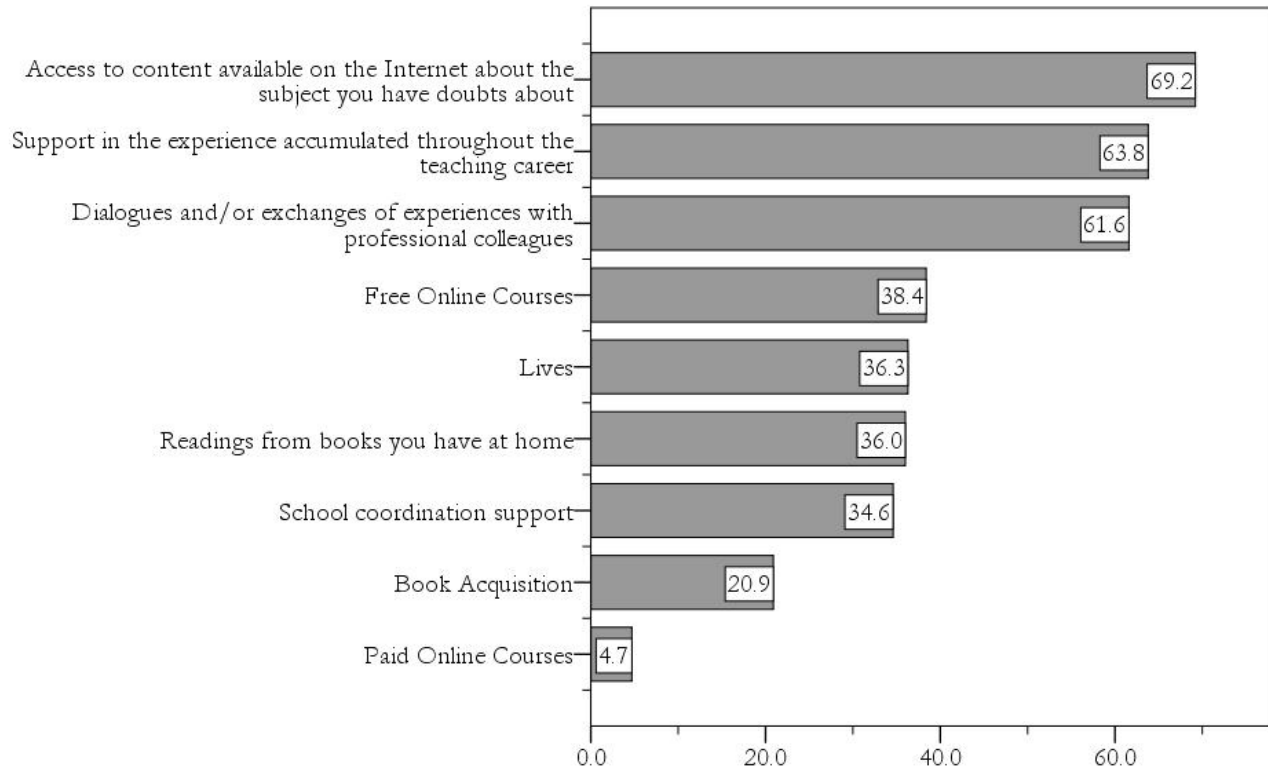

Teacher role	%
Encourage students' autonomy to follow the contents and activities.	92.3
Interact remotely with your students.	88.4
Strengthen the creation of bonds with the students.	88.2
Raise discussions of interest to the school audience.	85.2
To enable continuity to the contents that need to be worked on.	85.1
Encourage student engagement in discussions regarding the country's social context.	84.1
Disseminate reliable information regarding the covid-19 pandemic.	81.9
Support students psychologically.	79.2
To support students in finding a meaning in life, in the moment we live.	79.1
Facilitate the accompaniment of families in the learning process.	71.1

What factors have collaborated for teachers to learn to teach in this context?

Initially, it is noteworthy that 51.6% of the respondents had no previous experience teaching activities outside face-to-face, and that 25.3% had little experience. In terms of training for the use of digital technologies, 74.2% of the teachers surveyed had participated in some training activity of their teaching institution and/or Secretary of Education, but 70% of this public evaluated that the training partially met the needs of the pedagogical practice in remote teaching, and another 15.1% evaluated that the training did not meet such needs. For 15.9% no training was offered and 9.9% did not answer this item. It is also noteworthy that 53.4% of the respondents informed that they studied on their own, through online resources such as *lives,* videos or *websites.* Another 43.6% sought, on their own initiative, training offered by another institution.

When asked about what/who they sought out most often as a complement to their training in case of doubts about the educational practice in remote teaching, the results indicated a researcher attitude from the teachers, who sought, through the possibilities of the *Internet,* to improve their training. The experience acquired throughout their careers and the socialization of this experience among their peers also proved to be important subsidies for learning how to teach in the remote teaching model. Other complementary training strategies are also listed in Graph 4. Other complementary training strategies are also listed in Graph 4, but sought by teachers less frequently.

