INSTRUCTIONAL GUIDE FOR PHYSICS TEACHERS: THE USE OF THE PADLET TOOL AS A STIMULUS FOR OUT-OF-CLASS STUDIES

GUIA INSTRUCIONAL PARA PROFESSORES DE FÍSICA: O USO DA FERRAMENTA PADLET COMO ESTÍMULO AOS ESTUDOS EXTRACLASSE

GUÍA DIDÁCTICO PARA PROFESORES DE FÍSICA: EL USO DE LA HERRAMIENTA PADLET COMO ESTÍMULO PARA LOS ESTUDIOS EXTRAESCOLARES

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ABSTRACT: Teachers capable of recognizing the benefits that technologies can bring to the teaching-learning process are able to act in a more attractive and innovative way with their students, both in the classroom and in encouraging extra-class studies. In this context, the present work presents a proposal for the development and analysis of an educational product for Physics teachers, with the objective of stimulating extra-class studies through the use of the Padlet platform. This is a search with a qualitative approach carried out with the participation of two classes from the third year of high school. After analyzing the results, it is possible to suggest that the use of the digital platform, in association with appropriate pedagogical strategies, can help in a more dynamic teaching, promoting the relationship between the basic curriculum content, the reality and expectations of students, encouraging building knowledge in a more comprehensive and effective way.

KEYWORDS: Physics. Teaching methodologies. New technologies

RESUMO: *Docentes capazes de reconhecer os benefícios que as tecnologias podem trazer ao processo de ensino-aprendizagem conseguem atuar de maneira mais atraente e inovadora junto aos seus alunos, tanto em sala de aula quanto no estímulo aos estudos complementares. Nesse contexto, o presente trabalho apresenta uma proposta de desenvolvimento e análise de um produto educacional para professores de Física, com o objetivo de estimular os estudos extraclasse por meio da utilização da plataforma Padlet. Trata-se de uma pesquisa de abordagem qualitativa realizada com a participação de duas turmas do terceiro ano do Ensino Médio. Após a análise dos resultados, é possível sugerir que a utilização da plataforma digital, em associação com estratégias pedagógicas adequadas, pode auxiliar em um ensino mais dinâmico, promovendo a relação entre os conteúdos básicos curriculares, a realidade e as*

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expectativas dos alunos, incentivando a construção do conhecimento de forma mais abrangente e eficaz.

***PALAVRAS-CHAVE**: Física. Metodologias de ensino. Novas tecnologias.*

***RESUMEN**: Los docentes capaces de reconocer los beneficios que las tecnologías pueden aportar al proceso de enseñanza-aprendizaje son capaces de actuar de una forma más atractiva e innovadora con sus alumnos, tanto en el aula como en el fomento de estudios posteriores. En este contexto, el presente trabajo presenta una propuesta para el desarrollo y análisis de un producto educativo para docentes de Física, con el objetivo de estimular estudios extraescolares a través del uso de la plataforma Padlet. Se trata de una investigación con enfoque cualitativo realizada con la participación de dos clases de tercer año de bachillerato. Luego de analizar los resultados, es posible sugerir que el uso de la plataforma digital, en asociación con estrategias pedagógicas, puede ayudar en una enseñanza más dinámica, promoviendo la relación entre los contenidos curriculares básicos, la realidad y expectativas de los estudiantes, fomentando construir conocimiento de una manera más integral y efectiva.*

***PALABRAS CLAVE**: Física. Metodologías de enseñanza. Nuevas tecnologías.*

Introduction

The Brazilian educational context lacks changes that can reverse the current scenario of students' demotivation. Many students abandon their studies due to problems related to school infrastructure, lack of teaching methodologies consistent with their social reality or because they do not understand the importance of learning. Today's students demand teaching skills and competencies for which their teachers often have not been prepared (BACICH; MORAN, 2018). Still in this line of thought, Martins and Paulino (2021) highlight as a demotivating factor the lack of family participation in the learning process.

