

Contributions From The Remote Workshop "Tangram and The Pythagorean Theorem" In Basic Education And Teacher Training

Contribuciones del Taller Remoto "Tangram Y el Teorema de Pitágoras" en Educación Básica y Formación del Profesorado

Contribuições da oficina remota "Tangram e o Teorema de Pitágoras" na Educação Básica e na Formação Docente

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ABSTRACT: *This research aimed to identify contributions from the workshop entitled "Tangram and the Pythagorean Theorem" in Basic Education, based on assumptions about BNCC, manipulable materials and the Mathematics Teaching Laboratory, and Teacher Training, with Shulman as a theoretical framework. The work was developed during the academic year 2020, remotely, with a quali-quantitative bias, being an exploratory field research, using records and observation of the phenomena. The results point out that the workshop proved to be a potentializing activity in learning situations for students of Basic Education, bringing an investigative look to the knowledge construction process, in addition to providing teachers and/or future teachers with moments of reflection, expansion of didactic repertoire and reframing of pedagogical practices.*

REMOTE WORKSHOP. BASIC EDUCATION. TEACHER EDUCATION.

RESUMEN: *La investigación tuvo como objetivo identificar contribuciones del taller titulado "Tangram y el Teorema de Pitágoras" en la Educación Básica, basado en presupuestos sobre la BNCC, materiales manipulables y Laboratorio de Enseñanza de Matemáticas, y en la Formación Docente, con Shulman como aporte teórico. El trabajo se desarrolló durante el año lectivo de 2020, de forma remota, con un sesgo cuali-cuantitativo, siendo una investigación de campo exploratoria, utilizando registros y observación de fenómenos. Los resultados alcanzados señalan que el taller resultó ser una actividad potencializadora en situaciones de aprendizaje para estudiantes de la Educación Básica, aportando una mirada investigativa en el proceso de construcción del conocimiento, además de ofrecer a docentes y/o futuros docentes momentos de reflexión, ampliación de repertorio didáctico y resignificación de prácticas pedagógicas.*

TALLER REMOTO. EDUCACIÓN BÁSICA. FORMACIÓN DOCENTE.

RESUMO: *A pesquisa teve como objetivo identificar contribuições da oficina intitulada “Tangram e o Teorema de Pitágoras” na Educação Básica, a partir de pressupostos acerca da BNCC, de materiais manipuláveis e Laboratório de Ensino de Matemática, e na Formação Docente, tendo Shulman como aporte teórico. O trabalho foi desenvolvido durante o ano letivo de 2020, de forma remota, possuindo um viés qualitativo, sendo uma pesquisa de campo exploratória, recorrendo-se a registros e observação dos fenômenos. Os resultados alcançados apontam que a oficina se mostrou uma atividade potencializadora em situações de aprendizagem para alunos da Educação Básica, trazendo um olhar investigativo no processo de construção do conhecimento, além de proporcionar a professores e/ou futuros professores momentos de reflexão, ampliação de repertório didático e ressignificação de práticas pedagógicas.*

OFICINA REMOTA. EDUCAÇÃO BÁSICA. FORMAÇÃO DOCENTE.

Introduction

Studies in Mathematics Education have investigated the role of manipulative materials¹ in the teaching-learning-process of Mathematics. In general, such research points out several benefits of the use of such resources, including:

- a) Provides a favorable environment for learning, since it awakens the curiosity of children and young people and takes advantage of its playful potential; b) Enables the development of the students perception through the interactions carried out with their colleagues and the teacher; c) contributes with the discovery (rediscovery) of the underlying mathematical relationships in each material; d) It is motivating, since it gives a meaning to the teaching of mathematics. The content starts to have a special meaning; e) It facilitates the internalization of the perceived relationship (Sarmiento, 2012, p. 4).

It is believed, therefore, that the manipulative materials incorporated into teaching practices are facilitators of learning and understanding of the content in a playful, motivating and interactive way. Through the use of such teaching resources, combined with innovative methodologies, several objectives can be achieved, related to cognition, affectivity, socialization, and involvement in the construction of their learning. “Manipulable materials are characterized by the physical involvement of students in an active learning situation” (Passos, 2012, p. 78).

Thus, we see potential in the use of manipulative materials for the understanding of various mathematical concepts. Therefore, we seek to transform school activities into true living laboratories in which students will develop cognitive and socioemotional skills.

