CHAPTER

3

Teaching programming for students remotely during social isolation due to the COVID-19 pandemic

https://doi.org/10.56238/emerrelcovid19-003

Janielly Maria da Silva
Graduating in Informatics
(Campus Teresina Zona Rural).
E-mail: j.anyelly@hotmail.com

Claudete de Jesus Ferreira da Silva
Professional degree in Technology and Management from UFRPE. Full Professor at IFPI. (Advisor).
E-mail: Claudete@ifpi.edu.br

Francisca Ocilma Mendes Monteiro
Graduated in Education from UNISIMOS. Full Professor at IFPI. (Co-Advisor).
Article presented to the Federal Institute of Education, Sciences and Technology of Piauí (IFPI), as a final requirement for obtaining the degree of Licentiate in Informatics.
E-mail: ocilma.monteiro@ifpi.edu.br

ABSTRACT
Due to the Pandemic caused by Covid-19, schools had to quickly adapt teaching to students. Faced with this situation, teachers had to overcome the challenges during this experienced period, and students had to learn to assimilate the contents remotely. Despite the difficulties and challenges faced by the professors, it was also an opportunity to learn how to use new technologies to assist in teaching and learning. The work had as a data collection instrument an online questionnaire produced in Google Forms, a questionnaire answered in person with the students, and an interview with two programming teachers of the school, anonymous and voluntary, being sent to the José Pacifico School of Moorish. It is noteworthy that we are going through moments of transformation and adaptation, in which we continue to learn and create new forms of teaching strategies. In this sense, technology becomes a positive strategy and contributes to student learning in remote learning, providing new ways to teach and learn.

Keywords: Remote teaching, Technologies, Learning, Teaching, Challenges.

1 INTRODUCTION

Technology has, throughout its trajectory, assisted teachers in teaching and seeking to contribute to student learning, and for many years, the school made predominant use of blackboard and projector. That reality has been altered as a result of the pandemic, caused by the spread of COVID-19.

This context imposed significant changes in society and, in particular, in the school. With this transformation and the search for adaptation to the new scenario of technology experiences, new possibilities were emerging regarding the ways of learning and teaching. According to Nhantumbo (2020), unexpectedly, the search for technological tools has become an important means of methodology for teaching in the period of remote classes.

In this context, this research yearns to contribute and understand the reality that we are experiencing within the teaching and learning process.

It is understood that in this new context, the teacher needs to break through the barriers that prevent him from seeking to update himself, in addition to seeking new knowledge to meet the new reality that we are experiencing. According to Charnei (2019), there is a possibility of using

technology to improve teaching in the format of remote classes, being necessary, however, that the teacher who breaks the barrier to learn more and more, using new forms of knowledge.

Within this educational context, it is verified that there are technological disciplines such as the teaching of programming being taught amid remote classes. This teaching and learning may have become a little more difficult for some teachers and students because, in the pandemic, they were prevented from using the computer labs of the schools, an ideal structure for the remote model.

By experiencing these challenges in the day-to-day and the midst of reflections on teaching activities, the School selected to be the universe of study was the José Pacífico de Moura Neto Professional Education Center, for being a field school of the Pedagogical Residency Program, of the Coordination for the Improvement of Higher Education Personnel (CAPES).

This Program provided this relationship between the University and the contact with the basic school to initiate the qualification of teachers and, thus, to know and live the reality of which they will be part. Because we feel difficulties in the operationalization of remote classes and for reflecting on the teaching of programming for Students in the virtual teaching model during social isolation, due to the COVID-19 Pandemic, and in the case of a school that has an agreement with IFPI - Federal Institute of Education, Science, and Technology of Piauí, we decided to choose to be part of our research.

We believe that considering the problem that involves this process of challenges, of the process of teaching and learning the programming content, faced in times of pandemic in the modality of remote classes, in which specific technological tools are needed to help the applications of practical classes for better learning of the student, is fundamental in this period experienced.

In this perspective, because of the imposing character of associating technological tools and their applicability to education, this article aims to present the challenges of the teaching and learning process of programming content, faced in times of pandemic in the modality of remote classes of the Campo School - Center for Professional Education José Pacífico de Moura Neto.