There are numerous challenges that a teacher of Exact Sciences, such as Physics, faces in the exercise of his function in the classroom, such as: teaching gaps, problems of basic knowledge in Portuguese and Mathematics, demotivation, lack of commitment, low interest, devaluation of the school environment and indiscipline (BARBOSA, 2019). On the other hand, there are schools unable to offer students an efficient education that makes a difference in their personal and professional lives. Still, in the face of this reality, there are teachers unprepared didactically and technologically who, even in the face of so many developments and numerous available resources, still focus on the traditional model of teaching, in which the teacher believes to be the holder of knowledge and their students, mere receivers, i.e., the "banking education" is still in force (FREIRE, 2005).

Educators, in some situations, are not prepared to face the diversity and social problems that appear in the classroom. Conservative methods based on passive expectations can be replaced by appropriate pedagogical strategies that prioritize the development of skills and abilities necessary for the intellectual and personal growth of students (DEMO, 2011). Faced with so many paradigms that influence the teaching professional practice and, due to the increasing complexity assigned to the task of educating, the teacher sometimes ends up losing the focus and the main objective of teaching, which is to build knowledge. There are education professionals who get stuck in a repetition process, making their classes monotonous, not performing practical classes properly, causing the students' lack of interest in the content and consequently leaving the subject unstimulating (LABURÚ; BARROS; KANBACH, 2007). Given this context, the teacher must know how to instigate the curiosity of students and motivate them, respecting the particularity of each individual, so that their classes have greater engagement in performing the activities and greater participation during classes. For Clement, Custódio, and Alves Filho (2015), it is the teacher's function, by means of his or her teaching methodology, to motivate students, aiming at greater engagement and appreciation of school activities.

Teachers still face difficulties in stimulating their students to study outside class, since most of them do not even do the homework requested by the teacher. For Conelheiro and Ferreira (2012), this situation has generated conflicts between school, student and family, as teachers complain about the little importance that students give to homework, in a scenario in which parents do not charge their children, claiming to have other attributions or lack of specific knowledge to help them. The students, on the other hand, say they have little time to perform the tasks proposed by the teacher and, thus, the clash continues.

The digital information and communication technologies (DICT), outside the classroom, are increasingly part of the daily lives of children and adolescents, but their use in teaching practices is still incipient. Teachers capable of recognizing the benefits that technologies can bring to the teaching-learning process can act in a more attractive and innovative way with their students (BARTELLE; BROILO NETO, 2019). The DICT, when used in a contextualized way, can be enriching in a class, because the teacher, through the numerous resources available, can present the contents in a diversified and more attractive way, using, for example, the teaching platforms, associating the programmatic contents with the habits of their students. "These tools allow the student's engagement outside the classroom, making them have a closer and more current relationship with teaching and what is happening in the world" (BARTELLE; BROILO NETO, 2019, p. 288).

In this context, the proposal of this study was the development and evaluation of an educational product, in the form of an instructional guide for Physics teachers. The material, composed of didactic sequences, is based on the Padlet platform, a tool composed of a free interactive wall that allows students to upload documents, post texts, images, videos and have access to other students' materials. The platform enables interaction among participants and, consequently, contributes to the teaching-learning process. It can be used to support face-to-face and remote teaching, and also for out-of-class activities proposed in the Tutored Study Plan (TSP). These handbooks were developed during the period of social isolation, for the students and teachers to work on the curricular contents, respecting the monthly workload to be overcome by the student. The material developed addresses alternative pedagogical practices, which provide the development of students' creativity and autonomy, among other skills.

Methodological Procedures

The methodological path of the research was developed according to the steps detailed below. It is noteworthy that all steps were developed remotely, as a consequence of the measures for prevention and epidemiological control of the Covid-19 pandemic and in compliance with the National Law No. 13,979 of February 6, 2020 (BRAZIL, 2020).

