Creative Practices in Mathematics Teaching: results of planning through Universal Design for Learning

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Abstract: We analyze the excerpt of a creative pedagogical practice based on Universal Design for Learning (UDL) in Mathematics lessons for a 5th grade of Elementary School. It is part of a master's thesis at the Federal University of Paraná. The aim is to present how the integration of creativity and the principles of UDL transforms teaching, with a focus on teaching flexibility and student engagement. The study highlights inclusion in education as an ethical commitment, emphasizing practices that respect students' individualities. The pedagogical practice from the UDL perspective stimulated creativity and expanded access to knowledge, connecting Mathematics to everyday life.

Keywords Inclusion. Creativity. Principles and Guidelines of UDL. Planning. Mathematics Education.

Prácticas Creativas en la Enseñanza de las Matemáticas: resultados de la planificación mediante el Diseño Universal para el Aprendizaje

Resumen: Analizamos el recorte de una práctica pedagógica creativa basada en el Diseño Universal para el Aprendizaje (DUA) en clases de Matemáticas para un grupo de 5º año de la Educación Primaria, que forma parte de una disertación de maestría de la Universidad Federal de Paraná. El objetivo es presentar cómo la integración de la creatividad y los principios del DUA transforman la enseñanza, con énfasis en la flexibilidad docente y el compromiso de los estudiantes. El estudio resalta la inclusión en la educación como un compromiso ético, enfatizando prácticas que respetan las singularidades de los estudiantes. La práctica pedagógica desde la perspectiva del DUA estimuló la creatividad y amplió el acceso al conocimiento, conectando las Matemáticas con la vida cotidiana.

Palabras clave: Inclusión. Creatividad. Principios y Directrices del DUA. Planificación. Enseñanza de las Matemáticas.

Práticas Criativas no ensino de Matemática: resultados do planejamento por meio do Desenho Universal para Aprendizagem

Resumo: Analisamos o recorte de uma prática pedagógica criativa baseada no Desenho Universal para Aprendizagem (DUA) em aulas de matemática para uma turma de 5º ano dos Anos Iniciais do Ensino Fundamental. Este estudo faz parte de uma dissertação de mestrado da Universidade Federal do Paraná. O objetivo é apresentar como a integração da criatividade e os princípios do DUA transformam o ensino, com foco na flexibilidade do professor e no engajamento dos estudantes. O estudo destaca a inclusão na educação como compromisso ético, enfatizando práticas que respeitam as singularidades dos estudantes. A prática pedagógica na perspectiva do DUA estimulou a criatividade e ampliou o acesso ao conhecimento, conectando a matemática ao cotidiano.

Palavras-chave: Inclusão. Criatividade. Princípios e Diretrizes do DUA. Planejamento. Ensino de Matemática.

1 Introduction

Mathematics, often seen as an exact and restricted domain, reveals vast creative potential when taught in a dynamic way. Planning based on Universal Design for Learning (UDL) is an ally in this process, since it adopts a curricular approach that aims to plan pedagogical strategies redesigned to the diversity of each student (Góes and Costa, 2022). The articulation between creativity and the principles of UDL can transform the teaching of Mathematics, making it inclusive and accessible to all.

Inclusion goes beyond the mere physical presence of students in the classroom. It is about creating conditions that allow active participation and comprehensive development, respecting the particularities of each student. In the educational environment, it is important to recognize differences as an integral part of the teaching and learning process, which requires the restructuring of pedagogical practices to meet a wide variety of needs.

Inclusive education, based on equity and accessibility, requires that educational institutions value diversity. This involves ensuring accessibility for students with disabilities, disorders or specific educational needs, offering strategies that ensure access to the curriculum and effective participation in all school activities (Costa and Góes, 2022). UDL presents itself as a pedagogical approach aligned with this purpose, promoting inclusion through flexible and accessible practices, which can stimulate the creative process of teachers and students.

Recognizing that each student has a unique way of learning, UDL provides principles and guidelines for teachers to create environments that remove barriers and expand opportunities for success for each student (Góes, Costa and Góes, 2023). By integrating creativity and UDL, mathematics teaching can become a flexible, dynamic and accessible space, in which different learning styles are valued. This model allows students to choose how to interact with mathematical content, using technologies, manipulative materials or playful approaches that favor creativity and active participation. Based on the principles of engagement, representation and action/expression, UDL provides students with diverse ways of involvement and learning.

In the engagement aspect, students are motivated and involved, connecting emotionally to the content. In the representation domain, they become resourceful and experienced in recognizing and understanding knowledge in different ways. In the field of action and expression, they become strategic and goal-oriented, applying different strategies to solve mathematical problems, which promotes autonomy and critical thinking. With this approach, UDL in Mathematics teaching respects individual differences and ensures that all students have opportunities to actively participate in the learning process (Góes and Costa, 2022).

