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The use of games as playful pedagogical materials to problematize decolonial practices in educational environments

O uso de jogos como materiais pedagógicos lúdicos para problematizar práticas decoloniais em cenários educacionais

El uso del juego como material pedagógico lúdico para problematizar las prácticas decoloniales en entornos educativos

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Abstract
This article analyzes the relevance of working on decolonial issues through playfulness in mathematics. Methodologically, this is a bibliographical research, with a qualitative approach and reports of practices carried out with Youth and Adult Education classes and in Elementary School I. According to Educational Legislation, it is crucial to think about new methods that contribute to a movement of resistance and rupture in favor of the decolonization of schooling. In addition to contributing to the consolidation of mathematical concepts and countering patterns of Eurocentric colonial power, games provide reflections on conscious consumption, thus breaking with the capitalist system, which, according to Krenak, has the power of co-optation. Among the results and conclusions, playfulness in mathematics helps to promote inclusive education that values diversity.
Keywords: Mathematics Education; Decoloniality; Playfulness; Youth and Adult Education.

Resumo
Este artigo buscou analisar a relevância de trabalhar os assuntos decoloniais por meio da ludicidade em matemática. Metodologicamente, trata-se de uma pesquisa bibliográfica, de abordagem qualitativa e relatos de práticas realizadas com turmas da Educação de Jovens e Adultos e no Ensino Fundamental I. Conforme a Legislação Educacional é importante pensar novos métodos que contribuam para um movimento de resistência e ruptura a favor da decolonização da escolarização. Os jogos, além de contribuírem para a consolidação de conceitos matemáticos e contrapor padrões de poder colonial eurocêntrico, propiciam reflexões sobre o consumo consciente, dessa forma rompendo com o sistema capitalista que segundo Krenak, tem o poder de cooptação. Entre os resultados e conclusões tem-se que o lúdico na matemática, corrobora para promover uma educação inclusiva que valorize a diversidade.
Palavras-chave: Educação Matemática; Decolonialidade; Ludicidade; Educação de Jovens e Adultos.

Resumen
Este artículo busca analizar la relevancia de trabajar temas coloniales a través de la lúdica en las matemáticas. Metodológicamente se trata de una investigación bibliográfica, de enfoque cualitativo y de relatos de prácticas realizadas con los cursos de Educación de Jóvenes y Adultos y Educación Primaria I. Según la Legislación Educativa, es importante pensar en nuevos métodos que contribuyan a un movimiento de resistencia y ruptura en la educación. a favor de la descolonización y la escolarización. Los juegos, además de contribuir a la consolidación de conceptos matemáticos y contra los estándares del poder colonial eurocéntrico, alientan reflexiones sobre el consumo consciente, rompiendo así con el sistema capitalista que, según Krenak, tiene el poder de cooptación. Entre los resultados y conclusiones está que la diversión en las matemáticas ayuda a promover una educación inclusiva que valore la diversidad.
Palabras clave: Educación Matemática; Descolonialidad; Alegría; Educación de Jóvenes y Adultos.

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1. Introductory scenario: Aspects of mathematics

This article aims to analyze the importance of working on decolonial issues through playfulness in the context of school mathematics with practices carried out in youth and adult education (YAE) classes. In this context, we seek to use games for students' mathematical learning and integration, with a playful proposition, to contribute beyond limits, aiming not only at meaningful learning of mathematical concepts but also at questioning the predominance of Eurocentric colonial power patterns in force in many mathematics classrooms.

Since ancient times, humans have needed to develop survival techniques and instruments. Mathematics emerges in that experience, becoming indispensable for human evolution. In the Paleolithic, when human culture began to develop, with the emergence of cave art and tools made of chipped stone, animal teeth, and bones, primates had to use the first mathematical strategies, such as the demarcation of lands, the natural cycles of the universe, groupings, food storage, and predictions through natural sequences. Later, with writing, transmitting knowledge to other individuals became possible as mathematics became concrete when those writings appeared on stone tablets.

It is important to note that the Greeks significantly influenced mathematics, as they created schools on this subject to transmit knowledge acquired and accumulated by society. D'Ambrosio (1999, p. 97 apud Chaquiam, 2017, p. 16) says that:

> Mathematical ideas appear throughout the evolution of humanity, defining action strategies to deal with the environment, creating and designing instruments for this purpose, and seeking explanations for the facts and phenomena of nature and existence itself. At all times in history and in all civilizations, mathematical ideas are present in all forms of doing and knowing (D'Ambrosio, 1999, p. 97 apud Chaquiam, 2017, p. 16).

Mathematical knowledge is fundamental because it contributes to individual and joint decision-making and is an essential instrument for scientific construction in other educational areas. Likewise, it helps to structure students' thoughts and development of critical reasoning, preparing them to live in society. According to the National Curriculum Parameters (PCN):

> Mathematics can contribute to educating citizens by developing methodologies that emphasize the construction of strategies, the verification and justification of results, creativity, personal initiative, collective work, and autonomy arising from confidence in one's ability to face challenges (Brasil, 1997, p. 4).