Step 1: Literature review

The literature review was conducted in the period January 15, 2020 to August 30, 2021, by searching articles indexed in the Scientific Electronic Library Online - SCIELO, Google Scholar and the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel - CAPES. Inclusion criteria were: original, free papers, available in full, in Portuguese, English and Spanish, published between 2005 and 2021, which had a direct connotation with the theme and met the study objective (Chart 1). The exclusion criteria included incomplete studies, studies outside the established period, duplicates, and articles that did not meet the proposed plan. The descriptors defined for the search were: Physics. Teaching Methodologies. New Technologies. Books, graduate studies and documents from the Ministries of Education and Health were also used.

Char 1 – Papers included in the literature review[3]

[3] Translator's note: We have chosen to keep the original names of the papers in their respective languages.

Author(s)/Year	Journal	Main Topic	Country
BARBOSA (2019)	Periódicos UFES	Analisa as deficiências no ensino das competências nas turmas dos terceiros anos.	Brazil
BARTELLE; BROILO NETO (2019)	Revista Educação	Educação e tecnologia.	Brazil
CATALINA GARCÍA; AYALA-LÓPEZ; PASTOR (2019)	Mediaciones Sociales	Conhecer as percepções dos professores sobre a comunicação digital e o manuseio de dispositivos por seus alunos.	Spain
CLEMENT; CUSTÓDIO; ALVES FILHO (2015)	Revista de Educação em Ciência e Tecnologia	Como a Teoria da Autodeterminação e o Ensino por Investigação podem compor uma abordagem teórica consistente no processo de ensino-aprendizagem.	Brazil
CONELHEIRO; FERREIRA (2012)	Fundação Fafipa	Refletir e analisar o papel que as tarefas de casa assumiram no processo de ensino e aprendizagem.	Brazil
DEMO (2011)	Revista da Educação Profissional	O modo de o educador "ver e avaliar" as oportunidades educacionais dos alunos em meio às novas tecnologias.	Brazil
LABURÚ; BARROS; KANBACH (2007)	Revista Investigação em Ensino de Ciência	Razões particulares que levam professores de física do ensino médio a utilizar ou não atividades experimentais.	Brazil
LAI; BOWER (2019)	Computers & Education	Tecnologia e educação.	England
MARTINS; PAULINO (2021)	Revista Saberes Pedagógicos	O conhecimento do gestor escolar a respeito do texto do Estatuto da Criança e do Adolescente (ECA).	Brazil
MOTA; MACHADO; CRISPIM (2017)	Revista Redin	A integração entre educação e tecnologia.	Brazil
PÚBLIO JÚNIOR (2018)	Revista Ibero Americana de Estudos em Educação	Educação e tecnologia.	Brazil

Source: Prepared by the authors

Step 2: Field research

The research, carried out during the development of a master's thesis, was executed in a State School, located in the municipality of Turvolândia-MG, with two classes of the third year of High School, one class with five (5) students and the other with eight (8) students. Participation in the research required reading the Informed Consent Form (ICF) and, only after agreeing to the form, the respondent had access to the electronic forms. The questionnaires and the ICF were approved by the Ethics Committee, through the consubstantiated opinion number 4.339.514.

Step 3: Survey Questionnaire

The third step was the application of a survey questionnaire, made available to students through an electronic form application, consisting of 11 questions, being objective and discursive, prepared as proposed by Gil (2019). The purpose was to assess the students' prior knowledge regarding the contents of Physics, as well as the frequency with which they engaged in out-of-class activities, and their study habits supported by technological tools.

Step 4: Presentation of the Padlet platform and the didactic sequences present in the educational product

In the fourth stage, the Padlet platform was introduced to third-year high school students through an online meeting app. In this phase, the students had the opportunity to get to know the platform and explore its features. Next, the project's methodology was presented, with the proposal of supporting classroom teaching through out-of-class studies. The objective was to enhance the TSPs, using the resources that the platform makes possible. For the students to become familiar with the Padlet tool, an introductory presentation was made about the main features available in the platform, seeking to guide students about the many functionalities of the digital tool.