Chart 4: Activities complementary to training to work in remote teaching (in %)


Activity	%
Access to content available on the Internet about the subject you have doubts about	69.2
Support in the experience accumulated throughout the teaching career	63.8
Dialogues and/or exchanges of experiences with professional colleagues	61.6
Free Online Courses	38.4
Lives	36.3
Readings from books you have at home	36.0
School coordination support	34.6
Book Acquisition	20.9
Paid Online Courses	4.7

Regarding working with digital technologies, a didactic knowledge considered relevant or very relevant by most, 43.9% of the participants in the survey considered it easy or very easy, 15.7% considered it difficult and/or very difficult, and 40.4% considered it neutral. Analyzing the respondents according to teaching networks, it can be seen that the state network has the highest number, 27.4%, of teachers who consider it difficult or very difficult to work with technologies, and the highest percentage, 53.5%, of teachers who consider it easy or very easy perform their duties in the private network.

When asked how they felt in terms of professional maturity to deal with remote teaching at the beginning of the pandemic right after the suspension of classroom classes in March 2020, 56.6% assessed themselves as unprepared. Measuring how they felt after a few months of operation, when the questionnaire was answered, the perception of these teachers changed and the number dropped to 6.3%. Among those who felt prepared, or reasonably prepared, at the beginning of the pandemic were 33.1% of the participants, but this number rose to 75.8% after a few months of remote teaching.

The social sources of knowledge acquisition listed by Maurice Tardif (2014, p. 63) were evaluated by teachers as relevant or very relevant to the pandemic context according to Chart 5. It is noteworthy that 89.2% of respondents considered relevant, or very relevant, the experience as a teacher at school, the practice in the classroom, the socialization of knowledge already acquired among professional colleagues, the relationship with students, among others. Drawing a parallel between this data and Chart 4, related to complementary training, experience is shown as an important mechanism to support and guide teaching practice in remote education.

Chart 5: Sources of acquisition of teaching knowledge considered relevant or very relevant during the remote teaching period (in %)
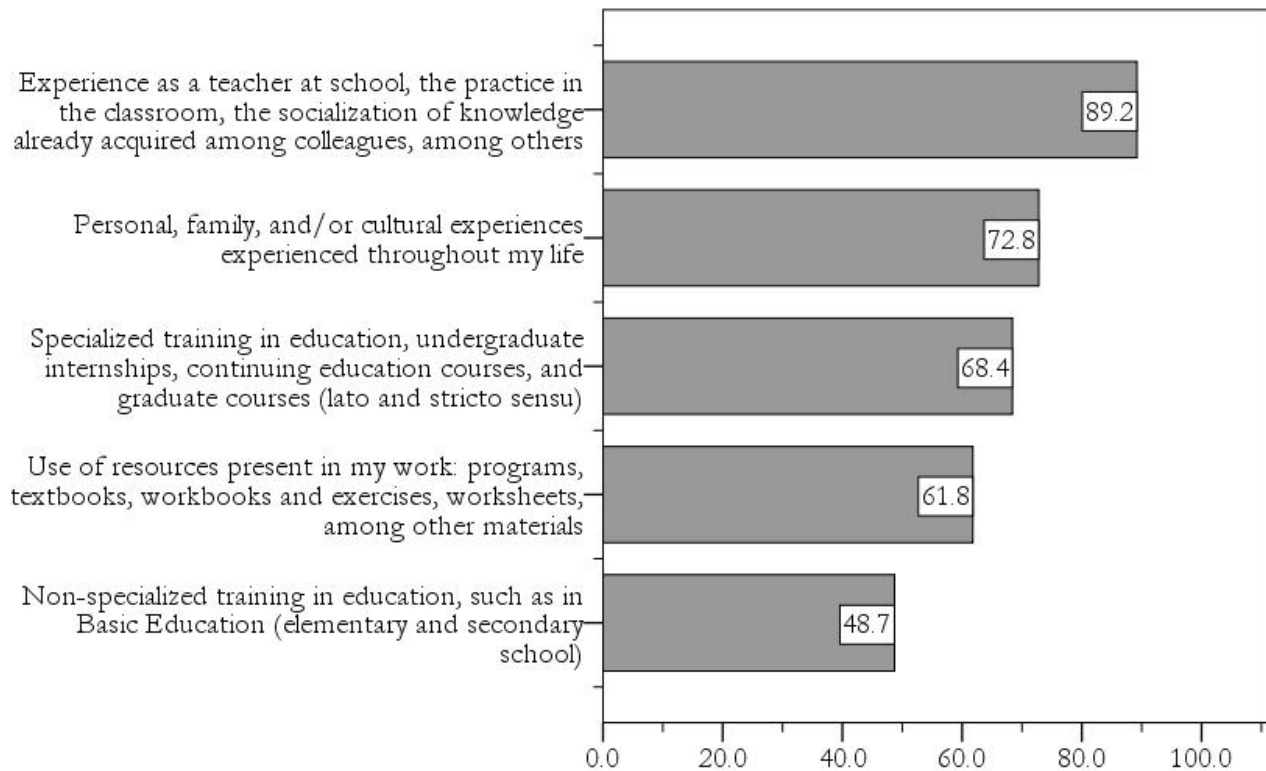
Still in the perspective of the analysis of the experience in remote teaching, we asked "how is the experience as a teacher in remote teaching going?", 13% of the teachers evaluated it as uncomfortable, 33.9% as an opportunity to build new learning, and 49.8% as challenging. Analyzing the networks and teaching levels, such experience proved to be more challenging for teachers in the private network, 55.8%, as well as for those who taught high school, regardless of the teaching network, 53.4%.