Therefore, the teacher can teach his/her classes using mathematical content that awakens students' interest and awareness that mathematics exists everywhere; it cannot be seen as a simple subject that students must master to pass school exams. The teacher must develop strategies so that students understand a vision of the meaning of studying mathematics. For example, the teacher could bring films to the classroom that refer to past periods in humanity's history and that led our ancestors to develop techniques to resolve everyday situations, such as calculating the age of a king to predict his death.

Next, in scenario 2, we present reflections on games used in the context of school mathematics and theories on the themes addressed throughout the article.

2. Scenario 2: The game in the context of school mathematics - necessary theorizations

Many teachers often point out students' lack of interest in many school activities. According to them, it is increasingly difficult to attract students' attention since they are distracted by the presence of mobiles, the Internet, and digital media, and they complain that no matter how hard they try, they cannot keep students interested in studying and concentrated in classes.

In the search for answers on how to make teaching enjoyable for both students and teachers, we inferred that using games and recreational activities as methodological resources can be one of the pedagogical alternatives to enhance the teaching/learning process and make classroom practices in mathematics in our schools more dynamic and enjoyable. Thus, we aim to propose to teachers the possibilities of using games and recreational activities as a pedagogical resource that can enrich the teaching process in the classroom and invite students to learn mathematical content in different ways and with cultural diversity.

To help us in this alternative pedagogical endeavor, we rely on authors such as Kishimoto (2011), Macedo (2005), Rau (2007), and Antunes (2013), among others, who understand the game as an effective instrument, capable of improving the educational work carried out by teachers in schools. According to Kishimoto (2011), using educational games for pedagogical purposes leads us to teaching-learning situations, as the child learns in a pleasurable and participatory way.

Regarding the cognitive aspect, Macedo, Petty, and Passos (2005) suggest that games help children acquire knowledge and develop skills and competencies. Thus, games and recreational activities as a teaching tool and facilitators of learning can improve teachers' pedagogical practice, awakening students' interest in the activities developed in the classroom and the school in general.

For Macedo (2005, p. 24), "working with games, in terms of the cognitive aspect, aims to help children acquire knowledge and develop their skills and competencies." Playing allows children to develop cognitive skills that help them internalize concepts and relate them to daily activities.

We also remember Vygotsky (apud Rolim, Guerra, & Tassigny, 2008, p. 177), who asserts that:

> Playing is also related to learning. Playing is learning; play is the basis of what will later allow the child to learn more elaborate things. Playfulness thus becomes an educational proposal for overcoming difficulties in the teaching-learning process.

Kishimoto (2011, p. 18) states:

> Defining games and toys is not easy, as these concepts vary according to the context in which they are inserted". According to the author, in Brazil, "the terms game, toy, and playing are used interchangeably, demonstrating a low level of conceptualization in this field.

Kiya (2014) believes the game is still seen as an activity to fill "gaps," in other words, an activity used at the end of the class to entertain students in the little time left, without an educational purpose. According to Kyia (2014, p. 9):

> Some scholars (Kishimoto, 2011; Rau, 2007; Macedo, 2005, among others) defend using games and recreational activities as tools to facilitate the teaching and learning process. They believe work using playfulness contributes to interaction between teachers and students.

According to Luckesi (2000, p. 2):

> What playfulness brings new is that when human beings act playfully, they have a whole experience," i.e., they become deeply involved in carrying out the activity. Therefore, work using playfulness can increase students' interest in the activity and commitment to carrying it out in a pleasurable way. Games and playing are ludic activities that are present in all human activity. Through these activities, the individual socializes, develops concepts, formulates ideas, establishes logical relationships, and integrates perceptions. These activities are part of a subject's construction.

Rau (2007, p. 49) states: "To be used as a pedagogical resource, games must be contextualized significantly for students through concrete materials and attention to its historicity." In this sense, Kyia (2014) states that the teacher must be responsible for identifying the educational needs of their students and the complexity of the content so that they can then make the necessary adaptations so that the ludic activity or game can be well explored and thus contribute to facilitating the teaching and learning process.

In his book Jogos na educação: criar, fazer, jogar [Games in education: creating, doing, playing] Lopes (2011, pp. 36-45) cites the pedagogical objectives in the school and clinical context that can be achieved by using game activities. The objectives that can be achieved through games are:

