SEVEN
publicações acadêmicas

APPLICATION OF HYBRID EDUCATION IN ELEMENTARY SCHOOL THROUGH A PEDAGOGICAL EXPERIENCE IN GEOMETRIC DESIGN

APLICAÇÃO DO ENSINO HÍBRIDO NO ENSINO FUNDAMENTAL POR MEIO DE UMA EXPERIÊNCIA PEDAGÓGICA EM DESENHO GEOMÉTRICO

APLICACIÓN DE LA EDUCACIÓN HÍBRIDA EN LA ESCUELA PRIMARIA A TRAVÉS DE UNA EXPERIENCIA PEDAGÓGICA EN DISEÑO GEOMÉTRICO

https://doi.org/10.56238/sevened2025.029-126

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ABSTRACT

In this article we will present a pedagogical theoretical/practical experience of hybrid education, with elementary school students. Starting from theoretical considerations on hybrid teaching, due to the dynamics of the method of rotation by stations, an activity on triangle study was developed. The objective was to present the content to students in an interactive and practical way, providing the development of skills and skills, promoting the interaction, debates and practical experimentation of the application of triangles. We describe the preparation of the material, methodology and the results obtained. Thus, from the perspective of methods that provide an “upgrade” in mathematics classes, it was possible to note that the method applied, based on hybrid education, stations rotation, enables teacher and student to interrelate with significant beneficial effects to short and long term learning. For the application to be efficient and successful, one must have a good planning.

Keywords: Triangles. Hybrid Education. Rotation by Stations.

RESUMO

Neste artigo apresentaremos uma pedagógica experiência teórico/prática de ensino híbrido, com estudantes do Ensino Fundamental. Partindo de considerações teóricas sobre ensino híbrido, pela dinamicidade do método de rotação por estações, foi desenvolvida uma atividade sobre estudo de triângulos. O objetivo foi apresentar o conteúdo aos estudantes de modo interativo e prático, oportunizando o desenvolvimento de habilidades e competências, promovendo a interação, debates e experimentação prática da aplicação dos triângulos. Descrevemos a preparação do material, metodologia e os resultados obtidos. Assim, na perspectiva de métodos que proporcionem um “Upgrade” nas aulas de matemática, foi possível observar que o método aplicado, com base no ensino híbrido, rotação por estações, possibilita que professor e estudante, interrelacionem com efeitos benéficos significativos a aprendizagem de curto e longo prazo. Para que a aplicação seja eficiente e tenha sucesso, deve-se ter um bom planejamento.

Palavras-chave: Triângulos. Ensino Híbrido. Rotação por Estações.

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RESUMEN
En este artículo presentaremos una experiencia teórica/práctica pedagógica de la educación híbrida, con estudiantes de primaria. A partir de consideraciones teóricas sobre la enseñanza híbrida, debido a la dinámica del método de rotación por estaciones, se desarrolló una actividad en el estudio Triangle. El objetivo era presentar el contenido a los estudiantes de una manera interactiva y práctica, proporcionando el desarrollo de habilidades y habilidades, promoviendo la interacción, los debates y la experimentación práctica de la aplicación de triángulos. Describimos la preparación del material, la metodología y los resultados obtenidos. Por lo tanto, desde la perspectiva de los métodos que proporcionan una "actualización" en las clases de matemáticas, fue posible tener en cuenta que el método aplicado, basado en la educación híbrida, la rotación de las estaciones, permite a los maestros y alumnos interrelacionarse con efectos beneficiosos significativos para el aprendizaje a corto y largo plazo. Para que la aplicación sea eficiente y exitosa, uno debe tener una buena planificación.

Palabras clave: Triángulos. Educación Híbrida. Rotación por Estaciones.

1 INTRODUCTION

The great challenge of the professional in the field of education today is in the proposal of work that awakens in the student the pleasure, motivation and autonomy to study, and consequently, develops skills and competencies so that he is able to understand the contents taught in the classroom and/or in a non-face-to-face way, consolidating his learning in a more effective way.

From the perspective of changes in the way of teaching from innovative, dynamic methodological approaches, linked to the need to build concepts based on a vision interconnected to the student's day-to-day practice, we consider that hybrid teaching is an alternative to be explored and applied in the classroom. This is due to the variability of methodological alternatives and the flexibility regarding the different levels of education, in addition to following the changes in educational processes. In addition, the *mix* of face-to-face and distance modalities, classroom and other environments, as well as the different experiences provided in the school environment, expands the potential of people motivated to learn, evolve and develop a more meaningful life project, considering that education is a constant active and progressive process of learning (MORÁN, 2015).

From the combination of hybrid teaching and learning by challenges, we must consider that the success of any activity that is proposed to be applied with students will be directly linked to the planning of didactic proposals, with the purpose of learning. Based on the theoretical and practical study on hybrid teaching, developed in the discipline of information and communication technologies in the teaching of science and mathematics, of the doctoral course in Science and Mathematics Teaching at the Franciscan University, in the first semester of 2018, the present research aims to present the results of a fragmented application on hybrid teaching, with 134 students from the 8th grade of elementary school at a federal school in the city of Santa Maria, RS.