In this conception of learning, the concrete material has fundamental importance because, from its proper use, students expand their conception about what it is, how and why to learn mathematics, overcoming the negative myths and prejudices, favoring learning by the formation of ideas and models (Lorenzato, 2012, p. 43).

In this perspective, projects executed in the Application School of the Federal University of Sergipe (CODAP/ UFS) have as a proposal the experimentation with the manipulative materials so that the students, in this process of construction and reconstruction of knowledge, develop multiple aspects. This is the case of the extension project “Math workshops” which involves students of basic education and undergraduates in mathematics from the supervised internship and fellows of the Pedagogical Residency Program that have the CODAP/UFS as field of action.

However, during the 2020 school year, there was the challenge imposed by the pandemic situation, forcing the pedagogical activities to be held remotely and, therefore, to have adaptation as a necessary north for its realization, being no different for the math workshops. Thus, in line with the vision employed in the pedagogical praxis of CODAP, even in a non face-to-face situation, it was decided to use didactic materials that were more accessible in practical experiences, in a perspective of interaction and student protagonism.

¹ We use the definition given by Matos and Serrazina (1971, as cited in Reys, 1996, p.193) for manipulable materials, considering them as “objects or things that the student is able to feel, touch, manipulate and move. They may be real objects that have application in everyday life or they may be objects that are used to represent and idea.”

Thus, by means of remote workshops, didactic sequences were applied based on experimentation and discovery of characteristics of relevant mathematical content and concepts during basic education, bringing the involvement and motivation of the participants as a key point of the action. The Tangram² was the central manipulative material to develop such didactic sequence in the teaching-learning of the Pythagorean Theorem.

The proposal was, therefore, to identify contributions of this action, carried out during the 2020 school year, in basic education and teacher training, as well as to qualitatively analyze the proposal of remote activities involving manipulative materials.

1. The context of the research

1.1 *The LEM in CODAP/ UFS and experimentation through manipulative materials*

The research was developed during the 2020 school year, marked by the pandemic situation experienced throughout the world. The social isolation caused the pedagogical practices to take place remotely and, thus, new configurations were established, challenging educators to act with differentiated resources and actions, compatible with the moment.

In the case of CODAP/ UFS, it is part of the practice of the Mathematics and Geometric Designs teachers to use the Mathematics Teaching Laboratory (LEM), as well as the execution of workshops, so that experimentation, by means of manipulative materials, would be part of the daily life of the school's students and also of other students, through the Teaching and Extension Project "Mathematical Workshops", developed by CODAP/ UFS teachers. According to Rêgo & Rêgo.

The Mathematics Teaching Laboratory (LEM) in a school constitutes an important space of experimentation for the student and, especially, for the teacher, who has the opportunity to evaluate in practice, without the pressures of the traditional formal classroom space, new materials, and methodologies [...] provides the opportunity to carry out activities in which teachers of basic education and undergraduate students can reflect and prepare their personal assessment of the teaching system adopted in their schools and build viable models to overcome its negative aspects (Rêgo & Rêgo, 2017, p. 41).

Thus, in accordance also with the conceptions of Lorenzato (2012), "The LEM can be a space specially dedicated to the creation of challenging pedagogical situations and to assist in the equation of situations foreseen in practice, due to the student's questionings during classes". (Lorenzato, 2012, p. 7) thus being a room-environment conducive to a challenging and more meaningful teaching, through innovative practices.

Supported by these pedagogical concepts that see the learner as the center of the teaching-learning process, Sarmento (2011) highlights research that shows the use of manipulative materials as propellant of significant learning arousing curiosity, investigation, motivation, and internalization of concepts through situations of student protagonism.

It is understood, therefore, that investigative activities in the teaching-learning process provide paths to "Exercise intellectual curiosity and resort to the approach proper to the sciences, including investigation, reflection, critical analysis, imagination and creativity, to investigate causes, elaborate and test hypotheses, formulate and solve problems and create solutions [...] Curriculum Common National Basis (BNCC, 2017), one of the general competencies of Basic Education, according to the BNCC.