Step 5: Project Development and Follow-up

This phase was carried out through the messaging application, through specific work groups. The objective was to evaluate whether the methodology of the proposed out-of-class activities associated with DICTs contributed significantly to the personal and, especially, intellectual development of students in relation to the subject of Physics.

In this perspective, five (05) contents were selected to work the complementary proposal to the TSPs: Electrification Processes, Electric Current, Electric Circuits, Natural and Artificial Magnets, and Electromagnetic Waves. The organization of all proposals was guided by the Common National Curricular Base (BRAZIL, 2018). Within the chosen themes, using the Padlet platform, we worked on the proposal of an experimental class, the research, preparation and resolution of activities, the creation of mind maps, the development of a Podcast and a discussion forum.

Step 6: Evaluation Questionnaire

The sixth stage was based on the application of a questionnaire, composed of nine (9) evaluation questions, made available to students through an application of electronic forms, which were objective and discursive. The questionnaire aimed to evaluate the development and understanding of some Physics contents that were proposed during the development of the project, in order to verify if the Padlet tool helped in the teaching and learning process. A questionnaire entitled "Your opinion" was also made available to the students, composed of six (06) discursive questions, with the purpose of listening to the suggestions, compliments, criticisms and opinions of the students regarding the development of the project, as well as to evaluate their degree of satisfaction and interest in continuing to use this teaching methodology in future practices. During the research there were minor problems, mainly related to the quality of the internet connection. These difficulties were pointed out and solved, so as not to compromise the results of the work.

Step 7: Data Analysis

For the analysis of the students' answers, the content analysis method was used (BARDIN, 1998). The technique is divided into three stages: pre-analysis, exploration of the material and treatment of the results, which include inference and interpretation. In the pre-analysis there is a systematized organization of the initial ideas, seeking to make the raw results meaningful, so that they meet the research objectives. After the first stage, the analysis was performed, followed by categorization and interpretation.

The following categories were identified:

1) Students' conceptions of out-of-class activities;
2) Motivation towards the use of DICT;
3) Impressions on the methodology used in the research;

Results and discussion

The analysis of the data obtained by the survey questionnaire shows that all students participating in the research frequently use DICT and consider it essential as a support for educational development. Digital tools are used for research and the search for new information; thus, it is feasible to use them in pedagogical strategies. Ferreira (2014) also obtained positive results in his research reconciling educational methods and technological tools.

Approximately 40% of students responded that they do not have the habit of studying outside the classroom and have little dedication to performing supplementary activities, which demonstrates the need to insert new teaching methods and practices that encourage dedication to out-of-class studies. According to Conelheiro and Ferreira (2012), homework is part of the teaching process and, when well designed and challenging, it contributes to meaningful and effective learning. This statement was observed throughout the development of the project, when students, even reporting the lack of the habit of studying outside the classroom, got involved in the dynamics of the activities and strove to complete, with excellence, all the proposals. It is assumed that this was motivated by the innovative nature of the proposal, which, through the use of DICT, stimulates the curiosity and interest of students.

Regarding the discursive questions, in addition to the opportunity to better understand the students and their expectations, because it is more complete answers, it was observed a unanimous enthusiasm among the participants regarding the insertion of DICT in teaching (Chart 2).

Quadro 2 – Examples of student responses on the question, "How do you evaluate the relationship between technology tools and teaching?"

Response	Students' identification
"Technology together with teaching, is the third pillar for a good education, because, first you need a good professional (Teacher), second a lot of dedication and commitment and third willingness to seek new information and solve doubts."	Student A, from the State School enrolled in the 3rd Year of High School.
"It's a great tool, but we have to be directed to use it in the best way possible."	Student B, from the State School enrolled in the 3rd Year of High School.
"Good. They can be very useful when used in the right way. Easy to understand material and explanations are needed. Thus improving teaching and expanding knowledge."	Student C, from the State School enrolled in the 3rd Year of High School.