- **Improve** motor coordination: Some children have a delay in fine motor coordination, which influences their writing. Students with "ugly" handwriting need activities to develop this motor coordination. Games and activities such as origami, collages, painting, drawing, and handling scissors help students exercise their motor skills.
- **Develop** spatial organization: Some children experience spatial disorganization when they need to calculate the available space mentally. They are clumsy; they fall, bump, and knock everything over. They also have difficulty keeping their material in order and cannot organize facts in a logical sequence of events.
- **Improve** segmental control: Children need only one hand and the forearm when writing. When the child does not have segmental control, he or she forces the entire arm, shoulders, neck, jaw, forehead, and eyes, causing fatigue, tension, and discouragement for the writing task. Activities such as making games, guided by the teacher, help the child learn to control the segments of their body.
- **Increase** attention and concentration: lack of attention and concentration interferes with learning. There are many reasons, but the most common is a lack of interest in the proposed activity. It is necessary to motivate and awaken the child's interest in the activity they will have to carry out. It is possible to exercise this skill through activities that gradually stimulate increased attention. Painting, collaging, cutting, and viewing different objects within a set help develop attention and concentration.
- **Develop** anticipation and strategy: Those skills are important for accomplishing many tasks in life. Reasoning, predicting, calculating, and creating hypotheses are essential for students to broaden their worldview. Activities involving creating and participating in games allow children to develop self-confidence and plan their actions.
- **Work** auditory discrimination: Discriminating phonemes is crucial for the child to be able to read and write. Working with the sound of words, games that present different sounds allow the student to develop their auditory acuity.
- **Enlarge** logical reasoning: This is a cognitive aspect that requires to be exercised the most to be developed. Children usually have a certain "mental laziness" and do not want to think to solve problems. The teacher must always be working to develop this skill. Games that require anticipation, planning, and strategy encourage children to develop reasoning skills.

- **Develop** creativity: Children need activities that unleash their imagination and help them create and make different movements. The teacher must create situations that encourage the development of imagination and artistic creations.
- **Perceive** figure and background: Perceiving the parts of a whole is a skill that must be developed. This skill is essential when starting the literacy process because, in the beginning, it separates the parts of the word: the letters, then the 16 syllables; then, they are joined to form the words and the text. Children must learn to select their attention to perceive the figure and the background and, at times, that they are in inverted positions.
- **Work** on the game: Children quickly learn game rules but do not realize how to win or lose. They must experience both situations to deal with their emotions appropriately. When well conducted, competitive games teach children to work on their emotions and internalize concepts that will help them deal with their feelings within a group context and prepare for life in society.

Agreeing with Lopes (2011), Antunes (2013), in his book *Jogos para a estimulação das múltiplas inteligências* [Games to stimulate multiple intelligences], states that four elements justify and condition the application of games. These elements are important and must be considered. They are:

- Ability to become a factor in the student's self-esteem: Students lose interest in games that are too easy or difficult. The teacher must choose the activity according to the student's cognitive level. Activities that are easy or difficult above the student's ability can make them feel incapable or a failure.
- Favorable psychological conditions: The teacher should use games to combat apathy, aiming at inclusion and challenge for the group. The teacher must demonstrate enthusiasm when preparing and proposing the activity. The teacher's enthusiasm encourages the student to want to play.
- Environmental conditions: The organization of the environment, the material that will be used, and the hygiene of both the table and the place where the activity will be carried out are fundamental to the success of using games.
- Technical fundamentals: Every game must have a beginning, a middle, and an end. It should never be interrupted. If there is any doubt about whether or not the activity can be completed, it should not be started. (Antunes, 2013, p. 41-42)

We remember that mathematics is also present in students' lives in games and play, with which they learn to compare quantities, operate, make routes, observe the shapes of objects, etc. Therefore, exploring these situations as a starting point for some learning is only natural. However, the game or play must lead the student to construct mathematical knowledge, and the teacher's intervention is essential. The teacher must be the mediator of learning, and students must assume the leading roles, i.e., they are the ones who build their learning strategies through internal resources that have already been assimilated.

Freire (2006) observed that the educator must behave as a provocateur of situations, a cultural animator in an environment where everyone learns together. In this context, the teacher can plan practices beyond traditional content, such as notebooks and books, expanding their didactic and pedagogical tools by including playfulness as a methodological resource for teaching mathematics.

It is noteworthy that playing becomes important in mathematics teaching and learning because these activities help students feel motivated; they also work with imagination and creativity and relate the abstract with the real, thus making the assimilation of content more accessible. Thus, the games being planned for pedagogical guidance are concrete resources that will contribute to developing students' essential skills in a pleasurable way.

According to Vygotsky (1994):

> Playing is fundamental in the development of a child's thinking. Through this, the child learns to operate with the meaning of things and takes an important step towards conceptual thinking based on the meanings of things, not objects. The child does not transform meanings in the blink of an eye (p. 54).

The results of external assessments show that students' performance in mathematics is low. Thus, concrete objects, represented by games and manipulative materials, help students understand algorithms and make mathematical teaching more meaningful. Furthermore, students develop the autonomy to solve daily problems by applying the knowledge acquired. According to Kishimoto (2011), "It is important to value games in education, that is, toys and games as privileged forms of development and appropriation of knowledge by the child and, therefore, indispensable instruments of pedagogical practice and a relevant component of curricular proposals."

Given the perspective above regarding the contribution of playfulness as a privileged form of learning development, it is how it can be used as a mediating object between the zones of actual and potential development. Guided and intervened by teachers, games and activities will be used in the zone of proximal development to develop the psychic areas of their students. Vygotsky also states that:

> The zone of proximal development defines functions that have not yet matured but are in the process of maturation and functions that will mature but are currently in an embryonic state. These functions could be called "buds" or "flowers" of development rather than "fruits" of development (Vygotsky, 2007, p. 98).