This article presents an excerpt from the master's dissertation defended in the Postgraduate Program in Education: Theory and Teaching Practice, at the Federal University of Paraná (UFPR), developed by the first author, under the guidance of the second and third authors. The research investigated pedagogical practices planned based on UDL, aimed at learning in Mathematics, in light of Edgar Morin's complex thinking. The study analyzed classroom interactions involving 29 5th grade Elementary School students and sought to understand how the integration of creativity and UDL principles can transform Mathematics teaching, making it more accessible, dynamic and inclusive.

2 Inclusion in Education

Inclusion in education goes beyond the simple inclusion of students with different characteristics in the school environment. It is an ethical and pedagogical commitment that aims to guarantee everyone's right to learn, respecting singularities and promoting full development. This concept, based on democratic practices, recognizes that diversity is not a challenge to be

overcome, but rather an asset that can transform educational relationships and processes (Costa and Góes, 2022).

Historically, the concept of inclusion arose from the recognition of the exclusion faced by marginalized groups. Initially, the focus was on people with disabilities, but over time, it expanded to encompass all barriers that limit access to learning. Thus, the idea of inclusion is intrinsically linked to the construction of an education that values heterogeneity, combats structural inequalities and promotes equitable opportunities for each individual.

Inclusion in education requires a pedagogical approach that recognizes diversity as an inherent characteristic of the educational process.

> One of the tools that demonstrate completeness for the development of inclusive education is the so-called curricular differentiation, which is embodied in the UDL with its three principles, which make it possible to create challenging and engaging learning environments for all students (Sebastian-Heredero, Moreira and Moreira, 2022, p. 3).

According to Mantoan (2015), educational inclusion involves compensating for the structure of schools and their pedagogical practices, eliminating obstacles that hinder learning. This movement requires changes in mindsets and teaching strategies. Its goal is to create conditions so that each student can actively participate, contributing with their unique perspectives and talents. This involves adjusting school structures and their pedagogical approaches, removing barriers that impede learning. This transformation requires a significant change in teaching attitudes and methods, with a view to establishing an environment in which each student can engage, bringing their views, skills, weaknesses and preferences.

Another aspect to be considered when addressing inclusion in education is teacher training, since they play the role of mediating learning experiences that respect the particularities of each student. To this end, it is necessary to offer opportunities for ongoing training, enabling them to deal with diversity and to adopt strategies that promote the active participation of students.

Sebastian-Heredero and Seneda (2019) emphasize that the essence of inclusive education lies in the exclusion of uniformity, recognizing and valuing the uniqueness of each individual in a context of equal rights. In this sense, inclusive education goes beyond the mere guarantee of enrollment, since it requires a joint commitment from all members of the educational system so that the school effectively becomes a space free of exclusions.

This set of principles reinforces the idea that the school is not only a space for the transmission of knowledge, but also a place for coexistence and the construction of citizenship. Therefore, the concept of inclusion in education goes beyond the adaptation of materials or physical spaces. It is necessary to redesign them as a commitment to social transformation, valuing the potential of each individual and promoting a rich and diverse coexistence. This perspective challenges educational systems to break with traditional models and become genuine spaces of welcome and development for all.

3 Paths and possibilities for learning

Learning is an ongoing process, rich in possibilities, and each student follows a unique path, shaped by their experiences, interests, and challenges. Recognizing this uniqueness is essential for building educational environments that foster comprehensive development and respect the diversity of ways of learning (Góes, Costa and Góes, 2023).

The paths to learning are as varied as the people who follow them. Some explore

knowledge through experimentation and practice, while others find ways to deepen their knowledge through reading and reflection. There are those who excel in collaborative activities, in which the exchange of ideas and dialogue are essential, while others prefer individual work, guided by their autonomy and their own pace (Cast, 2018).

In this context, education faces the challenge of meeting the multiple ways of learning, considering the needs, interests, and uniqueness of each student. To this end, careful planning is essential, based on knowledge of individual strengths and weaknesses. Teaching must be flexible and sensitive, promoting inclusive practices that expand opportunities for participation and development. In addition to the school environment, learning occurs in different spaces, such as social interactions, cultural experiences, professional experiences and everyday life, expanding opportunities for the construction of knowledge and the development of skills.

As Sebastian-Heredero and Seneda (2019, p. 33) state, "an educational practice in accordance with the ideal of inclusion requires consideration of the school as an essential space for the development of human transformation". In this sense, the role of the school is not limited to the transmission of content, but to the creation of conditions so that individuals can recognize and develop their potential in an autonomous and critical manner.

Similarly, as Morin (2000, p. 14) warns, "knowledge of knowledge" must occupy a central position in the educational process. This reflection highlights the need to prepare students to deal with the constant risks of error and illusion that can interfere with learning. At the same time, it reinforces the importance of developing the skill to think in a complex way — essential in a world characterized by diversity and interconnections. These interconnections, which are also present in the classroom environment, are conducive to the development of creativity when planning is based on UDL.