Being a key point in the execution of teaching, research, and extension activities, the LEM of CODAP/ UFS is a very alive and active environment for both students of the Application School and for other students, from basic education, such as, for example, Mathematics undergraduates who have the school as an internship field and/or field-school in the case of the Pedagogical Residency

² Tangram is a geometric puzzle originated from cutting out a square-shaped figure. (Benevenuti & Santos, 2016, p.4)

Program Fellows. Therefore, the experimental practices carried out in CODAP constitute processes that integrate basic education and also teacher education.

1.2 Remote workshops in 2020

With the social distance imposed by the Covid-19 pandemic, the physical environment of the LEM was not used, by the whole concept of investigative lessons and pedagogical experimentation, based on methodological trends that make student the center of the teaching-learning process, were the focus of the proposals, as it was in the classroom.

The non presential activities then brought the challenge of acting according to the pedagogical bias that the activities were developed in Aplicação School, however, adapting the spaces, times and materials, used in the didactic activities, since the students should use objects and resources existing in their homes. Anchored in these adaptations, several remote workshops were held, with materials, easily accessible to students, in order to bring the manipulative materials as a motivating resource and learning facilitator.

These remote workshops were aimed at Primary School Students and the objects of knowledge addressed in such actions permeate thematic units related to Numbers, Geometry, and Quantities and Measures. In the table below are listed the workshops held and information about the classes, the period of the workshops, and the objects of knowledge. It can be seen that all the final years of elementary school (6th to 9th grade) were part of the target audience of the workshops.

Workshop	Target Audience	Period of realization	Knowledge objects
June balloons	6 th and 9 th grades	June/ 2020	Geometry: triangles, quadrilaterals, angles, geometric solids
Tangram and the Pythagorean Theorem	9 th years	September/ 2020	Triangles: Diagonal of a square; Areas of plane figures; Pythagorean Theorem.
Tangram and Fractions	6 th years	October/ 2020	Plane geometric figures; Diagonal of a square; fractions.
Newton's disk	9 th years	October/ 2020	Circumference and circle; circular sector.
Math and Music Pythagorean Experiments	6 th and 7 th grades	December/ 2020	Units of measure; fractions.
The Cartesian plane of the home: a concrete tool to discuss social estrangement	8 th and 9 th grades	December/ 2020	Cartesian plane; distance between points in the cartesian plane.

Table 1- Remote workshops held in 2020 school year.

Source: elaborated by the authors.

The focus of this research is the workshop entitled “Tangram and the Pythagorean Theorem” in which Tangram was used, a teaching resource that provides a range of geometric approaches and “stimulates the spirit of inquiry, interest, creativity, curiosity and the development of problem-solving skills.” (Benevenuti & Santos, 2016, p.6), opting for its construction, considering that the students did not have this resource in their homes, but there were materials that enabled its confection, such as sheet of paper, scissors and/ or ruler. Moreover, “the construction of didactic material is often a learning opportunity”. (Lorenzato, 2008, p. 20)

From this perspective, the process of making the Tangram provides an opportunity to approach concepts that served as references for markings and/ or cut-outs, as can be seen in Figure 1, below.



Figure 1- Tangram Construction process

Source: author's collection

Therefore, the workshop began with the construction of Tangram, using simple materials, and working concepts inherent to geometry, such as geometric shapes (triangle, square, trapezoid, parallelogram), classification, elements and height of a triangle, diagonal of a square, line segments and angles. From then on, using the Tangram, actions were proposed in order for the students to investigate the manipulative material and obtain relationships that would trigger the Pythagorean Theorem.

1.3 Junior Scientific Initiation

The workshop focus of our investigation was an action linked to the Research Project “Hand in hand: manipulative materials developed by its members. The proposal had as its inspiration the work of Pereira (2013) that brings the Tangram, famous Chinese puzzle, being used to make a verification of the Pythagorean Theorem.

The project “With hands on: using manipulative materials to learn mathematics”³ has two PIBIC Junior scholarship recipients, students from the 1st years of high school at CODAP/ UFS, and has as fundamental assumptions the contribution in the formation of students participating in the project and other students through research, making and using differentiated resources in activities using manipulative materials, thus increasing their involvement in pedagogical activities and their self-esteem towards mathematics.

Being a project of scientific initiation in basic education, it seeks to provide relevant experiences and a broad and diversified training to the scholarship students, instigating critical development and stimulating curiosity and scientific achievement.