Source: Questionnaire applied to 3rd year high school students. Prepared by the authors

When asked the students if they believe that inserting, in the educational context, diversified classes that use interaction platforms would be an interesting strategy for the development of their knowledge, again, all students expressed themselves in a positive way, reporting that it would be a very valid strategy (Chart 3).

Chart 3 - Examples of student responses on the question, "Do you believe that inserting in the educational context, diversified classes, using interaction platform, would be interesting for the development of your knowledge?"

Response	Students' identification
"Yes, it is very interesting and fruitful!"	Student D, from the State School enrolled in the 3rd Year of High School.
"Yes, different classes are always welcome!"	Student E, from the State School enrolled in the 3rd Year of High School.
"Yes. Interactive classes collaborate with learning interest and bring us new perspectives."	Student F, from the State School enrolled in the 3rd Year of High School.

Source: Questionnaire applied to 3rd year high school students. Prepared by the authors

The survey questionnaire also specifically addressed the students' views on the subject of Physics (Chart 4).

Chart 4 – Examples of student responses on the question, "How do you rate the physics classes and your knowledge regarding the content studied in Year 3 so far?"

Response	Students' identification
"The physics classes are excellent, although I don't think the content has been fixed completely. A review would be good."	Student G, from the State School enrolled in the 3rd Year of High School.
"I have a little difficulty in Physics, the content we saw in class before the pandemic I understood better, however I had a lot of difficulty understanding TSP."	Student H, from the State School enrolled in the 3rd Year of High School.
"The teacher gives us all the support we need, but it needs a little more study and effort on my part."	Student I, from the State School enrolled in the 3rd Year of High School.

Source: Questionnaire applied to 3rd year high school students. Prepared by the authors

In general, the students showed difficulties in the Physics contents. Some reported a worsening in learning after the advent of the remote classes, which began with the interruption of school activities, due to strategies to control the dissemination of the new coronavirus.

After the application of the probing questionnaire, the pedagogical interventions were started through the didactic sequences present in the educational product developed for use in the Padlet platform. On this opportunity, the Padlet platform and its features were presented, as well as the entire methodology of the project. During the class, all participants interacted reporting their doubts and suggestions regarding the platform and the didactic sequences that were presented. It was observed that the students were very involved and interested in the project dynamics. One of the third-year A students reported: *"I am very eager to start the activities, it will be a great experience, because the Padlet platform offers excellent resources to work with, thus opening possibilities of information sharing and interaction"* (Student J), confirming the statement of Mota, Machado and Crispim (2017, p. 5), who report that the platform "[...] stimulates thinking, imagination and curiosity, aiming to transmit on the mural information that will be presented to others who will have access to Padlet, besides allowing the interaction between both".

After the introductory lesson, the development of the didactic sequences began. One of the proposed sequences, on the theme "Electrification Processes", will be described below. [4]

First proposal

Content: Processos de Eletrização.

Objective: Basic common content (MINAS GERAIS, 2007, p. 44):

Understand electrostatic phenomena and their applications.

Know how to distinguish the difference between conductors and insulators.

Understand how the insulators can be charged by friction and how metals can be loaded by induction.

Activity: Presentation of an experimental class.

Target Audience: Third year of high school

Literacies: research literacy

multimedia literacy

Complexity: ★★★

Language

Vocabulary: Search; Technology; Learning

Functions: To present; to discuss

[4] The other activities present in the instructional guide for Physics teachers can be accessed through the link: https://drive.google.com/file/d/1-7LbuKUwHdFP2Lu0w9QKCvNElJKiBAMI/view?usp=sharing.

Competences: Read, write, speak

Proposal: The students, divided into working groups, should conduct research on the three electrification processes (friction, contact, and induction) and then make a presentation on the results. This research and presentation must include the practical and theoretical aspects of each process. The activity consists in a recording of the results, which will be posted in a specific Padlet, created for this purpose, whose intention is that all colleagues have access to the publications and can interact with opinions and questions regarding the published content. This activity allows students to face real situations in their daily lives, relating theory and practice, making concepts clearer and expanding their knowledge about the subject.

