

**Reading, interpretation and evaluation of three teachers on  
the indication of educational games in Mathematics  
curriculum materials**

**Leitura, interpretação e avaliação de três professoras  
sobre o indicativo de jogos em materiais curriculares de  
Matemática**

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**RESUMO**

O estudo relatado no artigo foi orientado pelo objetivo de *conhecer e analisar a leitura, interpretação e avaliação que professores fazem do indicativo de jogos em materiais curriculares de Matemática*. A produção de dados foi realizada com um grupo focal, com a participação de três professoras que discutiram textos de orientações de ensino e tarefas relacionadas ao indicativo de jogos em Manuais do Professor. As enunciações das participantes foram analisadas considerando a relação professor-materiais curriculares e as abordagens pedagógicas. Os resultados revelam que as professoras mobilizam conhecimentos ao ler, interpretar e avaliar os indicativos de jogos, apresentando suas perspectivas e reflexões sobre os papéis que estudantes e professores podem assumir nas aulas de Matemática. A participação no grupo focal pôde permitir às professoras (re)significarem os jogos como práticas pedagógicas que podem contribuir para promover processo de aprendizagem mais significativo para os estudantes.

**PALAVRAS-CHAVE:** Relação Professor-Currículo. Materiais Curriculares. Indicativo de Jogos. Abordagens Pedagógicas

**ABSTRACT**

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The study reported in the article was guided by the objective of *understanding and analyzing the reading, interpretation and evaluation that teachers make of the indication of games in Mathematics curriculum materials*. Data production was carried out with a focus group, with the participation of three teachers who discussed texts of teaching guidelines and tasks related to the indication of games in Teacher's Materials. The participants' statements were analyzed considering the relationship between teacher and curriculum materials and pedagogical approaches. The results reveal that teachers mobilize knowledge when reading, interpreting and evaluating the indications of games, presenting their perspectives and reflections on the roles that students and teachers can assume in Mathematics classes. Participation in the focus group may allow the teachers to (re)signify games as pedagogical practices that can contribute to promoting a more meaningful learning process for students.

**KEYWORDS:** Teacher-Curriculum Relationship. Curriculum Materials. Indicative Games. Pedagogical Approaches

### First considerations

Regarding the practices of teaching and learning Mathematics, in studies such as those by Linardi (1998), Grando (2000), and Smole, Diniz, and Cândido (2007), games are addressed as pedagogical resources that help students construct learning. These authors discuss the importance of games in Mathematics classes, highlighting their potential for teaching practices. To implement games in classes, teachers use various materials to evaluate and select both games and corresponding tasks, with curriculum materials being one of the tools considered.

Curriculum materials are the primary support tool for teachers and students, and they are the focus of research on their uses in curriculum development (Januario; Lima, 2021). The teacher-curriculum materials relationship involves the interaction between both agents in the process of planning and implementing lessons.

Teachers use materials to read and interpret teaching guidelines, evaluate and select tasks when planning their lessons, and put their plans into practice by reproducing, adapting, or improvising according to teaching objectives and student demands (Januario; Lima, 2021). This activity is indicative of games, which emerges from the purpose and the quest to diversify teaching approaches.

The inclusion of games in Mathematics curriculum materials, especially in the Teacher's Handbook, provides support and guidance on how to use games in class to engage students in the learning process. Teachers can find guidance on how to implement games, including learning objectives and suggestions for adaptation according to student skill levels. For students, games can help develop skills such as logical reasoning, problem-solving, and teamwork. According to Souza (2024), "materials influence the practice of teaching and learning, serving as (re)contextualizers of pedagogical practices" (p. 29).

Our understanding is that the inclusion of games in the materials contributes to this influence. Games aid students' learning process, promoting conceptual understanding and stimulating engagement, motivation, and the development of various skills. In this understanding, when citing the *Parâmetros Curriculares Nacionais de Matemática* [National Curriculum Standards — PCN], Grando (2000) considers that “games can contribute to the formation of attitudes — building a positive attitude towards mistakes, socialization (decisions made in groups), facing challenges, developing critical thinking, intuition, creating strategies, and basic psychological processes” (p. 5).

This reinforces the idea that games are not limited to entertainment, but also a pedagogical resource for exploring content and forming concepts, developing procedures, and developing attitudes.

Curriculum materials are considered one of the main resources that support teaching practices and teachers' plans, especially given the *Programa Nacional do Livro e do Material Didático* [National Book and Teaching Material Program — PNLD]. This program aims to ensure that all Basic Education students have access to classroom support materials that are appropriate to curricular guidelines and promote meaningful learning. The presence of these materials in teaching practices promotes curriculum implementation and also serves as a support for teachers in planning their lessons.

The objective of the study presented in this article<sup>3</sup> is *to understand and analyze teachers' reading, interpretation, and evaluation of the role of games in mathematics curricular materials. Next, we present the theoretical framework.* The following sections address methodological procedures, analysis, and considerations.

### **Pedagogical approaches**

When discussing the process of reading and interpreting teaching guidelines and evaluating tasks that teachers complete in Mathematics curriculum materials, we refer to the meanings and senses they attribute to these documents. Reading, in this context, goes beyond decoding words. For Remillard and Kim (2020), teachers seek to understand the guidelines that guide their practices, the learning objectives, and the students' expectations, adjusting their teaching strategies to the educational objectives.

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<sup>3</sup> This article is part of the master's dissertation of the first author (Durães, 2025), developed in the Research Group Curriculum in Mathematics Education — GPCEEM, defended in the Postgraduate Program in Education at the State University of Montes Claros, Brazil, organized in multipaper format.

After reading, teachers interpret the information in the curriculum materials and design adaptations as they envision the implementation of the proposed tasks. This is followed by evaluation, in which they examine the tasks, considering various aspects, guided by the purpose of creating opportunities for students to construct the expected learning.