The outline of these analyses, in this work, consists of four moments, articulated among themselves, designated as Identify the difficulties faced daily by teachers in the context of remote classes at school; Describe the challenges faced by students in building knowledge during remote classes with Programming teaching; Present the difficulties of teachers with the teaching of Programming in the Field School - Center for Professional Education José Pacífico de Moura Neto durante the remote classes; Relate the difficulties of students in assimilating the subject of programming during remote classes.

To this end, a research form was applied to the students and teachers of the Technical Education of Informatics of the 1st year B of the Escola Campo Centro de Educação professional José

Pacífico de Moura Neto, aiming to identify what the Students and Teachers think about this theme. It is expected that this reflection can be analyzed and proposed strategies to contribute to the development of methodologies for teaching and learning in technological education in remote teaching.

2 THE INFLUENCE OF COVID-19 ON EDUCATION

In the world and Brazil, the school context since the year 2020 has been going through troubled times, caused by the COVID-19 pandemic. Due to this, we are experiencing moments of uncertainty, questioning, ideological, political, and infrastructure conflicts, among other issues to promote quality education to students.

Due to the social distancing recommended by the WHO - World Health Organization, this was a form of containment and proliferation of COVID-19, a measure adopted worldwide, as well as guidelines, state and municipal decrees and strategies used in an attempt to develop activities schoolchildren, and among the many teaching strategies, some institutions chose remote classes, using various resources aided by technology. Nationally, Ordinance No. 188 of the Ministry of Health, of February 3, 2020, declared a public health emergency of national importance in Brazilian territory (BRASIL, 2020).

Consequently, the traditional teaching and learning process was adapted in an emergency way, bringing a great challenge to students, teachers, and school management.

In this sense, it is worth emphasizing the concept of learning as a process that occurs from the beginning to the end of life, and for all life. On this, Davidoff believes that:

> Learning is an activity that occurs within an organism and that cannot be directly observed; in a way not fully understood, the subjects of learning are modified: they acquire new associations, information, insights, aptitudes, habits, and the like (DAVIDOFF, 1984, Q. 158).

Learning encompasses all the moments of the individual's life and does not occur only in the school environment. We also learn, in social and family life, among others. In addition, we can add that learning is not modified, only if new information and habits are acquired.

Throughout history, society has always sought to perfect its tools and techniques. This is due to the need to push the boundaries of skills. Thus, various technologies are developed and incorporated into people's daily lives, such as the computer that, currently, is present in almost all the tasks of society, making it dependent on this technology. For the school, the task of facing the obstacles that society imposes is established, defining new competencies and learning strategies.

For Papert (2008), the use of the computer by students helps in a way that did not happen simply with pencil and paper. Learners develop interpersonal and self-directing skills in their ideas and also learn to put them into practice more easily. Remote teaching presents itself as a viable alternative,

focusing on learning, using the technology available amid internet access to make use of modern and educational resources, seeking to contribute to the increase of students' autonomy, making the student a participant in the process of apprenticeship.

2.1 THE CHALLENGES OF THE TEACHING AND LEARNING PROCESS IN A TIME OF PANDEMIC

There have been many challenges faced during the pandemic, especially as it relates to the teaching and learning process. During face-to-face classes, students had access to the library and laboratory, spaces where low-income students had access to technology. With the changes imposed by social isolation, for some students, there was difficulty in accessing virtual learning, considering that the pandemic reflected on the economy and other factors, causing financial difficulties that had repercussions on remote learning.

It can be understood as "remote teaching all that content that is made available in virtual environments or transmitted synchronously, where the teacher teaches following an adaptable schedule of face-to-face teaching" (COSTA apud JACOB, 2020, p. 23). Still for this author, "remote teaching is similar to Distance Learning (EaD), especially about the aid of technology" (COSTA apud JACOB, 2020, p. 24).

In this sense, distance education has a characteristic of support for teaching, with a workload distributed in different types of technological resources, which does not happen with remote classes, which happen, in general, in a non-strategic way, so little administrative and technological preparation, in addition to which it should be taken into account that the teachers had no preparation or contact and even skill in handling and starting virtual meetings, planning, and teaching classes virtually.