Creativity expands learning possibilities, opening paths to reinvent practices, explore new ways of teaching and learning, and face the challenges that arise along the way. According to La Torre (2012), creativity must begin with a surprising and open approach, since reducing it to a single criterion or test limits its dynamic and constantly changing essence. It is essential to cultivate environments that encourage creative expression, respect individuality and promote autonomy, creating spaces in which each person can flourish and contribute in a unique way to the educational process.

Therefore, as provided for in the guidelines and considerations of the UDL (Cast, 2018), education is not restricted to the acquisition and use of new technologies; it must encompass the understanding of the learning process itself, enabling students to become protagonists of their own education.

> Education should help move from developing to advanced learning: people who want to learn, who know how to do it strategically and who, from a highly flexible and personalized style of their own, are well prepared for lifelong learning (Sebastian-Heredero, 2020, p. 735).

Exploring learning paths and possibilities requires a close look at diversity, inclusion and innovation. Recognizing that there is no one-size-fits-all path is the first step towards building a more accessible and transformative education that values the potential of each individual in their learning journey. In this scenario, teachers are motivated to face the challenge of using creativity, especially when faced with situations that cause concerns about concrete actions.

4 Universal Design for Learning (UDL)

To understand the concept of UDL, it is essential to begin by explaining its principles, which are fundamental to building an inclusive educational environment (Meyer, Rose and Gordon, 2014). In this sense, UDL seeks to organize pedagogical practices that are accessible to all students, taking into account the diversity present in the classroom and ensuring that different forms of learning are considered (Raksa, Góes and Góes, 2024).

The first principle of UDL refers to engagement, which seeks to motivate students to actively engage in the learning process, addressing the why of learning. It is related to affective networks and focuses on the importance of emotionally engaging participants in the educational process. This aspect is crucial to creating an attractive and relevant learning environment, promoting continuous student involvement.

The second principle of UDL concerns access to information and knowledge, emphasizing the need to present content in different ways, that is, the what of learning. This principle is linked to recognition networks and addresses how content can be better understood and categorized, facilitating the recognition of information and its relationship with prior knowledge.

The third principle focuses on strategies for completing tasks, addressing the how of learning. This principle, centered on strategic networks, involves the application of different approaches to organize ideas and solve problems, promoting autonomy and critical thinking among students.

The integration of these three principles, from motivation to action, seeks to address the different ways of learning and ensure that all students can access knowledge in a meaningful way, respecting their needs and rhythms. Figure 1 illustrates the UDL guidelines, highlighting the means of access, construction and internalization as essential components for an inclusive learning process, adjusted to the needs of each student.

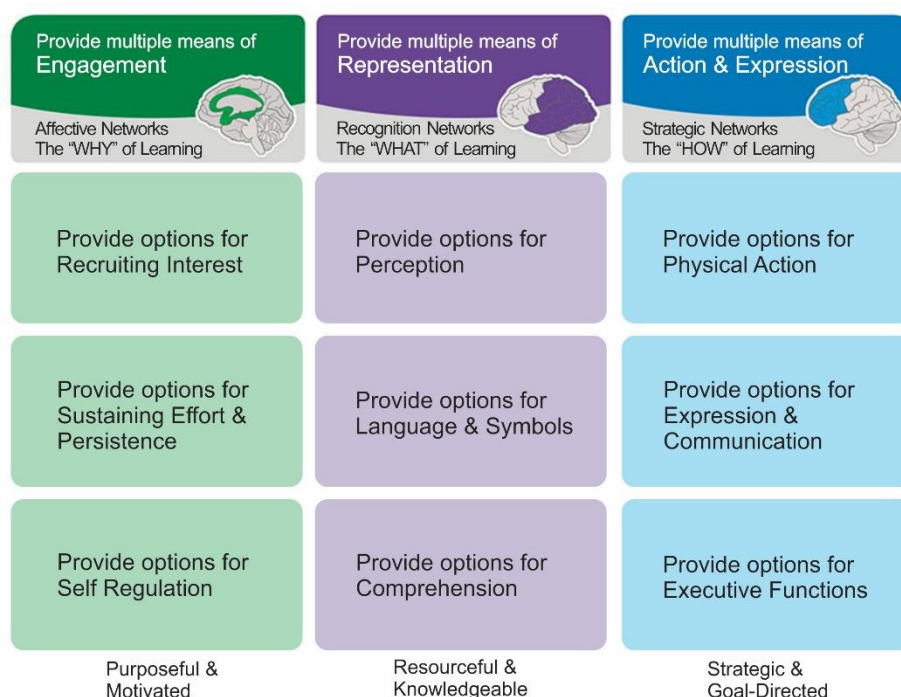| Provide multiple means of **Engagement**	Provide multiple means of **Representation**	Provide multiple means of **Action & Expression**
Affective Networks The "WHY" of Learning	Recognition Networks The "WHAT" of Learning	Strategic Networks The "HOW" of Learning
Provide options for Recruiting Interest	Provide options for Perception	Provide options for Physical Action
Provide options for Sustaining Effort & Persistence	Provide options for Language & Symbols	Provide options for Expression & Communication
Provide options for Self Regulation	Provide options for Comprehension	Provide options for Executive Functions
Purposeful & Motivated	Resourceful & Knowledgeable	Strategic & Goal-Directed

Figure 1: UDL principles and guidelines (CAST, 2021, adapted and translated by Coelho and Góes, 2021, p. 13)

The *Access* guideline refers to guidelines that seek to increase students' motivation and interest by offering different options for perception and physical action. *Construct* focuses on developing persistence, effort, language, and symbols, encouraging continuous learning.