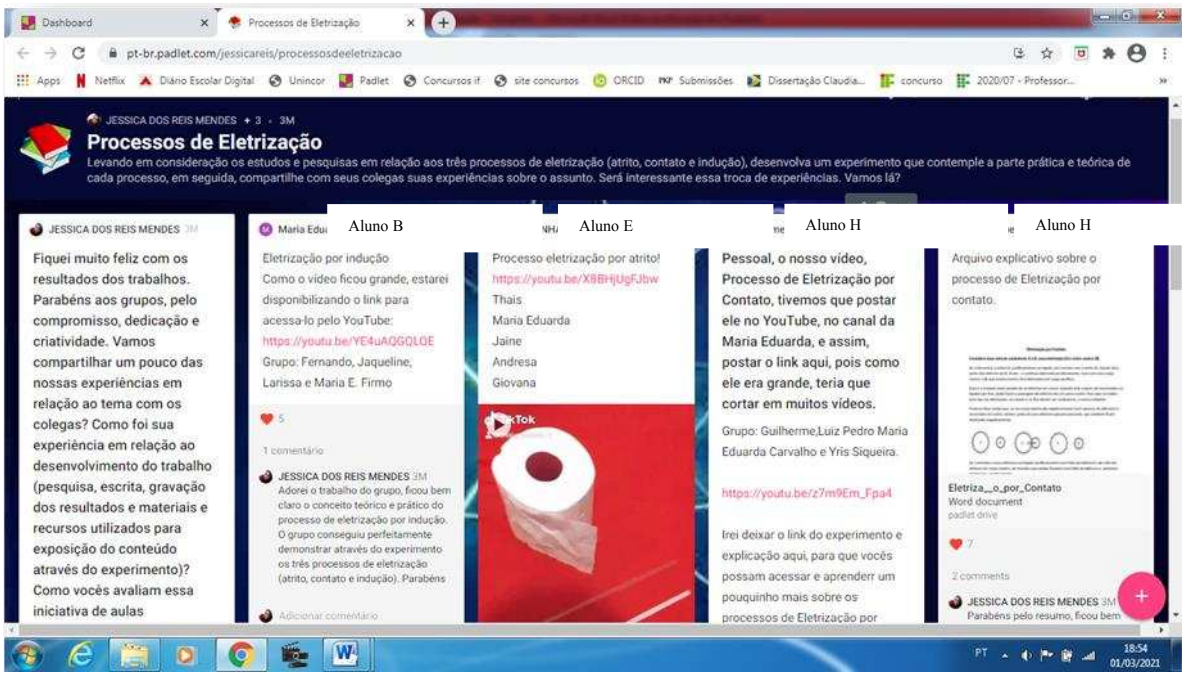
The guidelines were passed on to the students through a specific group on the messaging application called "Padlet". In this space, they posted the guidelines for the development of the theoretical part and the creation of the experiment. The teams had eight days to develop the experiment and make a video recording, including the theoretical and practical part of each electrification process. The interaction in the working groups occurred naturally and the discussions were very productive. All students were involved in the dynamics of the activity and brought relevant information about the themes worked on. The students engaged and contributed significantly to the doubts of their colleagues, exchanging information, research sources and possible results, emphasizing the need for the teacher to propose teaching strategies that motivate discussion and critical argumentation, because these two elements are fundamental for the construction of effective learning. The methodology used, besides contributing to the collective learning of the students, developed some social values that could be observed, such as respect, understanding, solidarity, and knowing how to listen and speak at the right time.

The results obtained in this first didactic sequence show that, when well planned, the practical class marks the student's learning, after all, the research and development of experiments stimulate creativity, logical thinking and critical sense, making learning more dynamic and concrete. The choice of methodology was fundamental to obtain positive results in the development and conclusion of the activities, increasing the students' involvement in the dynamics of the proposals and facilitating the understanding of the contents related to Physics.