How does mental health influence this professional development process?

From the MHC-SF results, it was found that among the participants, 37.6% were shown to be mentally healthy, i.e. *flourishing* (n=137), while 9.6% were characterized as *languishing*, which denotes a lack of mental health (n=35). The 52.7% were in the moderate mental health range, which are neither *flourishing* nor *languishing* (n=192). The Chi-square test revealed no differences between the groups when considering sociodemographic data.

However, when this information was crossed with those teachers who felt prepared or very prepared at the beginning of the pandemic for remote teaching and a few months later — when this research was conducted — we obtained the data shown in Table 2. At the beginning of the pandemic, teachers in a *flourishing* state felt more prepared, 15.3%, than those in a moderate mental health state, 11.5%, and these, in turn, showed more preparedness than teachers in a *languishing* state, 2.9%. The same pattern is seen after a few months of pandemic. In other words, the data indicates a correlation between teachers' mental health status and their self-perceptions of how prepared they were to perform in remote teaching.

Table 2: Mental health status before and after the pandemic. Values indicate the percentage of teachers who felt prepared or very prepared to work in remote teaching.

|	*Flourishing*	Moderate	*Languishing*
At the start of the pandemic	15,3%	11,5%	2,9%
After a few months of pandemic	52,6%	37,0%	17,1%

Source: Authors

Table 3 shows the relationship of mental health states to teachers' perceptions about the remote teaching experience. Most teachers in the *flourishing* state rated the remote teaching experience as challenging or as an opportunity for new learning. Whereas those in *languishing* perceived it more as challenging or uncomfortable. In the "other options" field, one teacher in the *languishing* state reported that it is "Extremely stressful and meaningless. I'm stuck inside a screen. I have lost my students, my classroom, my profession."

Table 3: Mental health and perception of performance in remote teaching

	Flourishing	Moderate	*Languishing*
Uncomfortable	2,9%	13,0%	40,0%
Challenging	45,3%	53,6%	37,1%
Providing opportunities for new learning	47,4%	26,0%	11,4%
I can't/want no opinion	1,5%	2,9%	1,0%
Other Options	2,9%	4,5%	10,5%

It was also observed, in general, that teachers with *flourishing* mental health status tended to score "higher" on items related to their performance during the pandemic than those with moderate status and these, in turn, registered "higher scores" than those with *languishing*. More specifically, teachers with better (worse) mental health status during remote teaching were associated with an attitude of registering as more (less) relevant the different didactic-pedagogical knowledge and the sources from which this knowledge comes, to resort to more (less) resources and/or people to complement their training, to perceive as more (less) relevant their role in front of the students, and to have less difficulty with the use of digital technologies. To illustrate, Chart 6 exemplifies this finding with regard to the five sources of teaching knowledge categorized by Tardif (2014), indicating the percentage of teachers in each mental health state who considered each of these sources relevant or very relevant. Those with better (worse) mental health had higher (lower) perceived relevance of the sources.

Chart 6: Mental health status and source of teaching knowledge considered relevant or very relevant (in %)
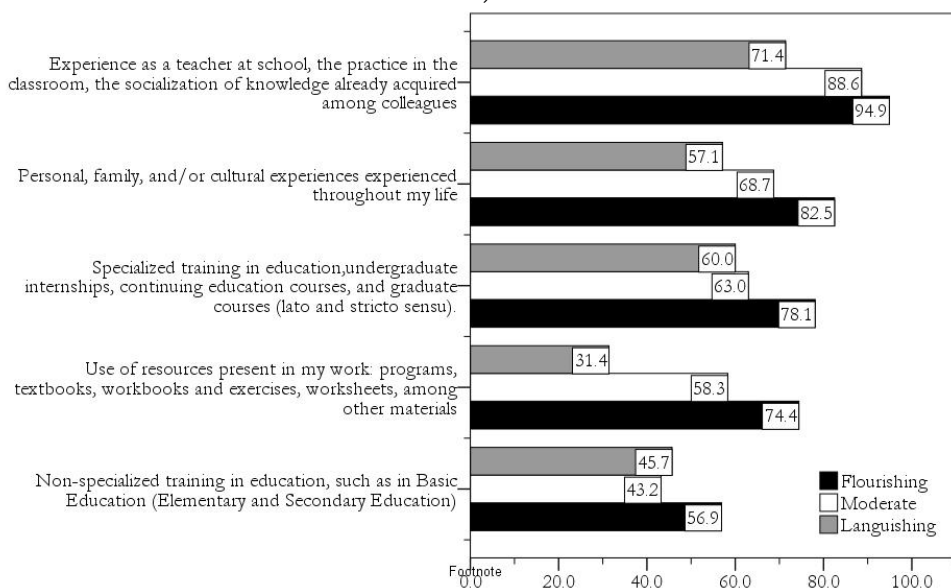
For better accuracy, the Kruskal-Wallis test was performed to determine if there were statistically significant differences in the scores of the aforementioned items between the groups that differed in their level of mental health: *flourishing*, moderate mental health, and *languishing*. Questions regarding mobilized didactic-pedagogical knowledge, social sources of acquisition of teaching knowledge, self-training, perception of the teaching role, degree of difficulty in working with digital technologies after a few months of remote teaching, and preparation for remote teaching at the beginning of the pandemic and after a few months when answering the questionnaire were analyzed. The results are shown in Box 1, where, for each item, the *H* value and the level of significance are noted. Those with significance levels less than 0.05 have been highlighted with "*", meaning that the null hypothesis — the mean ratings of the groups are equal — has been rejected. In other words, it means that the mean ratings showed statistically significant differences between the three groups. It is notable that for almost all items listed in Box 1 this null hypothesis was rejected, showing evidence, therefore, of the importance of mental health for the work activities developed by teachers, for their learning process of teaching or, more broadly, for their professional development.