Internalize aims to empower students for self-regulation and understanding, allowing them to apply knowledge independently (Coelho and Góes, 2021).

Sebastian-Heredero's (2020) statement highlights the idea that curriculum redesign should be a shared responsibility, with an emphasis on the needs of the curriculum itself, rather than on the limitations of students. By pointing out that many curricula still fail to meet individual differences, he questions the traditional view that students should conform to a rigid standard. The UDL model of curriculum organization, by prioritizing flexibility and personalization, proposes restructuring the curriculum so that it meets the needs of each student, and not the other way around. This approach reinforces the need for a curriculum that, from its conception, considers the cognitive, emotional, and cultural diversity of students.

Planning based on UDL means considering that organizational and curricular strategies are essential for the construction of meaningful learning, ranging from the planning and implementation of activities to the management of spaces, times, resources, and assessment (Sebastián-Heredero, 2018). In the context of an inclusive school, these strategies should directly impact teaching and learning, promoting learning to learn. This requires interventions that improve the educational processes of students who need support, strengthening their cognitive skills, personal growth and skills in teaching practice (Sebastián-Heredero, 2018).

To ensure that planning based on UDL is inclusive, it is essential to adopt a learning plan that considers the individual needs of students. The traditional lesson plan model, focused only on content, is limited to a smaller unit of the curriculum. The learning plan, on the other hand, must be based on an understanding of the characteristics of the class as a whole, prioritizing approaches that meet the diversity of learning methods, so that all students can access and effectively participate in the proposed activities.

UDL proposes a curricular organization that, when planned from the beginning, meets the different needs of students, eliminating the need for later adjustments (Sebastián-Heredero, 2020). This approach promotes varied options for accessing content, allowing each student to progress according to their own pace and needs, instead of assumptions about their level of learning.

In this sense, the teacher can develop varied activities, such as videos, texts, practical tasks and games, giving students the possibility of choosing the approach that is most aligned with their learning style. This favors a more comfortable and meaningful engagement with the content. In addition, it is essential to include moments of reflection and decision-making, in which participants can feel like protagonists of their learning journey, strengthening their autonomy and engagement.

Connecting the content with the personal interests of students, combined with the freedom to select approaches and activities, contributes significantly to increasing motivation and engagement. For this process to be truly effective, a continuous evaluation of pedagogical practice is essential, analyzing what worked well and adjusting the aspects that need improvement. With these strategies, it is possible to ensure that all students have equitable opportunities for learning and development.

In this context, it is essential to understand what UDL does not represent in order to delimit its application and pedagogical potential. Figure 2 illustrates essential aspects that do not characterize UDL, clarifying common misconceptions about this approach.

The first step in planning pedagogical practices based on UDL is to understand how each student learns, identifying the cognitive pathways they follow, the strategies they adopt, the motivational elements that drive their learning, and the types of activities that most interest them (Góes, Costa, and Góes, 2023). Thus, reflecting on UDL implies considering the

importance of pedagogical planning that is responsive and inclusive from the outset. This model proposes educational practices that encompass the greatest possible diversity of students, minimizing the need for subsequent adaptations. UDL represents an innovative paradigm for both teachers and students, requiring a new way of approaching teaching.

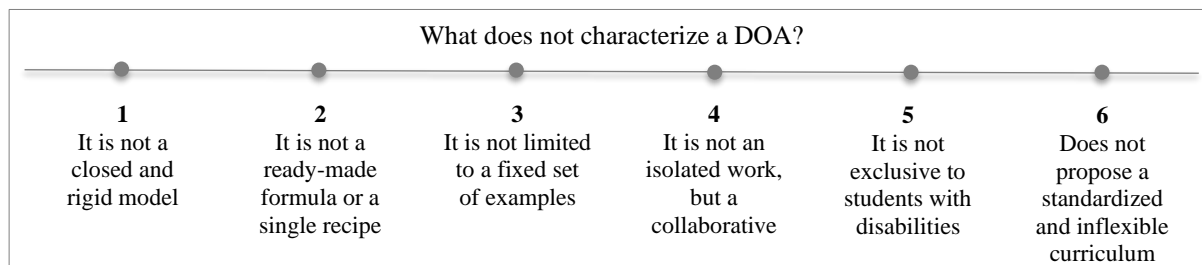| What does not characterize a DOA?					
1	**2**	**3**	**4**	**5**	**6**
It is not a closed and rigid model	It is not a ready-made formula or a single recipe	It is not limited to a fixed set of examples	It is not an isolated work, but a collaborative	It is not exclusive to students with disabilities	Does not propose a standardized and inflexible curriculum