Encouraging the demonstration of the physical concepts of electrification, contact, friction, and induction processes, for example, also acting in practical Physics, awakened the students' interest. The students had the opportunity to observe how Physics is present in our daily life and how it is possible to learn through different dynamics, proving theories and assimilating important concepts, without using paper and pen.

The activity was developed in groups, another strategy adopted, which, according to the students' own reports, contributed significantly to the learning process. They researched, exchanged information, discussed strategies, and organized themselves in such a way that all team members actively participated in the completion of the activity. On Padlet, where the experiments were posted, the interaction of the students was very productive (Figure 1).

Figure 1 – *Padlet made by the students*



Source: Padlet, prepared by the third-year students (2020)

There was sharing of experiences, doubts, criticism and praise regarding the methodology used and the strategies adopted by each group, making evident the involvement, enthusiasm and satisfaction of the teams in participating in the proposal for out-of-class studies and, especially, learning in a more dynamic and interactive way.

The presentation of the development of the first didactic sequence was intended to demonstrate the dynamics of the project. Besides the research and the production of videos, several other strategies, such as the construction of mind maps, podcasts and discussion forums, were used in the other sequences, always supported by the Padlet platform.

As a final proposal of the work, after the process of study and interaction on the Padlet platform, the students were asked to fill out the evaluation questionnaire, which aimed to verify the development and understanding of some Physics contents that were proposed in the project dynamics, in order to assess whether the Padlet tool was effective in teaching. They were also asked to fill out the questionnaire entitled "Your opinion", which aimed to hear suggestions,

compliments, criticisms and opinions of students regarding the development of the project, as well as to assess their degree of satisfaction and interest in continuing to use this teaching methodology in future practices.

Through the analysis of the content obtained in the answers to the evaluation questionnaire, it is verified that the students approved and got involved in the project methodology. The active participation contributed positively to the educational, social and personal development of the students, because the students, in addition to participating in the practices, had the opportunity to position themselves critically in relation to the proposed steps, thus having an active participation in the process (RABELO, 2017). The objective questions dealt with the association of the DICT with Physics teaching, the contribution of the Padlet platform as a stimulus for out-of-class studies, the importance of the activities proposed for out-of-class activities as a complement to the face-to-face classes and the TSP, and the effectiveness of the pedagogical strategy used in fixing the Physics contents. The answers to all these questions were unanimously positive.

Regarding the discursive questions, it was observed the students' interest in continuing to use the proposed methodology in future practices (Chart 5).

Char 5 – Examples of students' answers to the question: "Would you like to continue using the Padlet platform as an aid to out-of-class studies?"

Response	Students' identification
"Yes. I liked it, I thought it was an interesting way to learn. I thought it was easier to understand the subject matter."	Student K, from the State School enrolled in the 3rd Year of High School.
"For sure, the platform and its various resources made my study much more dynamic, I learned in a very different way than usual."	Student L, from the State School enrolled in the 3rd Year of High School.
"Yes, I even suggested to teacher Jessica that she publicize the project in the school so that the proposal will be adhered to by the other teachers as well."	Student M, from the State School enrolled in the 3rd Year of High School.

Source: Questionnaire applied to 3rd year high school students. Prepared by the authors

According to the students, the dynamics of the project contributed effectively to their learning, besides encouraging the search for new knowledge. In relation to the students' reports, it is observed that the use of didactic sequences associated with the Padlet platform helped stimulate study habits, develop creativity and autonomy, in addition to presenting a teaching proposal that students can use in another moment of their education and/or as a proposal for other curricular subjects. When the students were asked about the five (05) positive points of using the platform, the answers were very diverse, but very positive in relation to the students' opinion about the experiences lived and shared throughout the project. In the analysis of the

reports, it was observed motivation and enthusiasm about the use of technological tools in school activities outside class, which, consequently, contributes to a higher performance in relation to the contents of Physics (Chart 6).