To Gife (2020, p. 33), "Students and teachers are not very different, both have difficulties with technology", allied with this, it is emphasized that teachers need to plan and learn the workings of different technological tools. In the routine of your day-to-day, remote teaching is carried out by the teacher of the discipline, whether in classes broadcast live or recorded, through videoconferencing or similar resources.

In remote learning, the workload is no different from essential classes. Teachers and students have faced several challenges with classes in this model, after all, these changes were very abrupt. Changing your routine and the dynamics of your day-to-day from the face-to-face classroom to virtual platforms requires investment and time in technology.

Faced with all the difficulties already described, the teaching of programming awakens the ability of logical reasoning, and the ability of abstraction, in addition to developing the ability to solve

problems efficiently, using a series of mental tools that reflect a vast field of computer science. Therefore, for the teaching of programming, it is necessary to develop skills.

To Campos; Bortoloto; Felicio (2014, p. 33), competence can be understood as "the ability to use more than one resource to solve something in an innovative, creative, and timely way".

Thus, it is common for students of Logic Programming to have difficulty at first. Because it is a complex discipline with practice, thus becoming challenging, it can cause fear and insecurity to those involved in the process. However, the younger you are, the easier it is to learn.

According to Zanetti and Oliveira (2015), the teaching of Programming in schools encourages students to develop their creativity and their ability to solve and deal with problems.

However, technology has been a strong ally to the teaching and learning process, but we must observe the various difficulties and obstacles faced by teachers and students. Charnei (2019) states that it is possible that the Technology can assist the teacher in educational activities, but he is also open to new experiences.

Abruptly exiting face-to-face teaching and undergoing virtual and remote teaching is a major challenge for the school community. Even understanding that Information and Communication Technologies (ICTs) enable opportunities and mechanisms to teach and learn, Pimentel and Nicolau (2018) describe that the school community does not have basic access to these ICTs, where from the beginning of training this same community should count on these technologies capable of providing the construction of Computational Thinking.

On this, Christian Brackmann clarifies that:

> Computational Thinking is a distinct creative, strategic and critical capacity to use the concepts of computing in the most diverse areas, with the ability to solve problems individually or collaboratively (BRACKMANN, 2017, p. 25).

There arises, then, the need to understand the difficulties and challenges faced by students and teachers involved in this teaching and learning process, to reflect and instigate reflections that seek every day to improve this process. In this way, this research aims to collect information about the experiences of students and teachers in the teaching of programming, in the modality of remote teaching, seeking to know their difficulties, challenges, anxieties, perceived opportunities or even moments to know new learning methods with this new modality.

2.2 TEACHING PROGRAMMING REMOTELY IN HIGH SCHOOL

The teaching of programming is present at various levels of education in this computerized era. This discipline is related to elementary, secondary, higher education and even graduate school.

They propose the insertion of computing in Basic Education, to provide computational skills and competencies and to support science and its areas of knowledge. The emphasis in high school is on enhancing problem-solving ability through the realization of projects and the development of skills related to critical analysis.

It is a programming language that does not require prior knowledge of other programming languages, having been developed to help people in learning mathematical and computational concepts, with it it is possible to create games, animated stories and interactive programs. For Zanetti and Oliveira (2015), the teaching of programming should aim to lead the student to think and develop skills capable of solving problems.

Solving a problem with the help of a program using the aid of a computer collaborates with learning, since it creates a link with the factors of knowledge construction that are the description, execution, reflection and debugging of problems. Depending on how it is taught, the student may have great difficulty producing and assimilating programs that are difficult to understand and apply, which can generate demotivation in students.

Computational Thinking is one of the difficulties of the students presented by the students in this first contact with programming.

In the scope of education, Barr and Stephenson (2011) proposed an operational definition of Computational Thinking focused on basic education. It is made up of a set of problem-solving skills that can be broken down into six dimensions: Formulating problems in a way that machines can help solve; logically processing data; Represent data abstractly; Algoritmizar automatic solutions; Solve problems efficiently; and Use knowledge and skills in solving other problems.

They propose the insertion of computing in Basic Education to provide computational skills and competencies and support science and its areas of knowledge. The enfase in High School is in the improvement of the ability to solve problems through the realization of projects and the development of skills related to critical analysis.