For true knowledge learning to occur and for the correct choice of playful activities, the teacher must first conduct a diagnostic assessment of their students. This assessment is critical because, through it, the teacher will develop games based on their students' current level of learning. Through a diagnostic assessment, we always seek to:

> Seriously investigate what the students "still" have not understood, what they "still" have not produced, what "still" needs more attention and guidance [...] In short, locate each student in their moment and paths, radically changing the assessment focus and "recovery practices" (Hoffman, 2008, p. 68).

The teacher should choose games and activities that involve mathematical knowledge that students cannot solve without a mediator. Through playfulness and intervention, students may achieve autonomy and consolidate teachings. Furthermore, it is necessary, however laborious it may be, for the teacher to constantly apply formative assessments to detect students' progress or setbacks and accordingly intervene so that they advance towards a new assimilation and accommodation of knowledge.

Cardinet (1986, p. 14) defines formative assessments as an activity that:

> [it] aims to guide students in their school work, seeking to identify their difficulties to help them discover the processes that will allow them to progress in their learning. Formative assessment is the opposite of summative assessment, which constitutes a partial or total assessment of a set of learnings. Formative assessments are distinguished from diagnostic assessments by a less pathological connotation. They do not consider the student a case

> to be treated, and they consider errors to be normal and characteristic of a certain level of learning development.

We must mention that the results achieved during ludic activities as a teaching-learning object should also count as an assessment, as the transformations of traditional practices into contextualized and meaningful practices must permeate the assessment. We must move away from the vision of applying a punitive assessment, which only aims to classify students without considering their entire path. Just as learning through games is enjoyable, this moment must also be evaluated with a close eye on the processes of constructing the strategies students use to achieve results. According to the National Mathematics Curriculum Parameters:

> Changes in the definition of objectives for elementary education, in the way of conceiving learning, the interpretation and approach to mathematical content imply rethinking the purposes of assessment, what and how to assess, in a work that includes a variety of learning situations, such as problem solving, working with games, the use of technological resources, among others (PCN, 1997, p. 41).

Therefore, the teacher must also evaluate his/her methodologies through the results obtained in the assessments and surveys of his/her students to verify possible gaps and their potential. The teacher will achieve more significant teaching and learning mathematics results by combining the relationship between action and reflection.

3. Scenario 3: Youth and adult education and games

Lemes and Marcatto (2020) state that the games used during the mathematics teaching and learning processes have been presented as a methodology to lead to conditions that propagate and confirm mathematical knowledge by the subject. This methodology awakens students' interest, motivation, self-confidence, and autonomy in the proposed activities, also favoring concept learning.

Lorenzato (2012, p. 23) highlights that "the teacher's performance is fundamental to school success or failure," in line with the ideas proposed by Grando (2000, p. 2) when he emphasizes that "educators must know their students' specific internal components to guide their learning in a meaningful way," so that students can establish a fundamental connection between the school environment and the situations they experience daily. In this same context, Lorenzato (2012, p. 21) warns us about the importance of manipulative activities in teaching since they alone do not guarantee learning but can "be an excellent catalyst for the student to build their mathematical knowledge."

According to educator Jane Paiva (2006):

> From the still very commonplace view that education for young people and adults is done to make up for lost time for those who did not learn to read and write, going through the redemption of social debt until reaching the conception of the right to education for all and lifelong learning, the statements have varied, imprinting in the social imagination their most decisive mark, linked to the return to school, for those people to do in the present what was not done in childhood (Paiva, 2006, p. 3).

Therefore, we understand that:

Thinking about YAE subjects means working with and in diversity. Diversity consists of the differences that distinguish subjects from each other –women, men, children, adolescents, young people, adults, older people, people with special needs, Indigenous people, people of African descent, descendants of Portuguese and other Europeans, and Asians, among others. Brazilian society's diversity encompasses ways of being, living, and thinking that clash. Amid tensions between different ways of constructing social and ethnic-racial identities and citizenship, the subjects of diversity try to dialogue with each other or at least seek to negotiate political proposals based on their differences. Such proposals should include everyone in their specificities without compromising national cohesion or the right to be different, guaranteed by the Constitution (Brasil, 2008, p. 1).

The issue of welcoming and retaining YAE students and their learning, especially those of African descent, continues to challenge public policies, schools, and professionals. Understanding that playfulness and the production of decolonial curricula contribute to this purpose, together with the implementation of law n. 10.639, which, according to Oliveira and Candau (2010), grants "visibility of other historical logics, different from the dominant Eurocentric logic, putting epistemic decolonization into debate," this article aims to socialize a curriculum activity linked to the III Semana Municipal do Brincar [III Municipal Play Week], held in Juiz de Fora in May 2023.

In this context, several activities related to this theme were carried out in the municipal schools of Juiz de Fora, including the class of Youth and Adult Education at the Arllete Bastos de Magalhães Municipal School, where the first author of this article worked as a teacher in the initial years of elementary school, with integration of pedagogical practices.