Figure 2: Important aspects that do not characterize the DUA (Own elaboration, 2024)

By adopting universal practices for the classroom, UDL seeks to address different forms of learning, including not only auditory, visual, and kinesthetic styles, but also those who learn through touch (tactile), digital technology (digital), group interactions (social), or reflective and autonomous activities (intrapersonal). Furthermore, it considers learners who benefit from structured and logic-based approaches, as well as those who need emotional connections to engage meaningfully in the learning process. UDL confirms that each student is unique and that learning is not a homogeneous process, being influenced by several cognitive, affective and contextual factors.

In the context of Mathematics Education, UDL provides an opportunity to reformulate pedagogical practices, redesigning the curriculum and teaching strategies in order to facilitate the understanding of complex concepts by all students, regardless of their difficulties or potential (Góes, Costa and Góes, 2023). The use of multiple means of communication, such as visual, manipulative and technological resources, exemplifies how UDL can be implemented to ensure that all students can access, interact and demonstrate their learning.

5 Creative practices based on UDL in Mathematics classes

Mathematics teaching, often characterized by homogeneous and rigid methods, can be significantly transformed through the application of inclusive and creative practices when planning is based on UDL. Understanding creativity and the creative process as multifaceted phenomena, interconnected with students' cognitive, emotional and social capacities, is aligned with Morin's complex approach, which emphasizes the interaction and interdependence between the various aspects of reality (Góes, Muniz and Raksa, 2024).

From this perspective, creativity should not be devoid of content; just as the body and soul need food for spirituality, it needs to be constantly nourished. For La Torre (2008, p. 27), "creativity is not in the content, but in the attitude towards it", which implies that creativity refers more to the approach and manipulation of existing knowledge than to the invention of something completely new (Góes, Muniz and Raksa, 2024).

Thus, this study has a qualitative approach of the descriptive type, highlighting creativity in a pedagogical intervention based on the UDL. The theme and contents addressed are related to the Monetary System, developed from a recursive approach, with the objective of reviewing and deepening contents that were not fully understood by the students, especially after the low performance presented in the 2nd edition of the 2023 Curitiba Test, focused on the assessment in Mathematics. During the 8 hours/class, the students were challenged to apply different mathematical operations, such as addition, subtraction, multiplication and division, in the context of the monetary system.

Thus, a proposal for activities was structured based on the literature *Matemática até na*

sopa [Mathematics even in soup] (Sabia, 2020), which contextualized the monetary system by relating elements such as banknotes, gold, snails, salt, and pepper, exploring both forms of payment and the decimal numbering system. Throughout history, a fusion between reality and fiction was created to bring students closer to mathematical concepts in an engaging way.

To begin the class on the monetary system, students watched videos, illustrated in Figure 3, that showed the evolution of the Brazilian financial system since 1942. This visual approach facilitated understanding of the transformations over time. Next, students handled real-size bills (color photocopies) and original coins, providing a practical experience for recognizing money. The activity included a discussion on the differences in size between bills and coins, addressing the reasons and functions of these formats.

Figure 3: Presentation of content in multimedia (Research collection, 2023)

The lesson plan incorporated an inclusive perspective by discussing how blind people can identify bills and coins through tactile and auditory methods. The teacher explained the variations in size, texture, and relief on bills, emphasizing that wear and tear can affect these reliefs. In addition, techniques were presented that help blind people count coins based on their physical characteristics.

Next, students discussed the everyday uses of money, exploring when, where, and why it is used. The answers were recorded on a poster, illustrated in Figure 4, serving as a basis for later discussions. To enrich the learning, they used tablets to research curiosities about the monetary system, promoting dynamic interaction. Posters with drawings of bills and coins were displayed in the room, creating a visually stimulating environment and facilitating understanding of the monetary system.
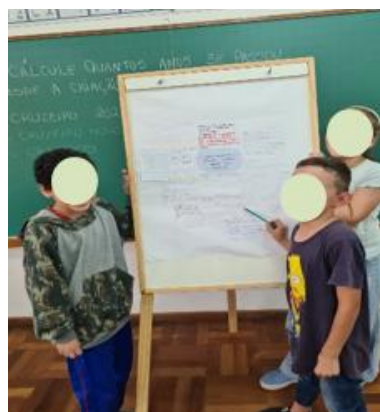

Figure 4: Research record regarding the use of money in everyday life (Research collection, 2023)

As part of the activity, students reflected on the animals depicted on Brazilian banknotes, establishing a connection with the country's fauna and flora. When asked about the images on the notes, such as the macaw on the R$ 10.00 note and the toucan on the R$ 50.00 note, the teacher took the opportunity to explain the concepts of fauna and flora. Fauna was defined as the set of animals from a region, while flora refers to local plants. During the discussion, examples of Brazilian biodiversity were presented, such as the jaguar, the maned wolf and the parrot, highlighting the uniqueness of these elements that make up the national identity (Figure 5).

