MAKER CULTURE IN EDUCATION: INNOVATION, STUDENT PROTAGONISM AND INCLUSION IN ACTIVE LEARNING PROJECTS

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ABSTRACT

This research analyzes the Maker Culture as an innovative pedagogical approach, with an emphasis on the protagonism of students and the development of essential skills for the twenty-first century, such as creativity, collaboration and critical thinking. The goal is to explore how this methodology, which integrates technology, craftsmanship, and hands-on experimentation, can make learning more active, meaningful, and contextualized. Classified as bibliographic, this study examines the application of Maker Culture in the educational environment, highlighting its potentialities and challenges. Among the benefits are the incentive to students' autonomy and the development of the ability to solve real problems, while the challenges include the need for teacher training for effective implementation. As a practical example, the project "Flavors of the Earth and Rhythms of Africa: An Interdisciplinary Journey in Celebration of Afro-Brazilian Culture", carried out at the E.E. of Campo São José, integrates the principles of Active Learning and Maker Culture. In it, students were divided into groups to produce and sell food, develop promotional materials, organize an Afro parade and deepen their research on Afro-Brazilian history and culture. The culmination of the project, on Black Consciousness Day, highlighted the importance of innovative pedagogical practices that strengthen the connection between theory and practice, in addition to valuing cultural diversity. The results confirm that Maker Culture can transform education by aligning technological innovation and cultural inclusion, meeting the demands of contemporary learning.

Keywords: Maker Culture, Active Learning, Student Protagonism, Interdisciplinary Project.

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INTRODUCTION

Contemporary education faces the challenge of preparing students for an ever-changing world, demanding the development of new skills and competencies. In this scenario, it is essential to adopt innovative methodologies that make learning more active and meaningful.

One of the approaches that has gained prominence is the Maker Culture, which places students as protagonists of the learning process, promoting creativity, collaborative work and the ability to solve problems in a practical and dynamic way. It encourages the exploration, planning, and construction of concrete objects, ranging from simple prototypes to more elaborate designs.

Combining technology, craftsmanship, and creativity, Maker Culture goes beyond the development of practical skills, also encouraging critical thinking, collaboration, and the ability to solve problems. This approach seeks to empower students, transforming them into protagonists of their own learning, while stimulating an innovative and entrepreneurial attitude.

Thus, the objective of this work was to analyze the potential of Maker Culture as an innovative pedagogical approach to promote the development of twenty-first century skills, such as creativity, collaboration and critical thinking, and to investigate its contribution to the construction of a more active, meaningful and contextualized learning.

The methodology used was bibliographic research, which enabled the analysis of relevant studies and publications on the subject, providing a comprehensive overview of the obstacles and possible solutions for the effective implementation of these technological tools in education.

The first chapter analyzes the concepts and benefits of Maker Culture as an innovative pedagogical approach, focusing on its ability to promote creativity, collaboration, and active learning, and discusses its potential to transform education. The second chapter analyzes the pillars of Maker Culture – creativity, collaboration, sustainability, and scalability – and their importance for the development of an innovative and effective pedagogical approach. In the third chapter, the synergy between Active Learning and Maker Culture is observed as a strategy to promote a more engaging and meaningful teaching, based on a practical project that integrates different areas of knowledge.

THE CONCEPTS AND BENEFITS OF MAKER CULTURE

Maker Culture has been consolidated as an innovative educational approach, highlighting creativity, experimentation and collaboration. Several authors have explored its concepts and benefits, revealing the transformative potential of this culture in the educational sphere. But after all, what is Maker Culture?

Therefore, according to Lange (2023), Maker Culture is a trend that encourages people to create or repair various objects, rather than just passively acquiring or consuming them. This movement encompasses a wide range of activities, from the production of household items to the creation of works of art, computer systems, and robotic devices, among others. Understanding this proposal and its history is essential to apply it effectively in education.

From this perspective, Cabral and Raimundo (2023), "value creativity and experimentation, allowing more people to have access to the tools and technologies to create and prototype their ideas" (p. 116). This approach makes designing and building projects accessible to individuals of different backgrounds and skill levels, fostering active and meaningful participation in the creative process.

In addition, Maker Culture highlights that anyone can become a creator or maker, regardless of their academic background or previous experience. By offering accessible tools and technologies, this approach democratizes creation and prototyping, promoting innovation, entrepreneurship, and engagement in learning, as well as encouraging problem-solving.

According to Dougherty (2016), Maker Culture provides students with opportunities to become creators and problem solvers, empowering them through practices that favor creativity and innovation. This methodology, when integrated into education, encourages an active stance in learning, especially through practical projects that highlight the value of experimentation and creativity.