Box 1: Kruskal-Wallis test results for the different mental health status groups (*flourishing*, moderate, and *languishing*)

	χ^2	p-value
For you, what is the most used didactic-pedagogical knowledge for the performance of the teacher in the context of remote teaching?		
Educational Legislation	5,810	0,055
Theories of learning	2,958	0,228
Pedagogical Theories	4,638	0,098
Ethics (professional attitude)	9,035	0,011*
Course Content	11,049	0,004*
Class Mediation	9,671	0,008*
Interpersonal relationships	6,678	0,035*
Class Time Management	6,986	0,030*
Creating a Favorable Learning Environment	12,340	0,002*
Creating an Inclusive Environment	6,482	0,039*
Digital technologies	8,369	0,015*
Planning	10,392	0,006*
Considering the pandemic context of covid-19, and the impacts on face-to-face teaching, for you, which social sources of acquiring teaching knowledge are most used for working with remote teaching?		
Personal, family, and/or cultural experiences experienced throughout my life.	8,720	0,013*
Non-specialized training in education, such as in Basic (Elementary and Secondary Education) and professional/preparatory courses (not related to teaching).	9,185	0,010*
Specialized training in education, done in a teacher training institution (teaching and/or degree course), undergraduate internships, continuing education courses, and graduate courses (*lato* and *stricto sensu*).	16,063	0,000*
Use of resources present in my work: programs, textbooks, workbooks and exercises, worksheets, among other materials.	22,572	0,000*
Experience as a teacher at school, the practice in the classroom, the socialization of knowledge already acquired among colleagues, the relationship with students, among others	13,216	0,001*
In case of doubts regarding the educational practice in remote teaching, what/who have you looked for as a complement to the training?		
Dialogues and/or exchanges of experiences with professional colleagues	5,020	0,081
Access to content available on the *Internet* about the subject you have doubts about	4,581	0,101
Free Online Courses	12,684	0,002*
Paid Online Courses	2,539	0,281
Lives	10,104	0,006*
Readings from books you have at home	9,440	0,009*

Book Acquisition	10,269	0,006*
School coordination support	14,086	0,001*
Support in the experience accumulated throughout the teaching career	22,768	0,000*
Considering the present moment, for you, what is the teachers' role in this context?		
Encourage student engagement in discussions regarding the country's social context.	6,487	0,039*
Strengthen the creation of bonds with the students.	14,503	0,001*
Disseminate reliable information regarding the covid-19 pandemic.	3,245	0,197
Interact remotely with your students.	20,682	0,000*
Raise discussions of interest to the school audience.	13,954	0,001*
Facilitate the accompaniment of families in the learning process.	16,311	0,000*
To enable continuity to the contents that need to be worked on.	18,910	0,000*
Encourage students' autonomy to follow the contents and activities.	15,124	0,001*
Support students psychologically.	17,639	0,000*
Support students in finding a meaning in life, in the moment we live.	12,703	0,002
Did you feel prepared at the beginning of the covid-19 pandemic in March 2020 for remote teaching?	1,921	0,383
Have you felt prepared at this point, after a few months of experience, to work in remote teaching?	13,155	0,001*
In your opinion, after this period of remote teaching, how do you consider working with digital technologies?	10,071	0,007*

When asked if they had any professional support to deal with mental health, 50% of the teachers said no. Another 22% indicated that the school and/or the Education Department had created listening and welcoming channels. Another 22% indicated that the school and/or the Secretary of Education created listening and welcoming channels, 13% indicated that the educational institution and/or the Secretary of Education offered psychological treatment, 4% received psychiatric and psychological treatment, and, finally, 11% expressed various opinions such as mentions of *lives* and lectures on mental health.

