CONTINUING EDUCATION: INDICATIONS FOR DISTANCE LEARNING OF BIOLOGICAL SCIENCES IN ELEMENTARY AND SECONDARY EDUCATION

ORIGINAL ARTICLE

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ABSTRACT

Although discussions about the possibility of online education in elementary and high school in Brazil have entered the wake of the theoretical debate, there is still great resistance. However, the pandemic context brought no alternatives, leading thousands of students to social isolation for more than a year. This context caused elementary and high school teachers to adapt to new technologies, thus

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demonstrating the need to prepare to work in remote learning teaching. The guide question of this material was: How can life science teachers prepare and what basic tools should they know to prepare their online classes? Thus, the general objective was to carry out indications that teachers should know to prepare their online classes. The methodology adopted was exploratory through literature review. The main indications were that teachers need to seek diversified content in the preparation of classes to adopt motivation strategies with their students, adopting care with the issue of language, audio and light in the production of classes. Finally, it will be up to the teacher to recognize the various tools and resources such as: Youtube, Instagram, Movies, Games, and other subsidies, so that there is an approximation between the teaching of biology and the reality of the student.

Keywords: Teacher Training, Distance Education, Biology Teaching.

1. INTRODUCTION

Since the end of 2019 the world has come across the SARS/COVID-19 virus. Its high contagion capacity, involvement of vital organs, especially the lungs, and the ignorance of the scientific community, led the International Organizations to decree a global pandemic situation, indicating immediate social withdrawal. This measure directly impacted organizations that had to adapt to new realities, using, as never before, technological means to enable the continuity of their respective functionalities. According to Gonçalves *et al.* (2020), in Brazil, one of the most affected institutions was schools, especially public schools, because, in addition to facing problems regarding the accessibility of technological tools, their teachers were not prepared for this reality, and many resisted the idea of online education, especially in high school and elementary school.

Lenzi and Santos (2021) alluded that even with vaccines and return to face-to-face classes, it is important that teachers adapt to the routines of distance learning, especially in what has been advocated by teachers as: hybrid teaching, because this

context is already a reality. This is why this study is to provide some indicative subsidies that teachers should consider when preparing their online classes, starting from the following guide question: How can life sciences teachers prepare and what basic tools should they know to prepare their online classes? Thus, the general objective of this study will be: to carry out indications that teachers should know to prepare their online classes.

Specific objectives will be considered: a) To demonstrate the main difficulties of online education of biological sciences and the importance of the use of technologies; b) Seek tools that can be incorporated into online education; c) Provide technological indicators and instructions that should be considered by the biology teacher. Thus, in the theoretical foundation, a broad search was used in *Google Academic*, using as descriptors: "Tools for the online teaching of Biology"; "EAD Teaching of Biology"; "Hybrid Teaching of Biological Sciences"; "Hybrid Biology Teaching." As inclusion criteria, it was considered materials that could contribute to the problem and objectives presented here. Twenty materials were selected, including scientific articles, books and manuals. In possession of these, in the results and discussions, a table was held with indications of basic tools and general considerations to be adopted in the teaching of online biology.

2. THE IMPORTANCE OF CONTINUING EDUCATION OF TEACHERS

The history of humanity is directed and constituted from different social, political, scientific and economic perspectives, and all these dimensions are affected by technological advances (TREBIEN *et al.,* 2020). Every social and system change directly affects the educational process in the school, and, thus, the school institution must follow these advances (RODRIGUES; LIMA; VIANA, 2017). The school must adapt to the new model. Given this scenario, the professor is strongly involved in a process that implies constant changes so that he can meet the challenges imposed by society. This is because we live in the information age and, thus, the initial training

of teachers is no longer a sufficient requirement to guarantee the mastery of content and pedagogical quality (JUNGES; KETZER; OLIVEIRA, 2018).