3 METHODOLOGY

This study is exploratory research with qualitative approach. Regarding exploratory research, Raupp and Beuren (2006) understand that This occurs when one has little knowledge about a certain subject and through it one seeks to know in greater depth the phenomenon studied.

This study aims to provide greater knowledge about the topic under discussion for the researcher.

The qualitative approach, according to Flick (2004), results in different lines of thought and in several theoretical approaches to be based, to consider subjectivity, its particularities and studied

subjects, which are an integral part of the investigative process. Thus, the reflections, observations, impressions and feelings of the researchers become data, constituting part of the interpretations. In addition, qualitative research is used in this work because it is a tool in which the focus does not require the use of statistics for data analysis, but the study of a situation in which it surrounds a certain problem.

Participants in this study were the professors and students of the discipline of Programming. To verify how the students felt the impacts of the sudden transition from face-to-face to remote teaching modality and how this impacted on the learning process, as well as what changed in the teacher's routine considering the change from face-to-face to remote teaching and how the teacher achieved the objective of the your lesson plan.

> Thus, data collection was carried out at Escola Campo - Centro de Educação Profissional José Pacífico de Moura Neto, with 02 teachers of the discipline of Programming, and all teachers are celetistas of the school. This school operates in three shifts (morning, afternoon and evening), all with ProgramAction teachers. The first 1st year begins with Logic Programming; 2nd year Schedule I, and each period may change in its capacity. All teachers choose the discipline of Programming by affinity and the profile of the students are high school students (1st, 2nd and 3rd year) of the Programming disciplines.

For data collection, a mixed online questionnaire was applied in Google forms. To verify the perception of students and teachers about the changes arising from the pandemic period with virtual classes. The questionnaire is an important tool for scientific data collection , generating a set of ordered and predefined questions with appropriate language.

According to Parasuraman (1991), the questionnaire is only used to construct a set of questions, where enough data are generated to achieve the objectives of the research project , but the author points out that not all research use this type of resource.

The questionnaire was produced in Google Forms Online, with an average of 12 questions, being objective and discursive questions, elaborated to evaluate the context, analyzing the challenges of the process of teaching Programming in the period of COVID-19 pandemic. The questionnaires were applied online. The participants of the research were the students of the 1st year B and teachers of the field school of the face-to-face courses Technical and High School. To this end, students and teachers were invited to participate optionally.

The first stage of the study consisted of surveying the profile of students regarding their school routine in the non-face-to-face teaching modality and the impacts on remote teaching.

In the second stage, the students were asked to answer the online questionnaire that was made available in the Whatsapp group of a class of 35 students.

4 RESULTS AND DISCUSSIONS

Discussions about remote learning and social distancing have many convergences. Thus, attention and direction should be paid to educational, professional and human relations. In the midst of this, one should minimize the educational problems generated by COVID-19.

In the survey of the data of the students of the class of the 1st year B of the technical course of medium level of CEEP - Center of Professional Education José Pacífico de Moura Neto, 34 students of a class of 35 students participated.

4.1 DIFFICULTIES PRESENTED BY STUDENTS DURING REMOTE CLASSES

To carry out this research, it was necessary to ask each student to answer the Free and Informed Consent Form (ICF). Next, questions were asked related to the teaching of Programming to students of remote form during social isolation due to the Covid-19 pandemic. The results of the analysis can be seen in Table 1, Table 2 and Table 3.

In the characterization, the students were 64.7% female (N=22) and 35.3% male (N=12). These students come from public schools with a percentage of 91.2% (N=31) and private 8.8% (N=3). Regarding the ease of access to the internet, it was found that 91.2% (N=31) said they have internet at home and; 8.8% (N=3) did not, but use broadband/internet package on their mobile phone. Regarding the question whether they have a computer or notebook at home, 41.2% stated that they do not have it (N=14) and 58.8% (N=20) that they have it.

Table 1 – Technological infrastructure of students (N=34)

Question	Variable	Frequency	%
1) Have you had contact with any programming logic before joining CEEP José Pacífico? *You can check more than one option*	No, I had the first contact at Ceep José Pacífico	27	79,4%
	Yes, Python	2	5,9%
	Yes, with PHP	0	0,0%
	Yes, with Python	2	5,9%

	Yes, with C/ C++/C#	1	2,9%
	Yes, with Pascal	0	0,0%
	Yes, with Portugol	0	0,0%
	Linux	2	5,9%

Source: Data collected. 2021.