In CODAP/ UFS, students are encouraged to develop activities directly as young researchers. Thus, the teaching-learning process instigates the students' curiosity and unites subjects that in the textbooks seem to have no connection. More specifically, it can be said that, besides a renewal in the way of teaching, the construction of knowledge through research practice is an activity that brings the student closer to the reality that surrounds him (Jarske et.al, 2019, p. 84)

Thus, being also a result of research carried out by PIBIC Junior Scholars, the workshop “Tangram and Pythagorean Theorem” was proposed as an Extension Action with vacancies being offered through registration in the Integrated System for Academic Activity Management (SIGAA) of UFS, having as its target audience students in the 9th grade of elementary school.

³ The project “Hands on: using manipulative materials to learn mathematics” has the financial support of the Fapitec/SE and counts with two PIBIC Junior scholarship holders.

2. Methodological Procedures

In order to identify contributions to the teaching-learning of the Pythagorean Theorem for basic education, as well as for teacher training, an exploratory field research was developed, consisting of the observation of phenomena and the recording of variables to be analyzed, having a qualitative bias, conceptualizing interrelations between the properties of the investigated phenomenon, with quantitative data and complementing them with descriptive and subjective data. (Marconi, 2002)

The research subjects were the participants of the remote workshop “Tangram and the Pythagorean Theorem”. For data production it was used the explanation of the perceptions of these participants through objective and subjective questions, collected through an online questionnaire (Google forms), whose link was made available after the workshops, and the interpretation of processes that occurred in the investigated context.

The online questionnaire, sent via link, had seven objective subjective questions, which sought to identify the tweet audience their considerations about manipulative materials and remote workshops, as well as an evaluation of the workshop and other perceptions regarding the experience during the proposed pedagogical situation.

3. Results and discussion

During the workshop “Tangram and the Pythagorean Theorem” about twenty-one students from Elementary School and twenty other participants were reached, being undergraduate’s students and teachers working in various states. The 9th grade students are the largest audience reached by the workshop, which took place in the virtual environment Google Meet.

Through data collected through an online questionnaire and explanations throughout the activity, we had a profile of the participants, as well as their perception of the remote workshop and the use of manipulative materials in teaching- learning the content covered. This workshop had 41 participants, of which 31 answered the questionnaire. We chose to categorize the real audience reached from the performance in the workshops and the participant’s level of education, since even having as target audience students in the 9th grade of elementary school, we also had the participation of undergraduates and teachers. Thus, our analysis will be divided into categories entitled: Basic Education and Teacher Training.

3.1 Basic Education

3.1.1- Basic Education Students participating in the workshop

The students of Basic Education totaled approximately 51.5% of the surveyed sample, 93,3% being in the 9th grade, the target audience of the workshop in question. In general, it was noticed a good interaction when participating in the workshops, and when asked in the questionnaire about the understanding of the mathematical content addressed, the answer was affirmative. “It was very good I learned about several things. I liked it a lot”. The vast majority (about 94.11 %) rated the workshop as excellent manipulative materials favoring learning and contributing to positive attitudes in students.

Only 35% said they had already participated in previous workshops. And they were unanimous in considering the use of manipulative materials as motivating element, feeling actively involved in the teaching-learning process. In this sense, Passos (2012) emphasizes the search for a process that should include the student’s attitude, from a mathematical investigation perspective.

Other aspects were also raised as important in the workshops, such as organization, interactivity, and playfulness. “The workshop was very good, because it had great explanations, and was done in an interactive way, making many people participate, putting into practice the things we learned”, Everything was perfect and well organized”, point out the research participants.

The development of BNCC skills linked to the thematic units Geometry (polygons, regular polygons, square, metric relations in the right triangle, Pythagorean Theorem, experimental verifications) and Quantities and Measures (angles, area of plane figures) is also highlighted, bringing

interrelations between different contexts and objects of knowledge, in a multiple articulation of aspects that complement and interact in order to bring meaning to the subject studied.

3.1.2 Basic Education Students- PIBIC Junior Scholarship Holders

As for the students of basic education who participated in the project “Hands-on: using manipulative materials to learn mathematics” as PIBIC Junior research fellows, there was a construction of multiple knowledge having as a central point experiences that enabled a plurality of knowledge.