Continuing education admits the activities developed by teachers after the first training. This occurs when the professional enters the teaching profession. It can be individual or collective (TREBIEN *et al.,* 2020). It becomes indispensable, therefore, a process of formation that is permanent and continuous, rooted in an epistemology of practice and daily life, being able to subsidize an innovative and conscious educational action (JUNGES; KETZER; OLIVEIRA, 2018). Due to the relevance of the continuity of teacher education, the Law of Guidelines and Bases of Education (LDB) contains a chapter that emphasizes the subject and provides support for this training: "[...] the association between theories and practices, including through in-service training", following the single paragraph, highlights the "continuing training for professionals in their workplace" (TREBIEN *et al.,* 2020, 94).

Given the increase and improvement of policies aimed at continuing education, mainly due to the concern with the quality of the teaching exercise, the theme has raised new actions. It is then necessary to join a well-designed continuing education program with well-structured purposes, comprising not only the needs of the teacher, but also the entire education system, involving teachers in this planning process, which must be participatory, collaborative and must admit their real needs (RODRIGUES; LIMA; VIANA, 2017). In order for their knowledge and praxis to be valued, the teacher, together with his peers, must reflect and dialogue, helping others to overcome their conflicts (FALSARELLA, 2004). In this way, continuing education will contribute to the development of the teacher's autonomy and dynamism of his daily practice:

> [...] continuing education as an intentional and planned proposal, which aims at changing the educator through a reflexive, critical and creative process, it is concluded that it should motivate the teacher to be an active agent in the research of his own pedagogical practice, producing knowledge and intervening in reality (FALSARELLA, 2004, p. 50).

The teacher's continuing education implies the adoption of a continuous posture that implies reflection, research, action, discovery, organization, foundation, review and theoretical construction. It does not involve only the learning of new pedagogical techniques or the latest pedagogical innovations (FALSARELLA, 2004). In this sense, the process of permanent formation must be based on the reality of each school, and it is necessary that pedagogical meetings and other moments of formation, inside and outside the school, rethought every day, in order to follow the changes of society itself (GADOTTI, 2008). The role of the teacher in this highly changeable and dynamic context implies the contextualization of the contents taught, so that learning becomes significant, which requires a constant exercise of critical reflection.

> [...] the propositioned theoretical knowledge is articulated, therefore, to the knowledge of practice, at the same time resignifying and being re-signified by them. The role of theory is to offer teachers perspectives of analyses to understand the historical, social, cultural, organizational, and themselves as professionals, in which their teaching activity takes place, to intervene in them, transforming them (GHEDIN, 2012, p. 31).

It is necessary that the professor appropriates the theory so that he can reflect and interpret the teaching practice in line with the demands of society, which implies changes in pedagogical practice, so that it is possible to strengthen the autonomy and dynamism of the teacher (TREBIEN et al, 2020). Pedagogical practice is the starting and coming point of the continuous education process and, at the same time, it is a path that enables the transformation of the teacher's action, and thus seeks the theoretical foundation of subsidies that allow the strengthening of praxis in a reflexive, dialogical and interactive way (GHEDIN, 2012). It is up to the teacher, therefore, to be willing to innovate, so that he can meet the demands of society in the field of teaching, so that he can transform practice and professional practice (RODRIGUES; LIMA; VIANA, 2017).

From the moment one begins to reflect on continuing education and how it must adapt to multiple advances (including those of a technological order), an intentional awareness of the social quality of education and of the school pedagogical practice is required (JUNGES ; KETZER; OLIVEIRA, 2018). Therefore, it is understood that an education of epistemological and social quality advocates for a fundamental objective: the need for a creative and strategic pedagogical practice is defended, and, therefore, it should not be shaped by the simple repetition of practices existing ones (GHEDIN, 2012). In this sense, the elaboration and application of policies aimed at training is essential. Nowadays, those focused on the performance of technologies in the classroom are fundamental. It is a reality that requires careful handling of theory and practice in teaching (TREBIEN et al, 2020).