Chart 6 – Examples of student responses on the question, "Give 5 positives of using the Padlet platform and out-of-class study as a support for face-to-face teaching?"

Response	Students' identification
"Good learning, enrichment in knowledge, practical application of subject matter, easy platform and objectivity."	Student C, from the State School enrolled in the 3rd Year of High School.
"We learn by doing; *We use theory in a shared way; We put ideas together;* *Learning from each other.* *Having more learning by seeking more information."*	Student F, from the State School enrolled in the 3rd Year of High School.
"1 more dynamic classes *2 easier to learn the contents* *3 learning with the help of the teacher and colleagues* *4 more interesting activities* *5 use digital resources to learn the contents of the school."*	Student A, from the State School enrolled in the 3rd Year of High School.

Source: Results of the questionnaire applied to 3rd year high school students. Prepared by the authors

Thus, when observed the distribution of responses, according to the categories obtained in the content analysis, proposed by Bardin (1998), it was found that all students presented a positive change in relation to their conceptions about out-of-class activities. The students also claimed a greater motivation in performing the tasks, when associated with DICT, and, thus, approved the methodology used in the research. The new generations use digital technologies habitually, whether in leisure time, communication or school activities (CATALINA-GARCÍA; AYALA-LÓPEZ; PASTOR, 2019; PÚBLIO JÚNIOR, 2018). There is a wide variety of programs that can be used in education (LAI; BOWER, 2019). In this context, the results obtained demonstrate that simple strategies, with free and easily accessible tools, can be useful in teaching and learning processes, making the contents more dynamic and attractive to the student.

Final remarks

Through the analysis of the data obtained, it was found that the students participating in this study were involved in the dynamics of the work and felt motivated to perform the activities proposed in the educational product, precisely because the didactic sequences are incorporated to the DICT and Padlet platform. It was also identified that some of the themes selected to compose the didactic sequences were evaluated by the students as complex and/or difficult to understand. However, after the dynamics of the activities and the interaction among the participants in the working groups, it was observed that the application of the Physics concepts became easy and the students had the opportunity to expand their knowledge.

The whole methodology of the work was designed to encourage the habit of out-of-class studies as a complement to face-to-face or remote learning. Even though most students reported, through the survey questionnaire, that they didn't have the habit of doing complementary studies, it was clear, throughout the development of the work, the motivation and commitment of the students to complete the oriented activities and seek new knowledge, besides that already proposed daily.

The students have seen in practice how the habit of studying outside class has contributed significantly to a better school performance and has opened up possibilities for new knowledge. Thus, it was possible to observe that the didactic sequences involving the digital tool Padlet were effective. Similar educational products involving other contents and subjects can be produced based on the material developed in this study.

It is inferred, therefore, that the DICTs are important in the Basic Education school institutions, because they are part of the everyday life of children and young people and are teaching resources that help in the teaching-learning process. New digital technologies can enhance educational practices and function as channels of communication, information transmission, and more inclusive and meaningful learning processes for students. Thus, the educator must use the DICT as a pedagogical support resource and know how to incorporate these tools in their teaching practices, because it is a possibility to instigate learners to proactivity, engagement, dialogue with others and collaboration on the Padlet digital mural, since this learning tool allows the posting of videos, audios, written texts, as well as comments on these posts.

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How to reference this article

MENDES, J. R.; CORDEIRO-JÚNIOR, D. A. Instructional guide for physics teachers: The use of the Padlet tool as a stimulus for out-of-class studies. **Revista Ibero-Americana de Estudos em Educação**, Araraquara, v. 17, n. 4, p. 2757-2774, Oct./Dec. 2022. e-ISSN: 1982-5587. DOI: https://doi.org/10.21723/riaee.v17i4.15865

Submitted: 17/11/2021
Revisions required: 26/04/2022
Approved: 09/10/2022
Published: 30/12/2022

Processing and publication by the Editora Ibero-Americana de Educação.
Correction, formatting, standardization and translation.