The MHC-SF subfactors showed a strong positive correlation with each other: emotional well-being and psychological well-being ($r = 0.53$), emotional well-being and sociological well-being ($r = 0.64$), and finally psychological well-being and social well-being ($r = 0.62$). This correlation shows an interdependence among the subfactors. In the MLQ, a weak negative correlation was found between the subfactors search for meaning and presence of meaning ($r = -0.14$).

Finally, a strong positive correlation was found between the presence of meaning and the three subscales of the MHC-SF: emotional well-being ($r = 0.52$), social well-being ($r = 0.51$), and psychological well-being ($r = 0.56$). A weak negative correlation was also found between meaning-seeking and the emotional well-being subscale ($r = -0.14$).

DISCUSSION AND CONCLUSION

The analyses undertaken in this research portray remarkable changes in the teaching work since the beginning of the pandemic, among which we highlight the new space — home — for professional performance, expansion of the workload, and experiences of teaching in virtual environments and with communication technologies. This study also reveals that the changes occurred in the midst of the absence or little experience of most teachers with non-face-to-face teaching and/or use of digital technology, lack of support and adequate working conditions, and the mental health susceptible to be affected given the new global scenario, either in the professional or personal context. The training offered to teachers by educational institutions was largely insufficient to meet the demands, provoking the need for complementary (self)training. Didactic knowledge has played a fundamental role in this context, and the knowledge arising from experience has been indispensable in learning how to teach. We discuss the main points in detail below.

Working conditions

In terms of working conditions, the research data shows significant changes in the teaching work, starting with the daily routine of this professional, who used to have a sequence of routine activities such as arriving at school, going through the teachers' room, the classroom, breaks, talking in the hallways, etc. With the implementation of remote teaching, this "ritualization of school work" (Tardif & Lessard, 2014, p. 165) was abandoned. Instead, the teacher had to improvise a home space, have their own equipment and connectivity to continue their work activities and, in most cases, teachers had no support from schools and/or education networks in adapting to the new reality. The changes could also be felt in the teachers' workload, since, for most of the teachers investigated, there was an increase in the number of hours available for preparing classes. Thus, the research exposes insufficient and improvised working conditions, which are ratified by data presented by research carried out by the Fundação Carlos Chagas (2020) indicating that, for a large number of teachers, there was an increase in workload and abrupt changes in the pedagogical work in remote teaching. Research undertaken by Flores et al. (2020), with Portuguese teachers, reveals a similar scenario, since, for 89.1% of the research subjects, there was an increase in the time spent teaching, and 96.7% use their own technological devices to work. In summary, insufficient and improvised work infrastructure, extended working hours, the responsibility to manage private and professional responsibilities within the domestic space, as well as the intensification of activities developed by the teacher, marked the working conditions in this pandemic context.

Activities and teaching knowledge

With the implementation of remote teaching, some teaching activities already performed in the face-to-face mode, such as class preparation and assessment correction, continued — albeit in an adapted manner — while others were introduced into the dynamics of daily teaching. One of them was the use of virtual learning environments. However, the data indicated that this resource was used in greater proportion by teachers linked to the federal network, possibly because most federal institutions, even before the pandemic, already had a virtual teaching structure, since they offer several courses in the distance learning modality. The lowest number of teachers using this device was found in the municipal networks, probably because these networks, in Brazil, are responsible, primarily, for early childhood and elementary education, which until the pandemic could only work in person.

Another activity carried out in this period what stood out was the interaction with students through digital resources. This information also stood out in the question about the role of the teacher in the pandemic scenario. In the face-to-face classroom, the teacher-student interaction is a fundamental element for the success of the teaching-learning process, because, according to Tardif and Lessard (2014) teaching takes place within interactions. This becomes even more essential for teaching in the pandemic scenario, considering that it brought uncertainties, and for many even the illness and/or loss of family members and/or friends. Interaction makes it possible to create affection and sensitivity to understand the students and their difficulties. The relevance of interaction in remote teaching also appears in the research undertaken by Charczuk (2020) in which teachers, students, and family members demonstrated in their narratives the importance of this element in the teaching process mediated by technologies.

In this context, it is important to highlight that interaction presupposes interactivity, a mode of communication through the *Internet* between sender and receiver, marked by: "a) participation-intervention: participating is not just answering "yes" or "no" or choosing a given option, it supposes interfering in the content of the information or modifying the message; b) bidirectionality-hybridization: communication is joint production of emission and reception, it is co-creation, the two poles encode and decode; c) permutability-potentiality: communication supposes multiple articulatory networks of connections and freedom of exchanges, associations and significations" (Santos & Silva, 2009, p. 271). If this fundamental character is lost in online communication, we run the risk of having unidirectional communication, based on the logic of transmission, characteristic of mass media and banking pedagogy (Freire, 1987). Education is not an industry of content delivery, but a process of formation and development with — and through — knowledge and awareness. Santos (2020) points out that remote learning, even with numerous difficulties and limitations, has enabled affectionate encounters and the

creation of study spaces and routines in such a challenging context. However, it is essential to make it clear that interaction in remote teaching was a palliative strategy that does not replace or exclude the value and power of face-to-face meetings, especially in the school context.