However, attention should be drawn to a problem faced by the Brazilian education system. In Brazil, historically, the predominant models of continuing education have privileged a merely instrumental conception of teaching work (FERREIRA; ALBUQUERQUE; LEAL, 2007). In this sense, the teacher is led to reproduce techniques and, passively, executes the proposals that are already ready. It is noticed that, in many times, the norms prescribe a teaching model that directs the student to an active, participative and autonomous learning. However, in practice, there is no articulation of this pedagogical knowledge in continuing education courses (TREBIEN *et al.,* 2020). However, continued training contributes to the improvement of the teacher and, consequently, to the quality of teaching. Thus, several knowledges of educational practice become necessary for the resignification of teaching practice, which implies a constant search and learning on the part of the teacher.

3. TEACHING DISTANCE AS A TOOL FOR CONTINUING EDUCATION

The use of technologies and distance learning is a reality that needs to be incorporated by teachers, since the pandemic has caused a kind of rupture of relationships, and, consequently, in education. It is estimated that even with the control of COVID, the school should adapt to another reality, if not fully online teaching,at least the adoption by hybrid models (LENZI *et al.,* 2021). Regarding the difficulties of online teaching, Gonçalves *et al.* (2020) considered the relationship between the school and the family fundamental, because it will be up to the student to follow the development of the student in his home. Nicola and Paniz (2016) add that regardless of the chosen technology, it is important that the teacher keep in mind that the diversification of educational technological resources will be essential for the success of learning teaching.

In addition, it is necessary to seek environments that translate the daily reality and the need of the society that the student is inserted in (ARAÚJO *et al.* 2011).

> [..] the "classroom", translated into a virtual space where lessons are made available, is not enough to ensure the desired result. As in a school, in the most traditional ways, it is necessary to consider all the agents involved. It should also be said that even if one has a notion closer to reality and that one has the ideal of the participants of the process, this is not enough to secure the achievement of the proposed educational objectives. In other words, it's not about having the components of a school and putting them together in the same place. What is wanted with the concept of school is the harmonic integration of the pieces so that the operation of this gear presents the least possible of edges (SOARES FILHO, 2013, p.418).

Olivetti and Periotto (2014), when interviewing 88 teachers, concluded that continued training is fundamental for the effectiveness of the use of technologies within the teaching of biology, because biology alone has always required resources other than theoretical ones, such as: laboratories and field. In addition, the teacher should keep in mind that the teaching of biology is a tool for critical and social construction of the

subject, and, therefore, it is necessary to use all resources so that the student has a better performance (LEITE *et al.,* 2017), including the adoption of the awareness that the student must understand biology within his/her daily reality (DURÉ *et al.,* 2018).

Rethinking, then, the teaching of biology, Brandim and Nogueira (2018); Machado (2017), carried out a reflection on the practices employed and the possibilities of technological tools in the teaching of biology, and emphasize the need for the teacher to seek constant training to better the result of his professional practice and his social role as a teacher. In addition to the context of teaching learning focused on the subject taught, the contemporary teacher should keep in mind that he also becomes a technological educator, that is, responsible for teaching the student the use of technology in a constructivist way, indicating the best options for use for the construction of critical thinking and better absorption of content that can serve in their formative process, and, therefore, interfering in digital behavior (ROCHA, 2013).

The virtualization of educational systems presupposes the alteration of the current teaching models and teaching practices, and thus the situation "forces" the teacher to assume new roles, thus communicating through ways with which he was not accustomed (CARRARI; SOUZA; BEHR, 2017). The teacher is not only responsible for the transmission of knowledge to his students, because, at that moment, he/she must guide the student's learning process, so that he/she can develop his/her abilities, that is, he/she must be helped to learn and thus develop his/her autonomy (ROSALIN; CRUZ; MATTOS, 2017). The teacher must accompany, motivate, dialogue, be a leader, mediator, fostering and mediating a positive human interaction (GOULÃO, 2012). It is expected that it will be a moderator in interpersonal and intrapersonal relationships and to continuously self-evaluate its performance, reviewing practices.