By participating in a project, the student is involved in an educational experience in which the process of knowledge construction is integrated to the practices lived. This student is no longer, from this perspective, just a “learner of the content of any area of knowledge. It is a human being who is developing a complex activity and in this process is appropriating, at the same time, a certain object of cultural knowledge and forming himself as a cultural subject” (Leite, 1996, p. 2)

Thus, it breaks with the idea of a passive student, who just observes the teacher’s explanations and simply repeats what was discussed by the teacher. In the context of the workshops, both the students participating in these actions and the fellows of the Junior Scientific Initiation project were protagonists, being active agents in the manipulation and experimentation with the manipulative material, proposing and expressing results of their research on Tangram and the Pythagorean Theorem, respectively.

Still on the knowledge acquired by the PIBIC Junior Scholars, with the proposal of the remote workshop, it is highlighted the research, the establishment of relations between contents and axes of Mathematics and development of various skills and competencies listed in the BNCC. In a survey conducted with these students, online via questionnaire, it was obtained that both consider that, throughout the project, several dimensions could be exercised resulting in a very positive improvement of general skills related mainly to knowledge, critical thinking, communication, digital culture, empathy, cooperation and responsibility.

In addition, the skills developed by the PIBIC Junior fellows go beyond those connected to the students just participating in the workshop, in a view of the work done prior to this moment, in an active involvement of these students with contributing aspects in the understanding of relations between the Pythagorean Theorem, its demonstration, experimental verifications and applications, connecting algebra, numbers, geometry, magnitudes and measures.

In view of this process that involved the workshop in a broader way, in its nuances of appropriation of knowledge, research, planning, execution and analysis of its results, a scholarship student emphasizes that *“The project made me see mathematics in a different way, my knowledge about the subject increased a lot, the project helped me to be more responsible, in addition to adding knowledge and experiences that I will carry with me for life. And after the workshop, it was great to see that all our preparation and organization worked out well, based on the results of the research”*.

Another fellow pointed out that “Developing the project remotely was a real challenge, but one that I see I overcame with effort and teamwork. Throughout the research project, I can feel that I improved a lot when it comes to searching and synthesizing content. This all became very evident when I could analyze the positive results of the workshop that we applied as an action of the project. “Thus, it can be seen that the project as a whole, and in particular the remote workshop “Tangram and the Pythagorean Theorem” provided a holistic development in these students who emphasize improvement in aspects that go beyond mathematical content.

3.2. Teacher training

This category is composed of undergraduate students and teachers, corresponding to approximately 33,3% and 15.2% of the sample, respectively. Thus, there were participants in the workshop who did not belong to Basic Education, the audience for which the activity was initially intended. Thus, the workshop was also characterized as a teacher training action corroborating Serrazina (1990), who defends teacher training (initial and continued), encompassing issues inherent to the use of didactic materials in mathematics teaching.

Half of the participants in this category had already participated in other workshops, and most of them (87,5%) considered the manipulative materials to be motivating for teaching and learning 93,8% claimed to have fully understood the content covered in the workshop and rated it as excellent. "It was very good, managed to pass the concepts clearly and objectively."

The fact that the workshop was remote was not pointed out as a negative point, as the following statement shows: "It was very didactic and very interesting to build the Tangram and use it to demonstrate geometrically the Pythagorean Theorem. Despite the remote form, I didn't see any problems". Such making it a possibility that proposes mathematical investigation and the involvement of the participants, even without the physical presence in the same environment.

In terms of methodology, there were positive results, expressed by the comments of the participants "The workshop was extremely important for the academic community to show that there are other forms of methodology that can be addressed in the classroom, once the teacher is not stuck until problem solving". And also highlights the search for training that focuses on methodologies that emphasize mathematical investigation associated with the use of teaching materials.

Given the context presented, the participation of undergraduate students and teachers in the workshop "Tangram and the Pythagorean Theorem" brought us another bias that online activities can provide the formation of teachers. It is worth mentioning that the *Aplicação* School of UFS especially the Mathematics Teachers, are active in initial and continuing education by supervising interns and participating in programs such as the *Programa de Iniciação à Docência* (PIBID) and *Residência Pedagógica*, as well as by offering courses targeted to teachers and students. These experiences, however, had never been carried out online.

According to Shulman (2004), in both initial and continuing teacher education, environments should be created which provide support, sustenance and refinement of the vision, practice, motivations and reflections of teachers by all members involved. The workshops are understood as a means to create these spaces for exchange and reflection by teachers, either in person or remotely thus expanding the teaching repertoire and promoting a moment to share ideas and pedagogical practices.