In addition to interaction, one of the main roles of the teacher in remote teaching, according to the teachers participating in the survey, was to promote student autonomy. Paulo Freire (2019) already ensured respect for student autonomy as an indispensable knowledge for teaching practice, however, in remote teaching, it was necessary to promote this autonomy even more. The abrupt changes in the student's routine required the development of new skills such as establishing a study routine, discipline, and organization, skills that are developed when the student has an autonomous attitude towards the construction of knowledge. Autonomy is also linked to the constitution of an active and critical individual, a very relevant and necessary attitude, especially in the pandemic context, marked by the availability of numerous news that is often false and distorted.

Still on the role of the teacher, it was noteworthy that the continuity of the curricular content appears in fifth place among other tasks emerging from the office of being a teacher in the pandemic. That is, in the perception of the teachers consulted, the curricular content did not have a central prominence in this scenario, so that learning seemed to gain broader contours, involving and/or intensifying affective, psychological, social and existential aspects also necessary for the joint confrontation of the pandemic. It is not only learning technical-curricular contents or strategies to survive, but critically learning contents linked to reality and strategies to live well, live healthy, live a meaningful life.

Another fact that could be highlighted in the investigation is the relevance of teaching knowledge for the teacher's practice in remote teaching. Mastery of didactic-pedagogical knowledge, as posited by D'Avila and Ferreira (2019), is a foundational element for the consolidation of professional teaching competence. However, they cannot be considered synonyms, since pedagogical knowledge is broader and comes from teacher training, theoretical currents of education, school programs, the concept of teaching, and experiences throughout the teaching career, while didactic knowledge is oriented to teaching, related to the organization of the teaching-learning process in a more practical way and comes from classroom experiences and the teacher-student relationship. Among the most relevant knowledge for teachers, in the context of remote teaching, didactic knowledge stood out. This knowledge is responsible for the organization and execution of the teaching process, instrumented by their own skills in the mediation of the subject and of the class. Based on this information, one can conjecture that for the teachers, at this moment, the most relevant knowledge was that which subsidized teaching, such as mobilizing digital technologies, managing class time, planning teaching, and creating inclusive and favorable learning environments.

The most relevant didactic knowledge, according to the research participants, was teaching planning, which, according D'Àvila and Ferreira (2019), unfolds in specific knowledge such as organizing and preparing content, teaching and learning objectives, selecting methodologies and teaching resources appropriate to the level of teaching and context. In other words, it is about lesson preparation. Teachers needed to review and redo all their planning and pedagogical practices, already prepared at the beginning of 2020, for the inclusion of digital technologies in their pedagogical horizon, another emerging — and urgent — didactic knowledge in this new educational scene. The (re)planning became an even more necessary device in the ERE so that a simple transposition from face-to-face teaching to virtual teaching would not happen.

Formation and Source of Teaching Knowledge

All this professional demand of remote teaching exposed so far, naturally, requires adequate training of teachers. In this sense, the data presented by this research revealed that almost all teachers have sought, on their own initiative, some kind of training that would provide and/or complement the development of competencies for the use of technologies in the teaching-learning process. Results from a survey among Brazilian teachers, as presented by Gestrado (2020), align with this scenario, given that 41.8% of the study participants sought training on their own as the education system and/or schools did not offer any kind of training, and 21% had access to online tutorials with information on how to use

virtual tools. A survey with teachers in Portugal shows that, although all respondents had received training, 34.9% considered it insufficient, and 29.4% did not take a position. The absence of adequate training was also considered for 30.6% of teachers as the main difficulty in this pandemic context (Flores et al., 2020).

Still related to the training issues for remote teaching, it is clear that no course and/or training offered a theoretical and methodological framework capable of meeting all the demands and difficulties raised in a context of singularities and unpredictability such as this. Thus, in face of these doubts that were not solved by the training courses, one of the teachers' main strategies to mitigate them, among other possibilities, based on the data from the study presented here, was to establish discussions and exchange experiences with professional colleagues. In research with Portuguese teachers, it is also noteworthy that 71.8% of the study participants first resorted to fellow teachers to mitigate the difficulties encountered during remote teaching (Flores et al., 2020). This attitude favors collective and collaborative work among teachers, making it pertinent in this current framework in which education professionals were learning, adapting, and creating new ways to promote student learning. In this way, training and teacher development also occur in the collaboration among peers, because the teacher is constituted through interactions among colleagues in the day-to-day of the profession, from experiences acquired and shared in real teaching situations, among other ways.

It is notable, therefore, that teachers have resorted to various mechanisms with the aim of developing new learning and improving the quality of teaching. In this sense, Nóvoa (2020, p. 10) states that "the capacities for initiative, experimentation, and innovation manifested during the pandemic should be broadened and deepened in the future, as part of a new professional affirmation of teachers." However, this search for better training conditions should not only be teachers' initiative, because schools and education networks also have the responsibility to offer training that meets the peculiarities of the reality in which these teachers are inserted, especially in the teaching process mediated by technologies, since teaching remotely is not the mere transposition of classroom teaching to a digital platform, such training cannot be based only on preparation for handling technological tools.