In addition, characterized by a practical and experimental approach, Maker Culture goes beyond the "do it yourself" movement, by promoting collaborative and interdisciplinary networks (Cabral & Raimundo, 2023). This open exchange of resources and knowledge fosters creative and effective solutions, strengthening communities and fueling a continuous cycle of innovation and development.

As Krob (2018) points out, the Maker Culture stands out for favoring practical methods, such as hands-on, which encourage a more active participation of students in the

learning process. This approach encourages creativity and critical thinking, promoting meaningful interaction with the contents. An example of the application of this methodology can be seen in the teaching of Science and Technology, where students develop practical projects, such as robots and electronic devices, to explore theoretical concepts in a dynamic and relevant way.

In addition, Maker Culture also promotes the democratization of knowledge and technology, allowing individuals of different profiles and skills to create and innovate in a collaborative and accessible way (Cabral & Raimundo, 2023). This approach values experimentation and creativity, using digital and physical tools to solve social and environmental problems. Grounded in the idea that everyone has the potential to create, it encourages digital fabrication, community work, and the search for innovative solutions.

Finally, by democratizing access to technology and knowledge, Maker Culture becomes a powerful tool to transform education. It encourages diversity of ideas, talent discovery and creative expression, promoting inclusion and innovation. In this way, educators find new possibilities to engage students, making them protagonists of their development and stimulating their creativity and commitment inside and outside the classroom.

THE PILLARS OF MAKER CULTURE

Maker Culture has fundamental elements that make it an effective methodology for the educational environment. According to Cabral and Raimundo (2023), its main pillars are collaboration, experimentation, and the search for innovative solutions. These aspects structure the approach, being complemented by the four specific pillars presented by Lange (2023): creativity, collaboration, sustainability, and scalability.

First, creativity highlights the importance of thinking innovatively, going beyond traditional approaches to solving problems or developing projects. In Maker Culture, this skill is essential to encourage experimentation and give space to originality, allowing participants to explore ideas and express their creative potential.

In addition, collaboration, another fundamental pillar, promotes cooperation and the sharing of experiences and resources. Instead of prioritizing individual efforts, Maker Culture values collective contribution, fostering an environment of mutual learning and joint growth.

In addition, in the aspect of sustainability, the emphasis is on environmental and social responsibility. The practice of Maker Culture encourages the reuse of materials and the reduction of waste, adopting solutions that consider both the environmental impact and social and economic issues.

Finally, scalability addresses the ability to scale and replicate creations. Projects developed in the context of Maker Culture can be reproduced, improved and disseminated by others, promoting a continuous cycle of innovation and expansion of collective knowledge. These pillars, integrated, strengthen the positive impact of Maker Culture, creating a community engaged in creativity, collaboration and transformation.

MAKER CULTURE AS A DRIVER OF ACTIVE LEARNING

Active Learning is a student-centered educational approach, promoting their participation and continuous engagement in the construction of knowledge. According to Felder (1995), this methodology facilitates a deeper and more lasting understanding of the concepts, as it involves students in continuous processes of construction and application of knowledge. Moran (2019) highlights that, by involving students in practical and reflective activities, Active Learning favors more meaningful and collaborative learning.

In this context, an example of this methodology is the flipped classroom model, in which students review the content at home and use the classroom time for practical activities, group discussions, and problem solving. Cabral and Raimundo (2023) explain that, in this model, the use of technology facilitates access to theoretical content outside the classroom, while time in the classroom is dedicated to the practical application of knowledge and the clarification of doubts.

In addition, Active Learning enriches the educational experience by providing hands-on activities that encourage student participation and interaction. Martinez and Stager (2013) argue that Maker Culture can work as an engine for Active Learning, as the creation of personal projects and the resolution of real problems engage students in a meaningful way, stimulating their autonomy and collaboration. Krob (2018) also observes how Maker Culture fosters curiosity and creativity, driving active and collaborative learning.

In this sense, the project Flavors of the Earth and Rhythms of Africa: An Interdisciplinary Journey in Celebration of Afro-Brazilian Culture, held at the State School of Campo São José, aimed to offer students a meaningful educational experience, based on the pillars of Active Learning and Maker Culture. According to Martinez and Stager (2013),

the Maker Culture, by emphasizing the creation and solution of real problems, plays a primary role as an engine for Active Learning. Integrating these approaches, the project sought to promote the autonomy, collaboration and creativity of students, preparing them to face contemporary challenges. The culmination took place through a fair of culinary products and an Afro parade, held on Black Consciousness Day, providing students with the opportunity to apply the theoretical content worked on in a practical way.