It is perceived, therefore, that the participation in practical activities, in which differentiated methodologies are employed, provides the teacher, or professional in training, with a mobilization of knowledge that can contribute to the "model of pedagogical action and reasoning", understood of processes of understanding, transforming, instruction, evaluation, reflection, and new understanding (Shulman, 1987) in the sense that the visions about objects of knowledge, pedagogical practices, and teaching resources are broadened and/ or re-signified from the experience.

Final consideration

The task of developing skills and abilities in students, making the education more holistic, is challenging and complex. This requires differentiated knowledge construction activities, with the students as the center of the teaching-learning process. The teacher becomes a guide, fostering actions that promotes possibilities for the students to act in a broad and meaningful way. The role of the school, in this sense, is to be a space of knowledge, re-signifying knowledge and corroborating the development of the learners.

Pedagogical potentialities are seen in didactic resources, in particular in manipulative materials, and can "serve as mediators to facilitate the relationship teacher/ student/ knowledge at the moment that a knowledge is being built" (Passos, 2012, p.78), adopting an investigative and active attitude in relation to knowledge. The material, in this sense, cannot be used as a purpose in itself, as Pais (2000) points out, and should be seen as an instrument for the apprehension of specific knowledge, emphasizing the mathematical concepts to be worked.

The educator, therefore, has a fundamental role in the process of didactic transposition, being necessary the knowledge of the material and a planning directed to pedagogical situations centered in the investigation and in the student protagonism. In this way, the material is an instrument to enhance actively, without which it is not possible to have a satisfactory learning, no matter the resource used. "The mathematical concepts that they must construct, with the help of the teacher, are not in any of the materials that can be abstracted from them empirically" (Passos, 2012, p. 81).

Thus, using the materials as mediators to build and explore mathematical concepts, the workshops were thought precisely because they have the practical bias as the core, seeking the active

participation of those involved. Already held frequently in CODAP/ UFS in previous school years, with good results in the students learning, they brought a possibility during the social distance, becoming remote actions, in the same way, as the other activities proposed by the school in the 2020 school year. Thus, the contribution of workshops, particularly the remote workshop “Tangram and the Pythagorean Theorem” in basic education through the development of various general competencies and essential skills brought by the BNCC, involving different thematic units, stands out.

The results were expressively positive regarding the participation in the workshops and their motivational role, having the manipulative materials as something that adds to the didactic moments bringing a feedback that drives us to continue performing actions later, either with students of Basic Education, teachers who teach mathematics or undergraduates. Thus, even in the face of new and challenging situations for everyone, it was possible to interact online in a productive and didactic way, which is one of the greatest achievements of this work.

Regarding the participation of teachers and undergraduates in the proposed workshop it is highlighted that the CODAP/ UFS is an environment of innovation and pedagogical experimentation that has in its essence the formation of teachers, whether initial or continued, working with undergraduates, from the supervised internship and programs such as PIBID and Pedagogical Residency, where the fellows have a wide range of activities in teaching, research and extension projects, and also covering undergraduates, through the promotion of actions and events. Including, one of the actions promoted was the minicourse entitled “Manipulable Materials and Math and Science Teaching”, held in 2017, focusing on teaching resources combined with methodological trends that provide investigative classes. Thus, having teachers and undergraduates in the remote workshops highlighted a demand for teacher training courses bringing aspects related to manipulable materials and differentiated methodologies.

Thus, the online format brought potentialities that were not idealized at first, but, the collected data brings a movement of reflection on the positive aspects of interactions in the remote format, one of them being the scope of actions, having the record of the participation of teachers from various parts of Brazil in the remote form, especially when it comes to workshops involving manipulative resources to be used. The connection of some participants is another point raised, because the interferences about such a situation make return steps of the workshop so that those who had problems with the internet can follow satisfactorily.

Undoubtedly, the remote experience brings very important aspects to be analyzed, such as the fact that it highlights a new look on the non presential modality for offering future actions, both for students of Basic Education and for teachers and undergraduates, in order to increase the range of potentialities and limitations. They bring, therefore, a new panorama in which the teacher will analyze the viability of the action according to the resources, whether physical or virtual, and the target audience, opting, when possible, for digital means to develop practical activities, as is the cases of the workshops.

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