It is observed that students know how to use technological resources, which contributes to teaching and learning in the classroom using ICTs.

It was found that most students (91.2%) come from public schools and only 8.8% are from private schools. However, it is also evident that 79.4% of the students had no contact with any programming language before joining CEEP - Escola Campo José Pacífico de Moura Neto, thus verifying the difficulty in having a first contact with a type of language remotely.

These changes are explained by Santos Junior and Monteiro (2020), who report that:

> Students' routines have been modified and for many, time is now divided with other activities. However, it is necessary to reflect on the need for students to adapt to this new moment, as well as the impacts that such changes can cause, including in the emotional conditions of each subject. (SANTOS JUNIOR; MONTEIRO, 2020, p. 14).

Analyzing the equipment that the students had at home, although the students knew how to handle, as was verified in the questionnaire applied, it can be observed that these resources are not always available for the use of the students.

Only 91.2% of students have easy access to the internet and 8.8 % have broadband/ mobile internet packages, making teaching and learning a little more difficult. Being that 58.8% of the class has a computer, and 41.2% of the class does not have any computer to use for the studies. In addition, 94.1% of the students stated that the device used to access the internet is the mobile phone and 44.1% use the smart TV. It was verified that 64.7% have the exclusive use of their technological equipment and 14.7% of the students have to share with the family at home. As for the access to the internet and computers the results are the same when compared with other researches, in which access to the world wide web is limited in the scenario and data (ARRUDA, 2020).

In this perspective, the inequalities of our students are evidenced by the difficulties of access and to the technological equipment itself. This disproportionate distribution of income at different levels that occurs in Brazil increasingly distances education (XAVIER, 2020). In the field of analysis

of the research, the return of non-face-to-face activities took place remotely, being mediated with the use of ICT, in which students are online receiving guidance for the contents and exercises to be performed during the orientations.

Table 2 – Characterization of students of difficulties faced (N=34)
(continues)

Scale	1	2	3	4	5
Rate your internet access as good quality.	2.9% (N=1)	8.8% (N=3)	20.6% (N=7)	32.4% (N=11)	35.3% (N=12)
How difficult were you to learn programming logic remotely?	8.8% (N=3)	17.6% (N=6)	26.5% (N=9)	32.4% (N=11)	14.7% (N=5)
How difficult have you been to move from in-person to remote teaching?	11.8% (N=4)	17.6% (N=6)	38.2% (N=13)	14.7% (N=5)	17.6% (N=6)

Source: Data collected, 2021.

Table 3 – Students' perspective regarding difficulties during remote classes

Issues	Answers
13. What difficulties felt in learning the programming content during classes Remote?	**Student.1** - Access to the cell phone, internet and the way of sending the activities. At the beginning until the middle of the year, it was a cell phone for me and my brother.
	Student.2 - I could not understand the subject so well.
	Student.3 - Due to the first contact with programming , I felt difficulties in understanding the structures and functions in the Codes.
	Student.4 - For me it was not so difficult, but when I had Questions I asked the teachers. What else did I have difficulty was not having the presence of teachers in feeling very general.

Source: Data collected, 2021.

The main difficulty reported in the period of remote classes, mainly focusing on research in the discipline of Programming among students was the fact that the first contact with the language took place remotely and the students did not have the computer to practice the codes, in addition to access to the internet.

In this research, students report that they use the telephone in remote classes due to lack of a computer and even share devices with family members at home, so this interaction between teacher and student is not guaranteed, as happens in face-to-face teaching.

4.2 DIFFICULTIES PRESENTED BY TEACHERS DURING REMOTE CLASSES

When teachers were asked about being properly prepared for this reality of change from face-to-face to remote teaching, the answer was 100% no.

In the process of teaching learning, there must be a fusion of information, enabling learning. For Sousa et al. (2020), in any pedagogical action in the classroom that is mediated by technology, we must never forget the objectives integrated with practice.