Figure 5: Creation of a poster of banknotes and coins of the Brazilian
monetary system (Research collection, 2023)

According to Possamai and Allevato (2022), problem-solving activities play a significant role in the teaching and learning process of Mathematics. These practices have provided several benefits, including

> the development of creativity, critical thinking, and autonomy; increased confidence in mathematical learning; improvement in mathematical reading and writing; perception and understanding of the connections between different mathematical contents; and improvement/expansion of the learning of a specific mathematical content previously covered (Possamai and Allevato, 2022, p. 20).

La Torre (2006) states that by adopting a teaching and learning approach based on creativity, the teacher becomes better prepared to implement pedagogical practices that encourage students' independence and originality, allowing them to actively participate in the construction of knowledge.

Another activity involved a discussion about the importance of organizing a shopping list, highlighting how this planning contributes to conscious consumption and financial management (Figure 6).

Students were then asked to draw the route from their homes to the nearest supermarket, illustrating the paths they usually take, accompanied by adults. The route content addressed the identification and representation of landmarks along the route, such as streets, blocks and establishments, promoting spatial orientation and recognition of the surroundings (Figure 7). The drawings included significant landmarks, such as neighbors' houses, pharmacies and other places. Some of the students' accounts reinforce the relationship between mathematical learning

and the students' daily experiences, connecting school content to their reality.

Figure 6: Carrying out activities related to the shopping list and problem situations
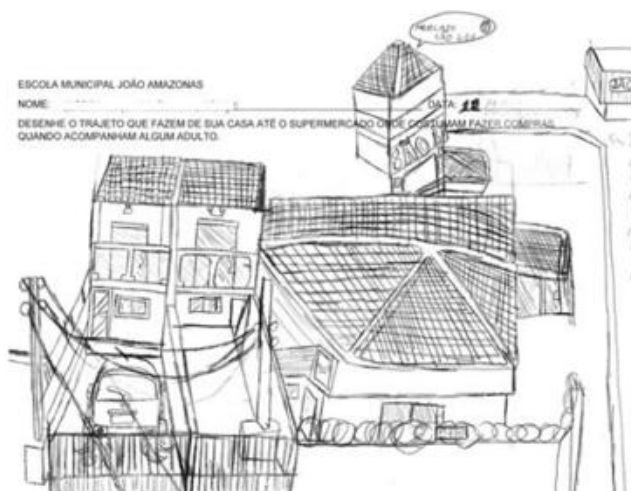(Research collection, 2023)

Figure 7: Construction of the graphic expression of the route to the supermarket (Research collection, 2023)

To provide a meaningful learning context, a practical activity was carried out using pamphlets and advertisements from local establishments. The students received real-size printed bills and real coins, which made it easier to identify and recognize monetary values. With these materials, they researched the prices of products they usually find at home and simulated a shopping experience, managing a previously defined budget (Figure 8).

The proposal involved the challenge of not exceeding the stipulated amount for purchases, encouraging planning and practical Mathematics. The challenge proposed to the students was: You have a budget of R$ _____ to make your purchases. The teacher's guidance was: *"Do not exceed the stipulated amount. Use the pamphlet provided to choose the items you want to buy. Then, calculate the total amount of the purchases and check if there is change. If there is money left over, record the remaining amount. Be strategic when making your choices, prioritizing essential products and respecting the available limit"*.

Figure 8: Process of making purchases and handling money (Research collection, 2023)

During the activity, students engaged in dynamic dialogues, sharing their strategies and reflections. Some expressed enthusiasm for the experience, highlighting the pleasure of experiencing the shopping process and handling money. There were also discussions about choices, such as promotions found in certain establishments and the concern about not spending on unnecessary products. At other times, questions arose about how to proceed in specific situations, such as the possibility of rounding up the values, which created an opportunity to reinforce the complexity of the exercise and the importance of respecting the stipulated budget.

This activity generated great engagement among the students, who shared their experiences and calculation strategies, promoting discussions about conscious consumption — a practical experience in financial management. The creativity of the students was evident in the various strategies adopted to solve the calculations. Some added up all the purchase amounts before subtracting them from the initial budget, while others preferred to subtract item by item, adjusting the remaining amount after each purchase. There were also those who chose to add the prices in pairs and subtract the total sequentially. These varied approaches demonstrated the creative use of mathematical concepts, adjusted to each student's preferences and style.

In addition to applying the four mathematical operations, the students also consciously reflected on consumption and the importance of planning when shopping. The task, which challenged and engaged the students, connected mathematical concepts to everyday situations, promoting active participation. The interaction was enriched by the critical analysis of pamphlets from different establishments, which stimulated debates about the economy and prices. To conclude this moment, the students shared with their classmates the amounts spent on their purchases, comparing the results with each other (Figure 9). This process generated discussions and dialogues about the purchases made by each one, in addition to reflecting on the discrepancies in the prices of the same products found in pamphlets from different establishments.