2 BLENDED LEARNING

Discussions about the need to readjust the Brazilian education system have become a common agenda for teachers and researchers working in different teaching modalities. For Schneider (2015) in (BACICH; NETO; TREVISANI, 2015), the elaboration of the National Curriculum Parameters (1998) and the National Curriculum Parameters for High School (2000), gave teachers the opportunity to reflect on the need to rethink the way of teaching, promoting teaching that values critical thinking, developing autonomy from the interaction

between students and opening a space for self-reflection on their role in the context of the society in which they are inserted.

However, when we talk about changes in teaching, we soon associate it with technological innovations and the challenges linked to its insertion in the classroom. Morán (2015) argues that proposing teaching that promotes change means mixing the different ways of presenting a content, a concept, based on challenges, projects integrated with different areas of knowledge, proposing face-to-face and/or distance activities, in groups or individually and collaboratively.

The miscellany of environments organized in different ways, activities, methodologies and levels of education make it possible to integrate what is really important to learn and this mixture, Morán (2015), calls Hybrid Teaching.

Blended learning is a powerful tool for the classroom teacher and

> [...] meets the recent needs to discover the best educational practice for teachers and schools. It is a teaching model that presupposes the use of technology for the development of activities inside and outside the classroom, in which the student is encouraged to seek knowledge with the mediation of the teacher and the school. (Silva and Camargo, in (BACICH; NETO; TREVISANI, 2015), p.181, 2015)

We can see that teaching when it is face-to-face added to an online tool, can be considered hybrid teaching. In addition, the online teaching part is directly related to the content worked in the classroom. Therefore, models in hybrid form are classified as sustained and disruptive. Sustained models combine traditional teaching with the benefits and classroom features of a virtual learning environment. Disruptive models, on the other hand, represent the rupture of a traditional paradigm, presenting innovative possibilities for teaching, through collaborative environments, mobile devices, game-based learning, among others.

Implementing blended learning can happen in many ways, often using a combination of one or more existing models. Next, it is important that the pedagogical project of the school in which hybrid teaching is intended to be implemented is structured based on actions that promote transformations and share successful experiences during the process, contemplating face-to-face and virtual teaching (Cannatá, 2015) in (BACICH; NETO; TREVISANI, 2015). Another important factor, according to Silva and Camargo (2015, p.184) in (BACICH; NETO; TREVISANI, 2015), is that the school gives "[...] freedom so that teachers can make changes in their planning and in their classroom dynamics".

The experience report with blended learning presented in this text is based on one of the models proposed by (CHRISTENSEN; HORN; STAKER, 2013), in which they follow a hybrid innovation pattern, as shown in figure 1.

Figure 1

Hybrid teaching zone

Source: CHRISTENSEN; HORN; STAKER, 2013

3 METHODOLOGY AND APPLICATION OF THE ACTIVITY

Based on this scheme, the hybrid model by rotation, subdivided into rotation by stations, rotational laboratory and flipped classroom can be integrated with technological resources with traditional forms of learning. The following table describes the three rotation models.

Table 1

Hybrid model by rotation

Model	Description
Rotation by stations	The activity is organized in groups of students, where they must take turns in different activities within a classroom or in other environments within the school.
Rotational Lab	Students take turns between the classroom and a learning laboratory for online teaching .

Flipped Classroom	The process takes place in person and online. The teaching practice is mediated by the teacher at school and another external one for the application of the content and lessons *online*.

Source: Prepared by the authors.

To carry out the activity, the rotation model by stations was chosen because it best adapts to the school's proposal, the available infrastructure and the content to be addressed.

3.1 PREPARATION OF THE MATERIAL AND APPLICATION OF THE ACTIVITY:

The theoretical and practical study was developed in the discipline of Information and Communication Technologies in the Teaching of Science and Mathematics, of the doctoral course in Science and Mathematics Teaching at UFN.

The subject addressed was within the discipline of geometric drawing in the 8th grade of elementary school at a federal school in the city of Santa Maria, RS. As an initial stimulus, a theme "construction of popsicle stick bridges" was proposed, an activity that will be developed in groups of students and a subsequent resistance test that would lead to its collapse.

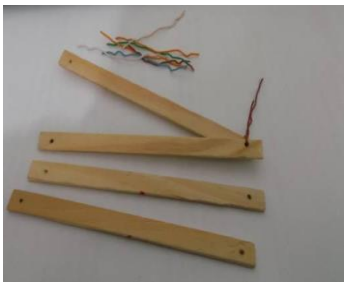
The stations were created in such a way that their start does not depend on a previous station and for control purposes called Station 1, Station 2 and Station 3 and allocated in rooms close to the students' original classrooms.