When verified with the teacher about having difficulties in teaching the discipline of Programming remotely, given being a discipline that encourages logical reasoning, Professor A answered no, Professor B answered yes, which he puts as divisions of opinions. By asking teachers how many of the skills you have in ICTs (Communication Technologies).

> Teacher A - Uses Smartphone, Uses Email, Uses Google Classroom, Uses Instagram, Uses Whasapp, Uses Youtube, Uses Google Meet, Uses Gamification, Uses Moodle Platform , Google Drive.

It is possible to infer that teachers are making videos and follow-ups through technological tools. When asked about the strategies used in teaching programming in the remote period, the teachers answered the following:

> Teacher A - Use of video lessons recorded by me, live classes by Google Meet, use of Google Classroom for activities, indication of mobile app for students to program at home.
> Professor B - Challenge of questions, studies and applications of technologies in practice to develop small sites and projects.

When teachers were asked about their support for offering Programming subjects in the remote format during the pandemic, the answer was 100% yes.

When asked about the difficulties perceived in the teaching of Program in the remote period, about their teaching practice, the answers of the teachers were as follows :

> Teacher A - The difficulty of access to the Internet by the students, the lack of mathematical basis and logical reasoning on the part of the students, the social crises raised by the pandemic: depression, anxiety, this affected the students and many felt discouraged, the lack of preparation and the delay of adaptation to this type of teaching.
> Teacher B - Some students do not have computers at home.

According to Nhantumbo (2020), the difficulties in adapting to remote teaching, in this pandemic period, have been varied and range from the lack of accompaniment of a teacher to the students, associated with insecurity and even the lack of handling in the use of the different digital platforms.

When asked if remote learning can bring positive and/or negative reflections to student learning, we obtained the following answers:

> For Teacher A - It had positive aspects, but also negative aspects such as: Positive, since the student becomes the protagonist of his education1717ção; Negative, since the change was sudden and with little time for adaptation; Positive, new perspectives of teaching and learning with the acquisition of new technologies; Teacher burnout, and who was overwhelmed by

the activities and multiple challenges in dealing with the number of students classrooms as well as adopted specific technologies, providing teaching.

Professor B - Only had positive reflections such as, positive, new perspectives of teaching and learning with the acquisition of new technologies; positive, increased creative capacity of both; Positive, Increased basic social skills such as communication and empathy; Positive, The use of the appropriate instruments already existing in the digital world.

Given the difficulties encountered and related to technological difficulties during remote classes, it is necessary to overcome all these obstacles and try to adapt to this new scenario, minimizing the impacts caused, whether economic or otherwise, seeking to adapt to quality education and for all in an efficient and egalitarian way.

5 FINAL CONSIDERATIONS

When tracing the panorama of education in the face of the results obtained, it was found that the current scenario experienced by the participants of teaching is challenging. In this context, the obstacles range from the lack of equipment and support from parents and educational institutions to social inequality, among others, which decisively influenced this pandemic period, making it necessary to create several strategies to ensure that it is possible to remedy the difficulties that have been raised.

Thus, the main difficulties of the students evidenced in the research are the lack of internet at home, as well as technological devices such as the computer. For teachers, the main complaint is precisely the lack of access to the computer at home by students, so that they can follow the online classes.

Another fact revealed by the research with teachers is that the pandemic has brought both positive and negative reflections related to student learning. Among the positive elements, we can mention the protagonism of the student in the which refers to their education, as well as new perspectives of teaching and learning with the acquisition of new technologies. In the negative context, the change in the modality of teaching occurred suddenly and with little time for adaptation. However, the research also showed that the positives stood out over the negatives.

In addition, the main difficulty reported by the students in this period of remote classes in the discipline of Programming is related to the fact that in addition to being the first contact with the remote modality and not having a computer to practice the codes, access to the internet was very bad or when the students had to share devices with other family members, aligned with the lack of the teacher to promote direct interaction as happens in face-to-face teaching.

Despite all the challenges and difficulties faced amid COVID-19 to return a quality education, these results run with other themes of this research, evidencing the importance of using technology to

promote learning in times of pandemic, presenting itself as an important and safe strategy for the execution of the classes in schools.