The need for self-training and training promoted by educational institutions, individually or collectively, may be linked to the increase in workload mentioned by the consulted teachers. The time dedicated to (self)training, and to the study resulting from it, certainly generated more working hours in the teaching routine, given the need to make up for the lack of knowledge and experience regarding the use of digital technologies in the teaching process, and, also, of methodologies that would contribute to or facilitate the development of student learning in the remote environment. It is fundamental to emphasize here that the relevance of digital technologies in this scenario should not lead teachers to be a mere consumer of content, but a producer of digital content situated and adapted to thier reality. This context brings up the discussions about the need to rethink teacher education, since the educational changes brought about by the pandemic demand and will demand a professional profile, as already advocated by Libâneo (2011), capable of learning how to learn, and possessing mastery of informational language and skills to integrate digital media with the teaching process. It is important to emphasize that remote teaching had an emergency character, and this rethinking of teacher training should be based on face-to-face teaching, but it may bring technological legacies of the pandemic.

In theory, it is possible to conjecture that the more intense use of technologies in the educational setting, due to the suspension of in-person classes may provide an opportunity, in the post-pandemic scenario, for the creation of new modes of learning that are more effective, interactive and participative, capable of providing greater students' autonomy in the construction of their knowledge. However, for this to happen it is necessary to invest in teacher training, because, according to the scenario presented in this research, even after a few months of remote work, the handling and use of technologies for educational purposes is still a challenge for a number of teachers, especially for those who teach in state public schools. For teachers in private schools, dealing with such tools was less challenging, because even before the pandemic, technologies were already present, in some way, in their daily school routine. As demonstrated by the ICT-Education/2019 survey (CGI, 2020), private schools use more communication resources such as *blogs*, virtual learning environments, and pages on social networks than public schools. However, it is worth noting that the migration from face-to-face to remote has proven to be a complex and often painful task, which implies the need for training and institutional support

regardless of the education network. A survey with teachers in Germany indicated that training teachers in the use of technologies, offering teacher training related to digital teaching and learning, and building pedagogical knowledge concerning the digital world are potential factors for teachers to be able to respond to the challenges that the educational situation in the pandemic imposes (König et al., 2020).

When analyzing the sources of teaching knowledge, the teaching experience acquired in classroom practice, as well as personal, family, and/or cultural experiences practiced throughout life are also the most significant for the research participants (Tardif, 2014). Thus, it can be assumed that the experiential knowledge, that built and mobilized in the interactions between teachers and other school agents, based on daily work and knowledge of the environment was essential for teaching in remote education. Corroborating this discussion, the data from this research also show that the lack of previous experience with the remote modality made teachers feel less prepared since they had never experienced such a reality, and they started to feel more prepared after a few months of remote work and a greater familiarity with the handling of technology. Practice has a strong influence on teaching learning, because becoming a teacher is a continuous process that requires specialized training, and is marked by personal, professional, and social experiences, contextualized in the workplace, i.e., the school, but which at this moment physically assumes the improvised spaces of the homes of teachers and students. Therefore, the experience lived by the teachers in the remote teaching environment enabled the constitution of new knowledge and professional skills.

In view of this, the experience in this teaching modality can be considered an element of self-training, but for this it needs to be based on a critical reflection, so as not to become a reiteration of individual findings and beliefs (García, 2009). In this sense, in agreement with what is already advocated by Imbernón (2011), the need to create spaces for participation and collective reflection, because from there, it is possible to develop alternatives for facing the challenges imposed on the educational practice, building new paths for the teaching performance, especially in the pandemic context. In this perspective, Darling-Hammond and Hyler (2020) indicate the creation of space/time for sharing successful practices among teachers, as an essential action for the quality of education in the pandemic and post-pandemic. Also in accordance with the authors, it is possible to state that one of the unexpected results of the pandemic in the teaching profession is the greater consideration of strengthening teacher learning throughout the professional continuum, and not only in initial training.

Mental Health

Mental health has presented itself as a major challenge of this pandemic. Numerous studies have already pointed out the effects on the general population, such as increased rates of anxiety, depression and excessive stress in different countries (Cooke et al., 2020; Vindegaard & Benros, 2020; Xiong et al., 2020). There are still few studies specifically with teachers, but those that exist have shown the presence of emotional problems (Aperribai et al., 2020) and anxiety, as well as other factors (Ozamiz-Etxebarria et al., 2021, Stachteas & Stachteas, 2020). In the present research, the data on mental health revealed how much it directly impacts the teacher's professional development, including the learning process of teaching during the pandemic period. Those with better (worse) mental health were associated with being more (less) prepared to act during the emergency remote teaching period, identifying this period as an opportunity for new learning (uncomfortable), seeking more (less) resources and people to enhance their training, valuing more (less) their professional experiences, showing more (less) ease in using digital technologies, feeling more (less) prepared to act in remote teaching, and perceiving as more (less) relevant their role, their performance, and the didactic-pedagogical knowledge mobilized. This corroborates Corey Keyes (2007), author of the MHC-SF scale used in this paper, that mentally healthy (*flourishing*) adults have better psychosocial functioning than moderately mentally healthy adults, who in turn functioned better than *languishing adults*.