To conclude the content covered, a discussion group was held with the aim of consolidating the learning about sustainable consumption and its environmental implications. During the activity, students were encouraged to reflect on their choices when shopping, encouraging them to prioritize products with recyclable, reusable or biodegradable packaging, in addition to opting for simpler and more economical alternatives. The main objective was to highlight the importance of recycling and responsible consumption, encouraging critical reflection on the environmental impact of everyday purchasing decisions.

To further deepen the discussion, a survey was conducted using tablets, in which students were able to investigate the decomposition time of different types of packaging, such as plastic, glass, metal and paper (Figure 10). By discussing this information, students better understood the long-term effects of this packaging on the environment, which was essential for

building a more conscious thinking about the consequences of their daily choices.

Figure 9: Discussion and dialogue about student purchases (Research collection, 2023)

Figure 10: Research on packaging decomposition time (Research collection, 2023)

Based on the findings, problem situations were proposed that challenged students to apply mathematical calculations, such as the time it takes for plastic packaging to decompose or the savings generated by choosing more environmentally friendly alternatives. These activities promoted the development of mental calculation, in addition to encouraging logical reasoning and more conscious decision-making, closer to planetary awareness, based on Morin (2000).

In the end, the discussion circle proved to be an important space for students to reflect on how small choices can have major repercussions on the environment, reinforcing learning about sustainability and motivating them to adopt more responsible practices in their daily lives. The end of the activity was a moment of integration, in which everyone was able to share their ideas and discoveries, increasing awareness of the environmental impact of everyday actions.

6 Final considerations

The article addressed an experience with 5th grade Elementary School students in teaching Mathematics, using pedagogical practices planned based on UDL. The application of these practices provided a diversified approach, demonstrating how intentional planning can meet the needs of each student.

Although carried out in a specific context, this experience highlighted the potential of UDL to transform the classroom into an equitable learning environment. However, for UDL to

consolidate itself as an efficient and comprehensive approach, it is essential that it be incorporated into the school's general pedagogical plan, involving all disciplines and encouraging coordination among teachers.

The pedagogical practices guided students to become dedicated and motivated, resourceful and specialized, strategic and goal-oriented, reflecting a view of education as a dynamic and multidimensional process. Teacher planning based on UDL contributes significantly to overcoming the fragmentation of knowledge, promoting creative and integrative practices. By expanding their consciousness, students establish new relationships and interactions, both with the content and with other individuals.

It is clear that, from the perspective of complex thinking, the school is an essential instrument for the transformation of human consciousness. This perspective allows students to situate themselves in history, recognize themselves as subjects and understand the interconnections between their way of thinking, knowledge and the society in which they are inserted, becoming active agents in their educational process.

The pedagogical practice based on UDL enabled an approach capable of stimulating creativity in both teachers and students in Mathematics classes. Through dynamic and contextualized activities, such as the study of the monetary system, it was possible to engage them in a meaningful way, promoting problem-solving in an original way and aligned with their realities. The teacher's innovative approach, which diversified methods and resources, combined with the autonomy of students to explore and present their solutions, highlighted the relevance of UDL in creating an innovative environment.

This experience expanded access to mathematical knowledge, highlighting the importance of relating school content to everyday life, strengthening critical and collaborative skills, in addition to going beyond the conventional limits of Mathematics, awakening interest in contemporary and significant issues, such as sustainability and the environmental impacts of everyday choices.

In a context in which creativity is not restricted to areas such as science, technology and entertainment, its role in the school environment becomes equally fundamental. For this skill to fully develop, it is essential to provide challenges that involve students, teachers and the entire educational community. The continuous construction of an inclusive school that is accessible to all will only be possible if creativity is considered a transformative and essential element to achieve its educational goals.

Referências

CAST — CENTER FOR APPLIED SPECIAL TECHNOLOGY. *Universal Design for Learning Guidelines.* 2018.

COELHO, José Ricardo Dolenga; GÓES, Anderson Roges Teixeira. Geometria e Desenho Universal para Aprendizagem: uma revisão bibliográfica na Educação Matemática Inclusiva. *Educação Matemática Debate*, v. 5, n. 11, p. 1-26, 2021. https://doi.org/10.46551/emd.e202122

COSTA, Priscila Kabbaz Alves; GÓES, Anderson Roges Teixeira. A Educação Especial e Inclusiva. In: GÓES, Anderson Roges Teixeira; COSTA, Priscila Kabbaz Alves. (Org.) *Desenho Universal e Desenho Universal para Aprendizagem*: fundamentos, práticas e propostas para Educação Inclusiva. v. 1. São Carlos: Pedro & João Editores, 2022, p. 15-24.