REFERENCES

Arruda, e. P. Educação remota emergencial: elementos para políticas públicas na educação brasileira em tempos de covid-19. In: rede-revista de educação a distância, v. 7, n. 1, p. 257-275, 2020.

Barr, v.; stephenson, c. Bringing computational thinking to k-12:what is involved and what is the role of the computer science education community?. Acm in roads, v. 2, n. 1, p. 48-54, 2011.

Brackmann, c. Projeto pensamento computacional para todos - programa "como será?" - rede globo 03/mar/18 | pesquisa desenvolvida durante doutorado no ppgie - ufrgs / cinted - centro interdisciplinar de novas tecnologias na educação sob orientação dos profs. Dante augusto barone e ana casali. 2012.

Brasil. Resolução cne/cp nº 2, de 5 de agosto de 2021. Diário oficial da união: seção: 1 edição: 148 p. 51, brasília, df, 2021. Disponível: https://www.in.gov.br/en/web/dou/-/resolucao-cne/cp-n-2-de-5-de-agosto-de-2021- 336647801.

Campos, i.m.i; bortoloto, t. M.; felicio, a. K. C. A produção de jogos
Didáticos para o ensino de ciências e biologia: uma proposta para favorecer a aprendizagem. 2014. Disponível.: http://www.unesp.br/pradpdfne202/aproducaodejogos.pdf. Acesso em 25 de janeiro de 2022.

Charnei, m. Dificuldade de aprendizagem do cálculo de área de figuras planas retangulares: uma possibilidade através do geogebra. In: viii congresso brasileiro de informática na educação (cbie 2019), brasília, 2020. Disponível: https://br-ie.org/pub/index.php/wcbie/article/view/9008/6554, maio, 2020.

Davidoff, l. L. Introdução à psicologia. Mcgraw-hill: makron books, 1984.

Flick, u. Uma introdução à pesquisa qualitativa. Porto alegre: bookman, 2004.

Gife, f. Ensino a distância na pandemia 2019. Reeduc ueg. V. 5, n. 1, jan/abr 2020.

Jacob, e. As consequências da pandemia na educação podem ser piores que o esperado. Disponível em: https:// www.jacobsconsultoria.com.br/post/as- consequ%c3%aancias-da-pandemia-na-educa%c3%a7%c3%a3o-po- dem-ser- piores-que-o-esperado. Acesso em: 29 jul. 2020.

Nhantumbo, t. L. Capacidade de resposta das instituições educacionais no processo de ensino-aprendizagem face à pandemia de covid-19: impasses e desafios. Educamazônia-educação, sociedade e meio ambiente, v. 25, n. 2, jul-dez, p. 556-571, 2020.

Papert, s. A máquina das crianças: repensando a escola na era da informática. Porto alegre: artmed, 2008.

Parasuraman, a. Marketing research. 2. Ed. Addison: wesley publishing company, 1991.

Pimentel, l; nicolau, m. Os jogos de tabuleiro e a construção do pensamento computacional em sala de aula. In: anais do iii congresso sobre tecnologias na educação. Fortaleza. Http://ceur-ws.org/vol-2185/ctrle_2018_paper_11.pdf, maio, 2018.

Raupp, f. M.; beuren, i. M. Metodologia da pesquisa aplicável às ciências sociais. In i. M. Beuren (ed.), como elaborar trabalhos monográficos em contabilidade: teoria e prática (3 ed., pp. 76-97). Atlas, são paulo. 2006.

Santos junior, v. B. Dos; monteiro, j. C. Da s. Educação e covid-19: as tecnologias digitais mediando a aprendizagem em tempos de pandemia. Revista encantar-educação, cultura e sociedade, v. 2, p. 01-15, 2020.

Xavier, p. C. Letramento digital e ensino. Alfabetização e letramento: conceitos e relações. Belo horizonte: autêntica, v. 1, p. 133-148, 2005. Disponível em: http://twixar.me/w0ht. Acesso em: 10 de maio. De 2020.

Zanetti, h. A. P.; oliveira, c. L. V. Prática de ensino de programação de computadores com robótica pedagógica e aplicação de pensamento computacional. In: iv congresso brasileiro de informática na educação (cbie 2015). Anais dos workshops do iv congresso brasileiro de informática na educação (cbie 2015), maceió, al, 2015.