The introduction of technologies in the teaching environment is a way to stimulate students, guiding their emotions, affections and attitudes (DIAS, 2008). The teacher, in this new technological scenario, must assume functions that awaken the creation

and use of digital resources, which implies reviewing their teaching strategies, enhancing interactions through technology. For this dynamic, it is necessary to understand the specificities of the channels that enable synchronous and asynchronous online communication (SALMON, 2000). It requires a good communication structure to generate an authentic virtual learning community, so that the student is connected and motivated. Regular communication with students must be carried out from different communication channels, so that they recognize that the presence of the teacher is essential. The "empty" virtual classroom must be resignified (GOULÃO, 2012).

The lifeless classroom, without social and cognitive presence, is a "lifeless" space (MOREIRA; FERREIRA; ALMEIDA, 2013). Virtual asynchronous communication classrooms are known as "forums". They are fundamental and respond to the essence of digital networkeducation, since they do not require a confluence of teachers and students in space and time, and thus there is greater flexibility in this educational model (MOREIRA; HENRIQUES; BARROS, 2020). For these classrooms to correspond to a powerful communication tool, it is crucial that they are well organized and structured, which requires the community to know its operational rules and follow them, so that virtual-digital promotes meaningful learning (SOUZA; ARAGON, 2018). It is recommended that there are spaces in this virtual environment for each activity.

A space for the communication of news and warnings, another for students' doubts to be answered, another informal space that allows interaction between students and teachers in a more relaxed way and spaces created for each type of activity, are necessary strategies for the digital to be efficient (MOREIRA; HENRIQUES; BARROS, 2020). There are a number of advantages promoted by digital technologies, however, continuing training, that is, continued, is crucial, since, in this area, innovation and incorporation of new techniques happens all the time, which requires significant changes in teaching practice (MOREIRA; HENRIQUES;

BARROS, 2020). In this sense, it is necessary to know the software, understand what is intended with its use, from the pedagogical point of view, and understand if this specific digital resource is the most appropriate (CARRARI; SOUZA; BEHR, 2017).

This is because the simple use of digital interfaces does not in itself guarantee advances or innovations in educational practices (SOUZA; ARAGON, 2018). Several Social Web interfaces are underutilized when the adopted references still replicate those practices acquired in Web 1.0. For these reasons, and, in addition, understanding digital networkeducation as a process characterized by the use of digital Social Web technologies, it is necessary to promote active and constructive pedagogical and didactic practices (ROSALIN; CRUZ; MATTOS, 2017). Knowledge and learning must be developed collaboratively. Network education, due to its own essence, is a process that requires the deep involvement of different actors involved in this articulation, especially the definition of the objectives and learning paths of the community.

The process also has repercussions on the close relationships constructed, collaboratively, among the peers that support the processes of innovation and creation of knowledge from digital pathways (MOREIRA; HENRIQUES; BARROS, 2020). For the collective construction of this new knowledge, it has been increasingly common and rapid the growth and expansion of the use of Open Educational Resources (OER). These have promoted access and free use of content and technologies (GOULÃO, 2012). Such resources correspond to an inexhaustible source of digital resources that can be linked to activities aimed at the presentation and enrichment of content. There are platforms that allow different forms of approach to knowledge (platforms that integrate video, audio and image, such as YouTube, and other social and digital networks/media) (SOUZA; ARAGON, 2018).

4. KNOWLEDGE NEEDED FOR ONLINE TEACHING

It is not the privilege of the biological sciences to face challenges in the teaching process of learning, or even more so, than teaching and how to teach. In the context of online teaching, these challenges were only more expanded by requiring the teacher's underdeveloped technological skills. Duré *et al.* (2018) point out that the greatest challenge of teachers both in face-to-face teaching and online teaching is to make students interested in classes, so when always seeking approaches considering their personal and social needs, the teaching process tends to be more effective. Another strategy that should be adopted by teachers in this process is the wide diversification of teaching mechanisms, such as videos on YouTube, movies, games, wanted (OLIVETTI and PEIOTTO, 2014; NICOLA and PANIZ, 2017; ARAÚJO *et al.,* 2011; LEITE *et al.,* 2017; LEÃO *et al.,* 2018)