GÓES, Anderson Roges Teixeira; COSTA, Priscila Kabbaz Alves. Do Desenho Universal ao Desenho Universal para Aprendizagem. In: GÓES, Anderson Roges Teixeira; COSTA, Priscila Kabbaz Alves. (Org.). *Desenho Universal e Desenho Universal para Aprendizagem*:

fundamentos, prática e propostas para Educação Inclusiva. v. 1. São Carlos: Pedro & João Editores, 2022, p. 25-33.

GÓES, Anderson Roges Teixeira; COSTA, Priscila Kabbaz Alves; GÓES, Heliza Colaço. Desenho Universal para Aprendizagem: a transformação necessária e urgente na Educação. In: GÓES, Anderson Roges Teixeira; COSTA, Priscila Kabbaz Alves. (Org.). *Desenho Universal e Desenho Universal para Aprendizagem*: fundamentos, práticas e propostas para Educação Inclusiva. v. 2. São Carlos: Pedro & João Editores, 2023, p. 23-30.

GÓES, Heliza Colaço; MUNIZ, Paula Fernanda Gomulski; RAKSA, Paula Regina. Criatividade: processo criativo interligado à capacidade cognitiva, emocional e social alinhado ao pensamento complexo de Morin. In: GUÉRIOS, Ettiène Cordeiro; GÓES, Heliza Colaço; GÓES, Anderson Roges Teixeira. (Org.). *Complexidade e formação de professores*: entrelaces interteóricos. São Carlos: Pedro & João Editores, 2024, p. 166-183.

LA TORRE, Saturnino. Avaliar a criatividade: um reto imaginativo. In: VALADEZ-SIERRA, María de los Dolores; BETANCOURT-MOREJÓN, Julián.; ZAVALA-BERBENA, María Alicia. (Coord*.) Alumnos superdotados y talentosos*: Identificación, evaluacion e intervencion. Una perspectiva para docentes. 2. ed. Ciudad de México: Editorial El Manual Moderno, 2012.

LA TORRE, Saturnino. *Criatividade Aplicada*: recursos para uma formação criativa. Tradução de Carmen Carballal. São Paulo: Madras, 2008.

LA TORRE, Saturnino. El diálogo analógico creativo: una estrategia de aprendizaje y evaluación integrador. *Revista Qurriculum*, n. 19, p 59-75, 2006.

MANTOAN, Maria Teresa Eglér. *Inclusão escolar*: O que é? Por quê? Como fazer? São Paulo: Summus, 2015.

MEYER, Anne; ROSE, David; GORDON, David. *Universal Design for Learning*: theory and practice. Lynnfield: Cast Incorporated, 2014.

MORIN, Edgar. *Os sete saberes necessários à educação do futuro*. Tradução de Catarina Eleonora Ferreira da Silva; Jeanne Sawaya. São Paulo: Cortez; Brasília: Unesco, 2000.

POSSAMAI, Janaína Poffo; ALLEVATO, Norma Suely Gomes. Elaboração/Formulação/Proposição de Problemas em Matemática: percepções a partir de pesquisas envolvendo práticas de ensino. *Educação Matemática Debate*, v. 6, n. 12, p. 1-28, 2022. https://doi.org/10.46551/emd.v6n12a01

RAKSA, Paula Regina; GÓES, Heliza Colaço; GÓES, Anderson Roges Teixeira. Da curiosidade à experiência na exploração matemática: o planejamento em resposta ao Desenho Universal para Aprendizagem. In: *Anais do 17° Encontro Paranaense da Educação Matemática*. Curitiba, 2024, p 1-14.

SABIA, Juan. *Matemática até na sopa*. Tradução de Mell Brites. São Paulo: Schwarcz, 2020.

SEBASTIÁN-HEREDERO, Eladio. Diretrizes para o Desenho Universal para a Aprendizagem (DUA). *Revista Brasileira Educação Especial*, v. 26, n. 4, p. 733-768, out./dez. 2020. https://doi.org/10.1590/1980-54702020v26e0155

SEBASTIÁN-HEREDERO, Eladio. Escola inclusiva: um novo olhar para o currículo de uma

escola para todos. *Revista Eletrônica da Educação,* v. 1, n. 1, p. 68-77, 2018.

SEBASTIÁN-HEREDERO, Eladio; MOREIRA, Samantha Ferreira da Costa; MOREIRA, Fernando Ricardo. Práticas educativas pautadas no Desenho Universal para Aprendizagem (DUA). *Revista Ibero-Americana de Estudos em Educação*, v. 17, n. 3, p. 1904-1925, jul./set. 2022. https://doi.org/10.21723/riaee.v17i3.17087

SEBASTIÁN-HEREDERO, Eladio; SENEDA, Elizete Varussa. Práticas educativas inclusivas: interface entre o gestor e o trabalho colaborativo no contexto de uma escola inclusiva. *Brazilian Journal of Development*, v. 5, n. 12, p. 31714-31722, 2019. https://doi.org/10.34117/bjdv5n12-259