Those activities aimed to comply with law n. 10.639, which deals with the mandatory curriculum of all subjects and stages of schooling to address themes related to Afro-Brazilian history and culture. Therefore, we chose to work with the YAE students on the game of African origin, Mancala, to overcome the place of submission and lack of knowledge in which black people are usually portrayed in school curricula, mainly when the topic addressed is the slavery period. It is of utmost importance that curricula are decolonized and include games and activities from other cultures, preferably African and Indigenous.

From our studies, we infer that mathematical knowledge produced by African peoples, Indigenous peoples, and marginalized groups often suffers erasure in a curriculum that emphasizes Eurocentric knowledge. In contrast, teaching how to think mathematically from a decolonial perspective can help rescue valuable contributions from other peoples to the same extent that it contributes to the deconstruction of Eurocentrism and the predominance of ideas from the global north.

For Nery and Nery (2017), coloniality constituted the hierarchy of races. They believe that in this process, Indigenous peoples, for example, were historically marginalized as producers of knowledge and skills. Decoloniality, in turn, denaturalizes this hierarchy of knowings and inferiorizations.

Thus, the objectives of the proposed activity involve decolonizing the curriculum through playfulness and addressing knowledge of the history and origin of the game that refers to African

cultures, in addition to developing mathematical skills related to the subject's curriculum contents, such as logical reasoning, counting, and developing strategies.

Some records made during the activity are presented below.

Figure 1: Mancala game being played in class (YAE)

Source: Authors' archive

We recall that Piaget (*apud* Macedo 1995, p. 2) classifies games into three categories: exercise, symbol, and rule. These structures, according to Macedo (1995), are characterized according to their form of assimilation. Macedo (1995, p. 6) also states: "Those who play can reach knowledge through the game characteristics, through the exercises, symbols, and rules". Furthermore, knowing the categories of games and their characteristics allows the teacher to better adapt this instrument as a pedagogical resource.

In our practice presented in the images, we infer that games, combined with playful activities with landscapes for investigation, can be an efficient strategy for teachers to stimulate their students' intelligence. In other words, through playing, students can overcome all the limits of their physical, mental, and intellectual capacity. Thus, Antunes (2013, p. 17) states that "in its integral sense, the game is the most efficient means of stimulating intelligence."

In this article, we detail that games played in mathematics classes can help teachers identify students' mathematical knowledge to understand the world in its social and cultural diversity, providing opportunities and inviting students to solve problems and develop their multiple intelligences.

Thus, we used games in our practice that allowed reciprocal and collective assimilation, with the possibility of repetition and regularity, with the exploration of conventions inherited from symbolic games, so that each student could learn a game that is not part of their culture, seeking to develop skills such as attention, concentration, memory, and reasoning.

In Scenario 4, below, we present the potential of using a remarkable game to enrich practice and learning in the mathematics classroom in the YEA and other educational contexts.

4. Scenario 4: The Mancala game and its potential for (ethno)mathematical learning

An ethnomathematical proposition for pedagogical action involves developing activities related to students' daily lives and seeks interaction with the school mathematics curriculum through the use of the ethnomathematical perspective (ROSA, 2010).

Dias Filho (2011) says that Mancala is a game in which each pair must have a rectangular board containing 14 holes, two rows of six squares each, and two larger ones that serve as a reservoir (an oasis or a mancala) and 36 seeds or buds. The board can be made with egg boxes. Each player will face the row that belongs to them. To decide who starts the game, one of the participants hides a seed in one of their hands. If the opponent guesses the hand that hides it, the game begins.

The first player must choose one of their houses (holes), take all the seeds from that house, and distribute them in the following houses to try to go through all the cavities on the board in an anticlockwise direction, always leaving a seed in each house until they run out. Whenever one passes through one's reservoir, one must place a seed and not place seeds in one's opponent's reservoir.

If the last house to leave a seed is one's reservoir, the player can play again; otherwise, the player gives up the turn to his/her competitor. The game ends when one of the rows is empty—the player with the most seeds in their reservoir wins. According to Zuin (2015), this game also allows the player to develop their logical reasoning by constructing tactics so that the seed deposit becomes increasingly fuller.

The activity with the game was planned to take place during a mixed YAE class, phases III, IV, and V. At first, we asked the students to indicate the names of the games they knew, and we wrote them on the board as they mentioned them. Later, we questioned that the list included only names of games of European origin, such as checkers, chess, and football.

The students did not know how to answer, and from this question, we began to reflect on how African culture is only remembered when the subject is slavery. In the second moment, we present the game rules and explain to the class the origin of Mancala, a board game of African origin, also known as Eastern chess. The game relates to sowing and harvesting seeds from the earth and how many kings of Africa used this game to celebrate good harvests.

In the third step, we distributed the trays made with empty egg cartons and the bean seeds. The students chose their partners to play, and we started the game. We followed the performance of the pairs during the game, and it was clear how focused they all were on the activity. In the fourth moment, we asked them to end the activity and opened a conversation circle to discuss their experience with the game, which will be addressed in Scenario 5.