Table 1- Teaching knowledge and indications for online education

Knowledge needed for Online Biology Teaching	Authors
Adapt the classes according to the reality of the student, whether social or personal	Araújo *et al.* 2011; Leite *et al*., 2017; Machado, 2017; Leão *et al*., 2018.
Search for videos, games, apps that can bring dynamism to biology teaching	Araújo *et al.,* 2011; Leão *et al.*, 2018.
Seek evaluation methods that involve the student, including group methodology, such as creating exhibition videos	Araújo *et al.,* 2011; Leite *et al.,* 2017; Leão *et al.,* 2018.
Conceptual map	Leão *et al.*, 2018
Use of quiz (Instagram)	Souza *et al.*, 2020
Research in different online media on the subjects exposed. Taking the opportunity to develop critical thinking and analysis of some positions at this time	Machado, 2017; Brandim and Nogueira, 2018

Diversification of Youtube resources, movies, games, texts	Olivetti and Peiotto, 2014; Nicola and Paniz, 2017.
Adaptation of Language, Lights and Recording Location	Soares Filho, 2013.

Source: Author

Souza *et al.* (2020) conducted a teaching experience through the "quiz" tool on Instagram, as a kind of knowledge testing. The results showed that the students felt motivated and excited, including developing a competitiveness movement among themselves. Evaluating how the students felt about this tool, the result was also positive, because the students were involved and motivated. Finally, the teacher's care when teaching online, seeking to update their language within the context of students, and investigating their technological resources such as light and sound, will certainly be made as a strategy in the success of teaching through better student support (SOARES FILHO, 2013).

The National Common Curriculum Base (BNCC) points out the need for a joint effort between teachers, researchers and national organizations so that essential competencies for Brazilian students of basic education are developed, including those related to the digital environment (FERREIRA *et al.,* 2021). These must be developed so that everyday demands are met. BNCC presents ten competencies aimed at human and integral training, including "digital culture". Thus, it is concerned with the development of skills and abilities related to the use of digital technologies in the classroom, and these should be appropriate to various social practices (MATTAR *et al.,* 2020). Thus, continuing education must help teachers understand, use and create information and communication technologies (CHIOSSI; COAST, 2018).

The use of digital technologies should be made critically, significantly, reflexively and ethically, introducing daily practices in the educational context. The objective is to

promote communication, access, dissemination of information, knowledge production, problem solving, the exercise of protagonism and authorship in the process of interaction with such technologies in the educational context (LEITE; SILVA, 2017). In this sense, by understanding the incorporation of digital technologies in the construction of the teaching-learning process and in the resolution of everyday problems, the BNCC suggests that professionals should be trained to be able to introduce digital in the classrooms (PIFFERO *et al.,* 2020). Teachers of different levels of education and multiple subjects should develop skills and skills that allow this inclusion (CHIOSSI; COAST, 2018).

Thus, national programs and policies that involve the incorporation of technologies in education should promote strategies that enable effective access to digital, but there are still numerous barriers and challenges (LEITE; SILVA, 2017). Information and communication technologies must go beyond the technical and instrumental use of digital (PIFFERO *et al.,* 2020). There are two factors that can delay the access of digital in the classroom: physical and structural conditions and inadequate training (FERREIRA *et al.,* 2021). Regarding the structuring of schools and the teacher training itself, the National Educational Technology Program (PROINFO), created in 1997, can be highlighted. This has triggered new developments, reaching the Program of Innovation and Connected Education. These initiatives are added to others developed since the 1970s.