To ensure the active participation of all students, the project was divided into groups, each with specific responsibilities:

- Production Group: Responsible for the creation and production of food to be sold at the fair, such as pot cakes, mousse, snacks and pastries. The students researched recipes, selected quality ingredients and carried out the production in a hygienic and safe way.
- Research Group: Delved into the research of the ingredients used in the recipes, seeking information on their nutritional properties, origin and cultural importance, especially those of African origin.
- Marketing Group: Responsible for publicizing the event. They created attractive visual materials, such as posters and posts for social networks, in addition to organizing the dissemination in the school and local community.
- Sales Group: Sales Group: Worked directly in the sale of products during the fair, providing customer service and receiving payments in an innovative way through a QR Code system. This tool made it possible to speed up transactions, making the process more practical and secure. The students were also responsible for controlling inventory, ensuring that all products were properly accounted for.
- Afro Parade Group: Organized the parade, choosing the songs, creating the clothes and rehearsing the choreography. The group also researched Afro-Brazilian history and culture, so that the parade would be a true celebration of black identity.

The project provided a rich integration between different areas of knowledge:
- Science: Students deepened their knowledge of food, nutrition, and the importance of healthy eating.
- Mathematics: Performed calculations to determine the quantities of ingredients, production costs, and selling prices of products.

- Portuguese Language: They developed texts to publicize the event, using digital tools such as Canva to create personalized invitations, informative flyers and posts for Instagram. Through WhatsApp groups, they collaborated, shared materials, organized responsibilities and planned collective actions. History and Culture: They studied the history of Africa and the African diaspora, valuing the contributions of Afro-Brazilian culture to the formation of national identity.
- Arts: They created the promotional materials and clothes for the parade, developing their creativity and expressing their ideas in an artistic way.

The fair and the Afro parade were a great success, exceeding the expectations of everyone involved. The students showed great enthusiasm and commitment to the project, developing skills such as teamwork, creativity, entrepreneurship and respect for cultural diversity. In addition, the school and local community actively participated in the event, valuing the initiative and celebrating Afro-Brazilian culture.

During the execution of the project, the students faced some challenges, such as organizing time, dividing tasks and solving unforeseen events. However, these challenges were overcome through dialogue, collaboration and the support of teachers.

In addition to the results achieved, the project showed how Active Learning and Maker Culture can transform the educational process. The inclusion of tools such as the QR Code, for example, reflects what Krob (2018) points out about the relevance of creativity and curiosity in the construction of knowledge. Through this technology, students not only explored technological concepts, but also improved skills such as problem-solving and adapting to varied contexts.

Thus, dynamics between the groups and the need for collective decisions reinforced the collaboration and autonomy of the students. Activities such as food production and the organization of the parade enabled the practical application of the contents worked in the classroom, ensuring a more meaningful and lasting learning.

In this way, the intersection between Maker Culture and Active Learning has proven to be a powerful model to involve students in the learning process. By combining the principles of these approaches, educators are able to create dynamic learning environments in which students can explore their skills and creativity to develop efficient and relevant solutions in an increasingly competitive world.

FINAL CONSIDERATIONS

The final considerations highlight the Maker Culture as a transformative pedagogical methodology that positions students as protagonists of the learning process. Focused on practical experimentation, collaboration, and creative problem-solving, this approach promotes the development of indispensable skills for the 21st century, such as innovation, critical thinking, and teamwork.

Although promising, the large-scale application of Maker Culture faces significant challenges, such as the need for continuous teacher training and the restructuring of school environments to meet the demands of practical and collaborative learning. Despite this, the future perspectives are encouraging, pointing to the consolidation of this methodology as a necessary pillar for an education more connected to the demands of a society in constant transformation.

REFERENCES

1. Cabral, G. N., & Raimundo, J. S. B. (2023). O método tradicional de ensino e as metodologias ativas: vantagens e desvantagens no processo de ensino e aprendizagem. In G. N. Cabral (Org.), Psicologia, tecnologias e educação: Reflexões contemporâneas (Vol. 3). Editora Gladys Nogueira.

2. Dougherty, D. (2016). Free to make: How the Maker Movement is changing our schools, our jobs, and our minds. North Atlantic Books.

3. Felder, R. M. (1995). Learning and teaching styles in engineering education. In D. A. Kolb & R. E. Fry (Eds.), Advances in experiential learning (pp. 31-56). Jossey-Bass.

4. Krob, D. (2018). Aprendizagem prática e Cultura Maker: Metodologias para o século XXI. Editora Didática.

5. Lange, M. (2023). Os pilares da Cultura Maker na educação contemporânea. Editora Maker.

6. Martinez, S. L., & Stager, G. (2013). Invent to learn: Making, tinkering, and engineering in the classroom. Constructing Modern Knowledge Press.

7. Moran, J. M. (2019). Metodologias ativas para uma aprendizagem mais significativa. Papirus Editora.