The following materials were organized:

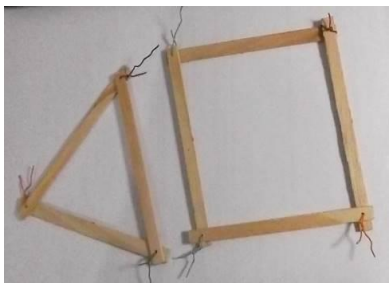
- Popsicle sticks that were previously drilled with a drill and a fine drill (or 10X10 nail) at their ends, as shown in figure 2 (a).
- Internet cable wires were cut to lengths suitable to pass through the holes made in the popsicle sticks (approximately 6 cm) shown in figure 2 (a).

Figure 2

(a) popsicle sticks and wires. (b) and (c) testing of the figures and perforated bars of metal and screws with nuts.



(a)



(b)

(c)

Source: Personal collection.

Assembly tests were carried out where the necessary ease was verified for the students to fulfill the objective shown in figure 2 (b). Metal bars (metal structures for robotics) and screws were also separated so that students have different options for assembly materials and obtain the same result.

- The form (*web quest)* was prepared on the Google platform and a functionality test was done.
- The videos were chosen and stored on a local computer to avoid internet access problems.
- The materials for the subsequent construction of the popsicle stick bridge were chosen and purchased by the school (popsicle sticks for crafts and white glue.
- Figures were printed with the models of bridges that could be built.

3.2 DESCRIPTION OF EACH STATION

- **Station 1**: The students watched a video about a 5-minute Toothpick Bridge Competition obtained on *youtube*, where students from the 2nd Basic Year of IME held a Toothpick Bridge Competition. The bridge that bore the greatest weight would win. After watching the video, figures were made available with models of bridges that could be built.
- **Station 2**: Here the students filled out two questionnaires, one individual and one in a group. A total of 14 groups answered *the* questionnaires online on Google.
- **Station 3:** In this station the students were accompanied by a teacher with two distinct activities: 1) Watch a video from the series Mathematics everywhere with

the theme Construction - Rigidity of Triangles from *youtube*. 2) Assemble two geometric figures with the connection points articulated, first a quadrilateral and check its stability, then a triangle and again check its stability. This assembly is done with metal frames, bolts and nuts shown in figure 02 (c) or popsicle sticks with holes in the ends and wires of internet network cable as shown in figure 02 (b). The vast majority of students opted for bars made with popsicle sticks.

The practice of this activity was done with enthusiasm and often with amazement at the conclusion, and shows how the triangle, despite being a simple figure, has the characteristic of not being able to modify the internal area or its shape, that is, it is a rigid structure. In the quadrilateral, the area and its shape can be easily modified. The activity also shows how important it is to carry out activities of manipulation of elements of the material world, to remove the student from the "normal" room, shifting his attention to a real learning point.

4 RESULTS AND DISCUSSIONS

At the beginning of the activities in each class, the methodology to be used, the location of the rooms and the order of trajectory in the stations were explained. The rotations took place smoothly, with the excitement and attention of the students. Some problems were detected on the first day and solved on the second day of activity, including incorrect identification (change of station number) in the rooms. This caused a slight discomfort and some groups of students needed help to know which station to go to. Another problem found was in the online questionnaire *,* where the possibility of answering "We haven't watched the video yet" was included for the group that starts the rotations without having watched videos.

Before starting the video at station 2, the following question was asked orally: Have you ever seen a triangle anywhere other than in class? Some students were surprised that they had never observed geometric figures outside the classroom and this was important information, as it allowed them to better relate the contents of the classroom with the real world. Others cited various places as building structures, in gymnasiums, roofs of houses, etc.

In this activity, the general competencies of the National Common Curricular Base (BRASIL, 2017) of numbers 01, 02, 04 and 05 were worked on. The specific mathematics competencies for elementary school present in the activity carried out are numbers 1 and 3, in addition to the skills present in most of the proposed activities are numbers 14, 15 and 18.

Table 2 presents the thematic units and objects of knowledge contemplated in the activity with the students.

Table 2

Thematic units and objects of knowledge of the BNCC contemplated in the execution of the proposal

THEMATIC UNIT	OBJECTS OF KNOWLEDGE
Geometry	Congruence of triangles and proofs of properties of quadrilaterals.
	Geometric constructions: 90°, 60°, 45° and 30° angles and regular polygons.
	Geometric transformations: translation, reflection, and rotation symmetries.
Quantities and measurements	Area of flat figures.

Source: Prepared by the authors.

5 CONCLUSION

In this brief report of experimentation of blended teaching and from the analysis of the results of the activity, we realized that the methodology provided the opportunity for the development of skills and competencies to students, promoting interaction, debates and practical experimentation of the application of triangles. We describe the preparation of the material, methodology and the results obtained. It is relevant to consider that the success of the activity was due to the previous theoretical study, planning and well-defined objectives for the study. The successful experience with blended teaching fostered the curiosity of teachers from other areas of knowledge through questions about how the methodology works.

From the experience carried out through the mix of traditional and technological teaching, the teacher has the opportunity to reflect on his pedagogical practice, the process of resignification of learning and motivation for other classes, due to the possibility of alternating different spaces for learning based on a theme.

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