The objective is to provide a computational structure to schools so that it is possible to promote an adequate teacher qualification, making feasible the use of TDIC in the context of education (FERREIRA *et al.,* 2021). In order to establish a concrete policy in the area of information technology in order to leverage the country's economy, technologies have become part of the most diverse contexts, however, they have not yet been introduced efficiently, since it is still difficult to implement a digital culture in the classroom (CHIOSSI; COSTA, 2018). However, with the need for the introduction of remote education, some inequalities were evidenced due to the pandemic

(SARAIVA; TRAVERSINI; LOCKMANN, 2020). As much as some schools can promote moments of digital meeting from the different platforms, access is still a problem.

In addition, the lack of mastery regarding the use of platforms, networks and digital media by the teacher also makes it difficult to incorporate technology into the teaching environment. Mastery of certain tools and technologies implies knowledge of such possibilities. New technologies emerge and are improved every day, which requires the teacher a constant search for the improvement of his skills and skills related to the handling of such platforms and digital tools (MATTAR *et al.,* 2020). The knowledge necessary for the teaching exercise permeates some fields. They are classified from some specific categories (TARDIF, 2010). They are the knowledge of disciplinary order; professional knowledge; curricular knowledge and knowledge associated with the experimental field (MATTAR *et al.,* 2020).

The technological skills that will be charged to the teacher in the teaching exercise are linked to certain knowledge and skills related to the handling of digital networks and media (FERREIRA *et al.,* 2021). In this sense, in order to make learning meaningful and tied to the use of technology, some skills become paramount, however, in order for them to be performed, it is necessary that the teacher has the necessary knowledge about their possibilities of use (PIFFERO *et al.,* 2020). Mastery of computer skills, software, tools,media and various virtual environments (such as *Google Meet* and other platforms) require a certain literacy and fluency in digital language (CHIOSSI; COSTA, 2018). Training courses should be based on this emphasis so that teaching in the virtual environment promotes efficient, dynamic and attractive learning for students.

5. FINAL CONSIDERATIONS

Based on the assumption of bringing some indications for the knowledge of the teacher in relation to online teaching, this study was based on the exploratory

methodology, seeking allusions and indications within other studies already conducted. Thus, to elucidate the final considerations of this study, the guide question was answered: How can life sciences teachers prepare and what basic tools should they know to prepare their online classes? The study showed that high school and elementary school teachers have the need to use multiple tools and strategies to prepare their online classes. It is not enough just to hold exhibition classes, it is necessary to involve the students. Interaction with such technologies must be stimulated, however, in so that learning is meaningful, it is necessary to master and know certain techniques, platforms, tools, etc.

Some effective tools pointed out by the literature are: Conceptual maps, YouTube videos, movies, games, *google search and other networks,* in short, tools that develop in the student, not only in the context of biology, but also, that encourage the conscious and effective use of technologies. In addition, some technical care is fundamental, such as: adequacy of language to the class, considering its age group, light and audio. Due to the pandemic scenario, and, consequently, the lack of classroom classes and possibilities to go to the field, this study brought some limitations, which could be better explored through research with teachers and students. It is indicated that further studies can be carried out in an applied manner with students and teachers, investigating strategies and tools that prove effective for the teaching of online biology in high school and elementary school.

REFERENCES

ARAÚJO, Magnólia Fernandes; SOUSA, Rute Alves; SOUSA, Ivanise Cortez de. Instrumentalização para o Ensino da Biologia. 2 ed. EDFRN, 2011.

BRANDIM, Maria Rejane Lima; NOGUEIRA, Johnson Fernandes. Ensino de Ciências e de Biologia: reflexões e práticas- Parnaíba: Edufpi, 2018.

RC: 96090
Available in: https://www.nucleodoconhecimento.com.br/education/biological-sciences

CARRARO, W. B. W. H.; SOUZA, M.; BEHR, A. Ferramentas de educação a distância utilizadas por profissionais de contabilidade visando a educação continuada. **Revista EDaPECI**, v. 17, n. 2, p. 144-160, 2017.

CHIOSSI, R. R.; COSTA, C. S. Novas formas de aprender e ensinar: a integração das tecnologias de informação e comunicação (TIC) na formação de professores da educação básica. **Texto Livre: Linguagem e Tecnologia**, v. 11, n. 2, p. 160-176, 2018.