5. Scenario 5: Analysis of the results of the practice with the Mancala Game

When analyzing the results obtained in this practice, we realized that the students, at the end of the game, demonstrated an increase in their interest in African culture, citing situations in which we give preference to European culture over African culture, such as the preference in buying clothes with phrases written in English and the prejudice when a product mentions the African continent. Furthermore, one student mentioned the recent case of racism against a Brazilian football

player in Europe and the fact that racism is part of the structure of society, making no distinction between rich and poor.

Likewise, since the use of the game requires quick thinking, a strategy to win the game, and ensures the approach of knowledge related to African history and philosophy, we were also able to demystify the association many make between the lack of intelligence and culture and people originating from Africa and how this relates to the issue of racism.

Pereira and Cunha (2010) say the absence of Afrocentric approaches in schools contributes to non-black students perpetuating racist practices and Afro-descendant students themselves reproducing racism by downgrading African peoples. Hence, the curricula practiced in YAE must prioritize the education of ethnic-racial relations and anti-racist approaches.

As for the mathematics subject, students developed counting skills during the strategies developed to collect the bulkiest number of seeds and win the game, contributing to confronting their feelings of self-worthlessness regarding this curriculum component.

In the scenario below, we present another game that enriched the dynamics of the classes and, consequently, students' learning.

6. Scenario 6: The Tsoro Yematatu game and its methodology

Tsoro Yematatu is an ancient game originating from the Republic of Zimbabwe, a country located in the south of the African continent. Its piece composition includes stones; however, the children use bottle caps, revealing a popular relationship with the consumption of soft drinks, which can be observed both in the USA and Africa. It opens a space for creating a vision of reusing materials, such as bottle caps, in the game, promoting a recyclable action instead of discarding them in the environment.

Likewise, working with games that are easily accessible in financial terms for students is of great value since most students in public schools do not have the resources to buy others. Furthermore, homemade games reduce environmental impacts caused by consumerism and capitalism. According to the Indigenous philosopher Krenak:

> The capitalist system has such great power of co-optation that any crap it announces immediately becomes a craze. We are all addicted to the new: a new car, a new machine, new clothes, something new. They have already said: 'Ah, but we can make an electric car without gasoline; it will not pollute.' However, it will be so expensive, so sophisticated, that it will become a new object of desire (KRENAK, 2020, p. 32).

The toy industry frequently launches new electronics to generate profit and thereby contribute to the degradation of the environment. Schools should be the first institution to encourage parents, guardians, and students to understand the importance of conscious consumption by organizing lectures and school science fairs on the topic.

Kistemann Jr. (2011) conjectures that preparing individuals to experience critical citizenship means placing them in front of access to the rules of the financial-economic game. Consumerism creates inequality in consumption itself, where some children can acquire innovations detrimental

to a subordinate group. Furthermore, many toys lose their playful nature, which impacts students' learning when the school opts for more didactic teachings and cannot find resources that meet the intended purpose, which, in this case, is teaching mathematics through games and play.

According to Oliveira:

> Large industries are interested in seducing consumers and not knowing and respecting the peculiarities of children as human beings. A toy is launched into the market because of its profit potential for the company that produces it. "A business is nothing more than that" (Oliveira, 1984, p. 35).

In this context, including African games as decolonization of school curricula, in addition to making African culture known and working on mathematics teaching, contributes to the reflection on games constructed by the students in class and more conscious consumption. The game Tsoro Yematatu is similar to tic-tac-toe, where it is necessary to align three pieces in the same vertical, horizontal, or diagonal line.

Tsoro Yematatu makes it possible to learn geometry and thus learn about the history of the African continent, where it began and developed. It is also possible to introduce the country where this game originated, Zimbabwe, which means "great stone house" in the Shona language (a group of people who speak the same language). As a brief historical introduction, the Kingdom of Zimbabwe, or Great Zimbabwe (11th to 15th centuries), was a kingdom with magnificent stone architecture, known as the Great Zimbabwe Wall, and a historical value similar to the Pyramids of Egypt. In this way, it aims to understand that students will deconstruct the image that relates Africa to a poor continent with many diseases and people lacking intellectual and material resources.

In this context, the game helps with performance and meaningful mathematical learning. Also, the teacher can ask students to research the African continent and its contributions to the development of various nations, such as agricultural techniques developed in ancient Egypt. In the words of Schaeffer and Timm:

> There are several possibilities in mathematics. Among them: using information processing to analyze data obtained in research on the topic with students' families and the school community; using geometry concepts to make replicas of masks and reinterpretations of African arts; developing logical and tactical reasoning through games of African origin (Schaeffer; Timm, 2016, p. 1).

Deconstructing a negative image of this continent is opening space for dialogue, respect, and reflections that will result in the construction of a less prejudiced society. In this way, many conflicts initiated by the non-acceptance of differences and the Eurocentric vision implanted in people's unconscious and in school curricula will be broken and will give space for the knowledge of new practices. Working with mathematical games from the African continent decolonizes the structural Eurocentric curriculum. According to Almeida:

> Modernity is not limited to European Enlightenment rationality, the impersonal state, and commercial exchanges; [...] it not only comprises trafficking, slavery, colonialism, and racist ideas, but also practices of resistance and anti-racist ideas formulated by black and Indigenous intellectuals (Almeida, 2018, p. 80).