A correlation between the presence of meaning in life and emotional, psychological, and sociological well-being was also observed. Indeed, this finding corroborates numerous research findings that have associated the presence of meaning in life with healthier attitudes and greater well-being (Glaw, Kable, Hazelton, & Inder, 2017; Steger, 2017; Steger, Fitch-Martin, Donnelly, & Rickard, 2014). This meaning in life can be understood as a personal and meaningful task to be accomplished in the moment

experienced in the space-time of the here and now. For Viktor Frankl (2008, p. 129-130) a pioneer in the study of meaning in life, "mental health is based on a certain degree of tension, tension between what one has already achieved and what one should yet achieve, or the gap between what one is and what one should become. This tension is inherent to the human being, and therefore indispensable to mental well-being." Therefore, to be mentally healthy is to be tense by a personal and meaningful task to be accomplished, a task apprehended by consciousness.

In this vein, the literature on teacher resilience recognizes how much teaching work is motivated by deep moral values, reinforcing the relevance of meaning of life, the existential positioning of the teacher. However, it also highlights the importance of the responsibility of schools and governments to ensure high quality leadership, appropriate working conditions, provision of physical infrastructure and materials, and other resources (Gu, 2018). These aspects were crucial in the pandemic, as can be seen from the data gathered and discussed in this research, but they remain fundamental to the work of teachers in any era. Moreover, it is necessary to invest in other protective factors for teachers' health and resilience, such as support networks, asking for help, problem-solving skills, reflection, setting limits, among many others (Mansfield, 2020; Wosnitza et al., 2018). Research on strategies for promoting teacher health in the pandemic is scarce, but one can find, for example, the positive effect of physical activity (Aperribai et al., 2020) and mindfulness (Matiz et al., 2020) to mitigate some of the negative effects of this context. In summary, it is necessary to take a comprehensive look at the human being, in its different dimensions, as advocated by Frankl himself (2008), so that policies and strategies can be proposed for the promotion of physical, psychological, social and existential health of teachers.

Limitations

The research systematized here presents limitations with regard to sampling. Since it is a non-probabilistic approach, one can say that the results cannot be generalized, although many findings are compatible with the results of other national and international studies. Another limitation refers to the small universe of participants from the private network. Despite the contact with teachers and entities of this network, the low adhesion leads us to consider the hypotheses of fear of exposing details of the work of this public before the school, despite confidentiality agreements, and the work overload of these teachers, since most private networks started the remote work soon after the suspension of classroom classes. The present work also portrays only one scene among several present in the plot of the Brazilian educational pandemic scenario. Thus, it is necessary to continue monitoring the teaching performance and everything that permeates it during the remote teaching and during the return of the classes in person, including when in the hybrid modality, mixing face-to-face and non-face-to-face activities.

However, we have here an outline, even if punctual, of the performance in remote teaching, revealing important aspects of working conditions, teaching learning, and teacher's mental health in this educational moment crossed by challenges and uncertainties. The reflections presented here demonstrate the need to broaden the view of the work of teachers in the pandemic and post-pandemic context, in order to clarify the effects of emergency remote teaching on the professional development of teachers. Conducting research with qualitative or mixed methods can be a significant strategy to deepen teachers' perceptions about their professional development.

Final considerations

Understanding that the professional development of teachers is contextualized in the teacher's workplace and that it contributes to the acquisition of professional skills through various experiences (García, 2009). On the one hand, despite the numerous challenges imposed by the pandemic, teaching in remote education was a space for professional development, especially for learning to teach. On the other hand, the effects of this period on the teaching profession are still immeasurable and will take time to be fully understood. Despite this, it was possible to notice that the unfavorable circumstances for teachers and their professional development were further intensified, making this work more precarious and fragmented. The working conditions, the anguish and uncertainty about the educational future, coupled with the concerns inherent to the pandemic scenario, made the teaching-learning process even more challenging. The emergency remote teaching was a new reality for all educational agents and

this demanded, besides other actions, technological, material, psychological, and training support. It is necessary to value the teaching work developed under these circumstances, as well as to create better conditions for the teacher's professional development.

By way of conclusion, it is understood that the reflections woven here around the professional development of teachers during the covid-19 pandemic contribute to the appreciation of the work and the social role of teachers, especially in such a challenging time for teaching. Taken together, the results of this research have shown the main activities and teaching knowledge during the period of emergency remote teaching, as well as the main factors that contributed to the learning process of teaching, highlighting the experiential knowledge. The implications of working conditions and mental health on this professional development process are also evident. These findings should be interpreted with caution given the specific scenario analyzed, while new research should be developed both for a deeper understanding of the reality portrayed, and for an analysis of a possible legacy of remote teaching after the return to face-to-face teaching.

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DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with this article.