DIAS, P. Da e-moderação à mediação colaborativa nas comunidades de aprendizagem. **Educação, Formação e Tecnologias**, v. 1, n. 1, p. 4-10, 2008.

DURÉ, Ravi Cajú; et. al; Ensino De Biologia E Contextualização Do Conteúdo: Quais Temas O Aluno De Ensino Médio Relaciona Com O Seu Cotidiano? Experiências em Ensino de Ciências V.13, No.1, 2018.

FALSARELLA, A. M. **Formação continuada e prática de sala de aula**: os efeitos da formação continuada na atuação do professor. Campinas, São Paulo: Autores Associados, 2004.

FERREIRA, L. P. S. et al. Autopercepção das competências digitais pelos professores da educação básica sergipana durante o ensino remoto. **Scientia Plena Jovem**, v. 8, n. 1, 2021.

FERREIRA, T. B.; ALBUQUERQUE, E. B. C.; LEAL, T. F. **Formação Continuada de Professores**: questões para reflexão. Belo Horizonte: Autêntica, 2007.

GADOTTI, M. **Boniteza de um sonho**: Ensinar e Aprender com sentido. São Paulo: Editora e Livraria Instituto Paulo Freire, 2008.

GHEDIN, E. Professor Reflexivo: da alienação da técnica à autonomia da crítica. *In*: PIMENTA, S. G.; GHEDIN, E (Orgs.). **Professor reflexivo no Brasil**: gênese e crítica de um conceito. 7ª ed. São Paulo: Cortez, 2012.

GIL, Antonio Carlos Gil. Método de Pesquisa. Ed. Atlas, São Paulo, 2018.

GONÇALVES, Janaína Oliveira. MIRANDA, Maurício Fernando Oliveira de. GONÇALVES JÚNIOR, Edson. Uma reflexão sobre a parceria da família e escola em tempos de COVID-19: Aspectos pedagógicos, econômicos e jurídicos. Revista Científica Multidisciplinar Núcleo do Conhecimento. Ano 05, Ed. 11, Vol. 06, pp. 141-154. Novembro de 2020. ISSN: 2448-0959, Link de acesso: https://www.nucleodoconhecimento.com.br/educacao/economicos-e-juridicos, DOI: 10.32749/nucleodoconhecimento.com.br/educacao/economicos-e-juridicos

GOULÃO, M. F. *The use of Forums and collaborative learning: A study case.* ***Procedia - Social and Behavioral Sciences***, n. 46, p. 672-677, 2012.

JUNGES, F. C.; KETZER, C. M.; OLIVEIRA, V. M. A. de. Formação continuada de professores: saberes ressignificados e práticas docentes transformadas. **Educação & Formação**, v. 3, n. 9, p. 88-101, 2018.

LEÃO, Marcelo Franco; et al; Estratégias didáticas voltadas ao ensino das Ciências. Ed. Edibrás. Uberlândia, 2018.

LEITE, M. S.; SILVA, S. R. F. da. Redimensionamento da Computação em Processo de Ensino na Educação Básica: O pensamento Computacional, o Universo e a Cultura Digital. *In*: **VI Congresso Brasileiro de Informática na Educação**, 2017.

LEITE, Paula Rayanny Mendonça; et al; O ensino da biologia como uma ferramenta social, crítica e educacional. RECH- Revista Ensino de Ciências e Humanidades – Cidadania, Diversidade e Bem-estar. ISSN 2594-8806 – 400. Ano 1, Vol 1, Número 1, Jul-Dez, 2017, p. 400-413

RC: 96090
Available in: https://www.nucleodoconhecimento.com.br/education/biological-sciences

LENZI, Juliana Fernandes de Almeida Castro. SANTOS, Marijara Barbosa Bragato. Sociedade Pós-Moderna Frente À Covid-19: Educadores Em Ação. Revista Científica Multidisciplinar Núcleo do Conhecimento. Ano 06, Ed. 03, Vol. 11, pp. 100-111. Março de 2021. ISSN: 2448-0959, Link de acesso: https://www.nucleodoconhecimento.com.br/educacao/educadores-em-acao

MACHADO, Claudia Pinto/ Ensino de ciências [recurso eletrônico]: práticas e exercícios para a sala de aula– Caxias do Sul, RS: Educs, 2017.