Returning to the game, Tsoro Yematatu is played by two players, each with three bottle caps of the same color and different from the opponent's. The students can make themselves a board that can be used to work on mathematical questions such as points, types of lines, planes, types of angles, types of triangles, vertex, trapezoids, and plane figures.

After creating the board, players must decide who will start the game. The game starts without any pieces on the board, and each player places their piece according to the strategy used, but after all the pieces are on the board, they only need to move them in the same line. The first person to align all three pieces wins the game. The board resembles an isosceles triangle (with two sides and two angles of the same size).

- Tsoro Yematatu rules

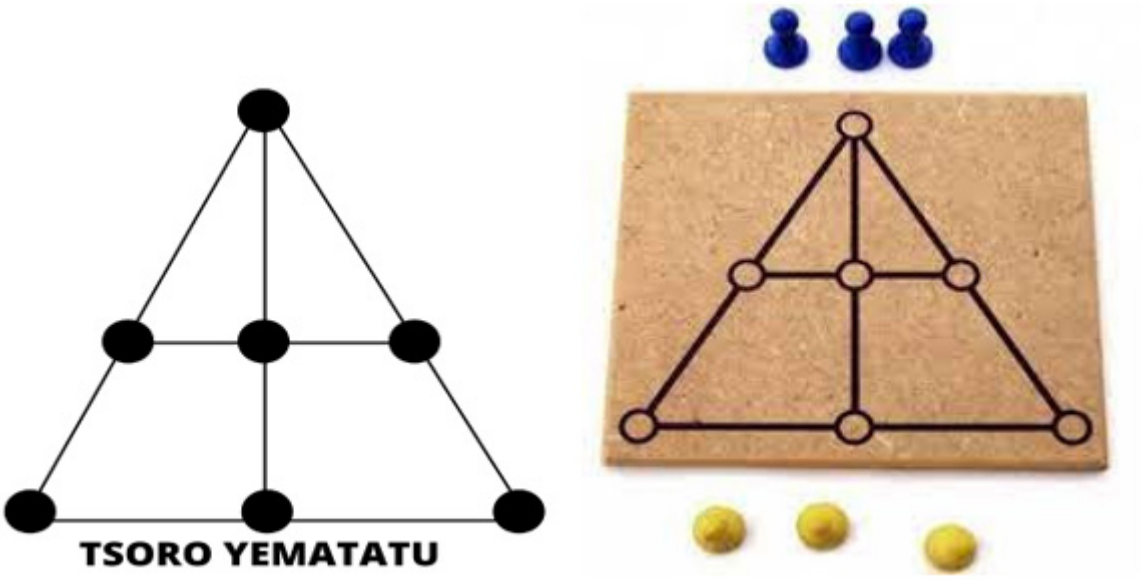
1) Each player receives three plastic bottle caps of the same shade;
2) Players decide by chance who will start the game (it can be made odd or even);
3) The player who wins the contest to start the game places their first piece on one of the lines of the board;
4) When all six pieces are in their proper places, move one piece at a time, from one circle to an empty one, in a straight line;
5) Each player, in turn, moves one of the pieces to a neighboring, empty space. Players are allowed to jump over a piece, theirs or their opponent's;
6) The player who occupies the three points on the board in a straight line wins;

- Materials for the game Tsoro Yematatu

1) One board
2) Six pieces (being a group of three equal colors for both)

- Board model for the game

Figures 2 and 3: Tsoro Board



Source: Authors' collection

7. Scenario 7: Working with the Tsoro Yematatu game in the classroom

Fourth-grade students at Salvador Kling Municipal School participated in the Tsoro Yematatu game during math classes. First, they were shown the board model used for this game and asked if they were familiar with this playful activity.

The students said they had never played this game but that it was similar to a checkers board. In the second moment, a conversation circle was held to present the origins of the game to the classroom. Each child gave their guess as to the country of origin of the game. Most students said the game came from the United States but were surprised to know it was created in Africa. They imagined that children in the African continent did not play; instead, they worked to help their parents support the family.