MATTAR, J. et al. Competências e funções dos tutores online em educação a distância. **Educação em Revista**, v. 36, 2020.

MOREIRA, J. A.; FERREIRA, A. G.; ALMEIDA, A. C. *Comparing communities of inquiry in higher education students: one for all or one for each?* ***OpenPraxis. Internacional Council for Open and Distance Education****,* v. 5, n. 2, p. 165-178, 2013.

MOREIRA, J. A.; HENRIQUES, S.; BARROS, D. M. V. Transitando de um ensino remoto emergencial para uma educação digital em rede, em tempos de pandemia. **Dialogia**, n. 34, p. 351-364, 2020.

NICOLA, Jéssica Anese; PANIZ, Catiane Mazocco. A importância da utilização de diferentes recursos didáticos no ensino de biologia. Infor, Inov. Form., Rev. NEaD-Unesp, São Paulo, v. 2, n. 1, p.355-381, 2016. ISSN 2525-3476.

OLIVETTI, Maria Madalena de Carvalho; PERIOTTO, Fernando. biologia e as novas tecnologias educacionais, um foco para a educação contemporânea. Revista Eletrônica Científica Inovação e Tecnologia Universidade Tecnológica Federal do Paraná Câmpus Medianeira. Vol.1, p. 9- 2014.

PIFFERO, E. de. L. F. et al. Metodologias Ativas e o ensino de Biologia: desafios e possibilidades no novo Ensino Médio. **Ensino & Pesquisa**, v. 18, n. 2, p. 48-63, 2020.

ROCHA, Jéssica. A percepção da ciência pelos alunos do curso de pedagogia UAB/UFMG. V Seminário Internacional de Educação a Distância. UFMG, 2013.

RODRIGUES, P. M. L.; LIMA, W. dos. S. R.; VIANA, M. A. P. A importância da formação continuada de professores da educação básica: a arte de ensinar e o fazer cotidiano. **Saberes Docentes em Ação**, v. 3, n. 1, p. 28-47, 2017.

ROSALIN, B. C. M.; CRUZ, J. A. S.; MATTOS, M. B. G. de. A importância do material didático no ensino a distância. **Revista on line de Política e Gestão Educacional**, v. 21, n. 1, p. 814-830, 2017.

SALMON, G. ***E-Moderating***. *The Key to Teaching and Learning Online.* London: Kogan Page, 2000.

SARAIVA, K.; TRAVERSINI, C. S.; LOCKMANN, K. A educação emtempos de COVID-19: ensino remoto e exaustão docente. **Práxis educativa**, v. 15, p. 1-24, 2020.

SOARES FILHO, Daniel. Conteúdos EAD: Pequenos detalhes que fazem a diferença. V Seminário Internacional de Educação a Distância. UFMG, 2013.

SOUZA, Dominique Guimarães; et. al. Redes sociais e o ensino de biologia: O uso do Quis do Instagram como Recurso Didático. Recite - Revista Carioca de Ciência Tecnologia e Educação · December 2020.

SOUZA, S. S. dos. S. de.; ARAGON, G. T. Estilos de aprendizagem e ensino a distância na perspectiva da inclusão. **EaD em Foco**, v. 8, n. 1, 2018.

RC: 96090
Available in: https://www.nucleodoconhecimento.com.br/education/biological-sciences

TARDIF, M. **Saberes docentes e formação profissional**. 17ª ed. Petrópolis, RJ: Vozes, 2010.

TREBIEN, M. M et al. Formação continuada de professores: uma epistemologia da prática. **Ambiente: Gestão e Desenvolvimento**, v. 13, n. 1, p. 91-102, 2020.

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