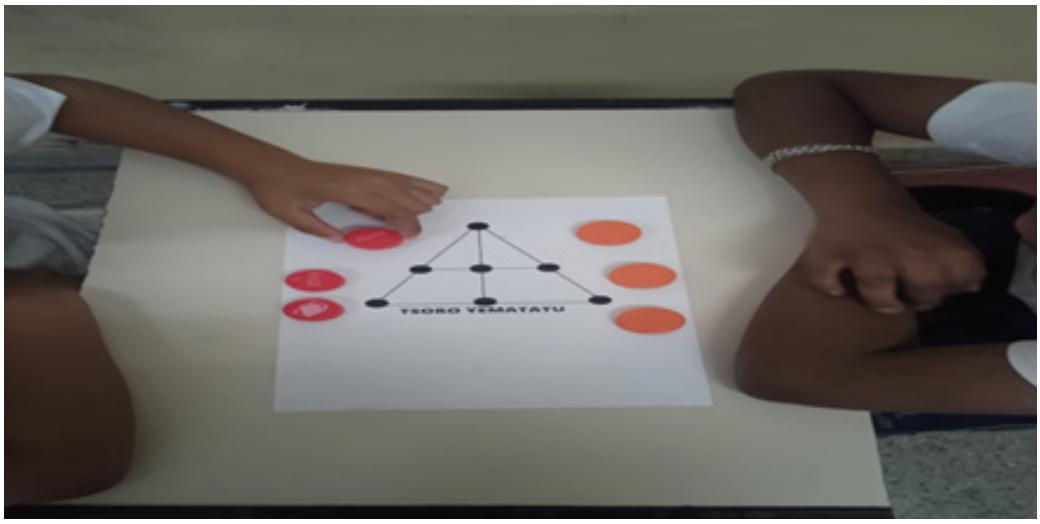
In the third moment, some images of children playing the game on the African continent were presented to the classroom. The students were happy to learn about a new form of play and culture. In addition, some themes related to Africa were also addressed, such as the fact that it is a rich continent and has contributed to the evolution of humanity through the creation of calculations, geometry, planting techniques, and other engineering.

In the fourth moment, the students received a sheet with the board in dotted lines to be covered with markers, and used rulers to check the measurements of the sides and angles of the board. The names of the figures on the board were also worked on.

In the fifth moment, the class was divided into pairs to start the game and were presented with the game rules, its purpose, the distribution of plastic bottle caps, and the duration of the activity. In the sixth moment, the pairs started the match and played for 50 minutes.

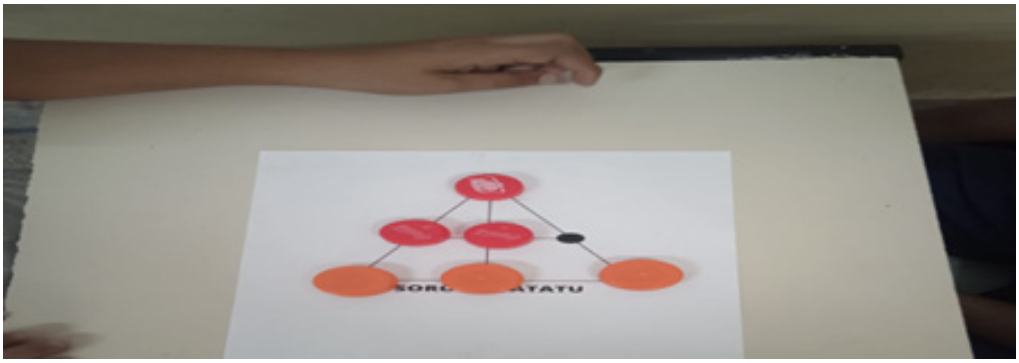
While the students played, we observed which strategies and reasoning they were using to win the games. At the seventh moment, the game was finished, and the players counted who had won the most matches. Here are some records:

Figure 4: Fifth moment, which requires reasoning and strategy.



Source: Authors' collection

Figure 5: Moment when one of the players won the match



Source: Authors' collection

We noticed that when working with mathematical games that students were unfamiliar with, they were more curious to find strategies to win the game. The students demonstrated a high level of concentration and interest during the game. In addition, they learned about the culture of the African continent, which was demystified during the conversation circle that preceded the matches.

8. Scenario 8: By way of a conclusion

In this article, we presented game scenarios to analyze the importance of working on decolonial issues through playfulness in mathematics in a YAE context. Therefore, it is coherent to state that mathematical games are fundamental to comply with Law n. 10.639, to transform the didactic sequences of mathematics classes because only contextualized and non-traditional practices such as games will students make sense of education.

According to Mosimege (2020, p. 15):

> Indigenous games have a great potential to change how mathematics teaching and learning is viewed in classrooms. They not only enable learners to engage in enjoyable activities, but they also have a great potential to help open avenues for the connection between concrete and abstract concepts, between classroom environments and activities outside the classroom.

We understand that Indigenous peoples' mathematical and cultural knowledge is made explicit when solving everyday problems, proving how social practices are related to this ethnomathematical knowledge for problem-solving.

In this sense, Rosa and Raimundi (2019) state that one of the main objectives of mathematics education is to seek the development of an educational process that enables students' acquisition and use of communicative, analytical, and material instruments essential for the full exercise of the rights and duties intrinsic to citizenship (D'Ambrosio, 2001).

Given the need to work on the theme of Africanities in schools, the Mancala game was relevant, as it brings to the classroom a new experience regarding games and plays often approached only from a colonial perspective. Furthermore, Mancala allowed students to learn a little about African culture and the intelligence originating from its people and work on the self-esteem of black students. Likewise, it was possible to work on the development of counting, symmetry, and teamwork.

Finally, based on the actions carried out, we argue that it is necessary to rescue the connection between (ethno)mathematics and daily practices in the mathematics classroom, which will result in practices that can become decolonial in the learning context, as we always question the discourse that mathematics has a single Eurocentric/Western reference and that only this reference is capable of promoting equity, citizenship, and social inclusion.

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