Pedagogical approaches include explicit or implicit messages about how students should interact with Mathematics, as well as with the teacher, the curriculum materials, and pedagogical resources that support teaching, such as games. Such approaches involve, among other elements, the types of content, the organization of students, the roles of students and teachers, and the source of knowledge.

Zabala (1998) proposes a typology for content: conceptual, procedural, and attitudinal. *Conceptual* content involves the exploration and formation of concepts; *procedural* content involves the mobilization of strategies and techniques for solving tasks; and *attitudinal* content involves the development of values, norms, and principles.

In teaching practices, student organization can be collective, in pairs, or individually, fostering communication, collaboration, and the exchange of experiences. Depending on the role assigned, students, according to Remillard and Kim (2020), are seen as active agents. Brousseau (1996) emphasizes that they are not mere receivers, but collaborators who bring their perspectives to the educational environment. In games, this approach is expanded, potentially promoting active participation and collaborative learning.

Remillard and Kim (2020) emphasize that the teacher's role involves organizing discussions that enable students to access mathematical ideas; and sequencing tasks that encourage autonomy. Games can promote a meaningful learning process, enabling students to be the authors of this process.

The role of the teacher, according to Brousseau (1996) and Remillard and Kim (2020), goes beyond the transmission of knowledge. Depending on the role envisioned in teaching orientation, the teacher can be a facilitator, creating and managing didactic situations to promote reflection and knowledge construction. They need to identify students' difficulties and guide them in solving tasks, fostering a collaborative learning environment. Brousseau (1996), when introducing the notion of didactic situation, which refers to the context in which teaching and learning occur, argues that the teacher's role is to create and manage these situations in order to promote reflection and knowledge construction by students.

Both Brousseau (1996) and Remillard and Kim (2020), as well as Barbosa and Lopes (2020) and Bueno, Alencar, and Oviedo (2017), emphasize that teachers need to encourage active participation, encourage discussion, and allow students to develop their own strategies. Teachers can play different roles, such as transmitter, reproducer, facilitator, or coordinator, depending on the context of the class.

As *transmitters*, teachers convey what they know as they lead the class; they present procedures; they explain ideas and concepts; and they provide answers. As *reproducers*, they guide the class by reiterating information, procedures, and answers contained in the reference materials consulted. As *facilitators*, teachers engage students in correction and discussion, asking questions or requesting explanations, and facilitating their interaction with each other and with the task and underlying content. However, they also intervene with students and present procedures, explain ideas/concepts, and provide answers. As *coordinators*, teachers encourage student participation to communicate their solutions and explain their strategies and understandings; they create opportunities for students to establish relationships, perceive properties or characteristics, and make discoveries; they allow students to analyze and discuss other students' strategies; and they make specific interventions.

Teachers also create an inclusive and participatory environment by using games to encourage social interaction and mutual learning. Diversity in tasks can stimulate student engagement, which contributes to skill development. The choice of pedagogical resources, such as games, must align with the learning objectives, promoting a dynamic and meaningful educational experience.

Remillard and Kim (2020) emphasize that the choice of knowledge sources is crucial for meaningful learning. This source can include the teacher, students, or curriculum materials, and must align with the learning objectives and consider classroom diversity. Games offer a practical and interactive approach, facilitating the understanding of complex concepts.

As a source of knowledge, teachers transmit knowledge, determine the task, and validate its correctness, and may assume the roles of transmitters or facilitators. Students, as sources of knowledge, generate knowledge, reason, arrive at discoveries, and make connections with the planned content; they may assume roles as describers or arguers. When the source is in the curriculum material, the knowledge, resolution strategies and correct answers are determined by the curriculum development support material.

In summary, the pedagogical approaches discussed reveal that the teacher's role goes beyond imparting knowledge, involving the creation of a dynamic and inclusive environment in which students can take an active role in constructing their learning. The selection of curricular materials, the use of games, and the diversification of teaching strategies play a central role in promoting student interaction and autonomy. Teachers, as facilitators and coordinators, need to create opportunities for students to explore, discuss, and develop concepts, enabling a meaningful and collaborative educational experience.

### **Methodological scenario**

The objective and intent of the study presented here enable analysis and reflection on the use of games in curriculum materials and the reading, interpretation, and evaluation processes carried out by Middle School Mathematics teachers. This objective led to a case study, which allowed for an analysis of the teachers' enunciations regarding teaching approaches to games in Mathematics classes. Gil (2002) considers a case study to be a research procedure that aims to investigate a phenomenon within a context, allowing for its detailed and contextualized understanding.

To collect data, we used the focus group interview technique. To form the group, we invited Middle School Mathematics teachers from municipal and state schools in the city of Coração de Jesus. Some teachers accepted the invitation; however, when scheduling the meetings, they declined to participate. Therefore, further invitations were extended to other teachers, resulting in three acceptances. The participants were: Dolaci, 47, with 28 years of teaching experience in the city of Coração de Jesus; Dolanei, 56, with three years of teaching experience in the city of Brasília de Minas; and Doladei, 38, with 15 years of teaching experience in the city of São João do Pacuí. The three teachers have teaching experience in Middle and High School in cities in Minas Gerais, Brazil.

Upon the teachers' acceptance, they were provided with the Informed Consent Form and 22 game guidelines for prior reading. The guidelines were previously selected from the Teacher's Manuals of five collections of curriculum materials<sup>4</sup>.

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<sup>4</sup> The *Conquista Matemática* [Mathematical Conquest], by José Rui Giovanni Júnior, published by FTD; *Amplitude Matemática* [Mathematical Amplitude], by José Roberto Bonjorno, Regina Azenha Bonjorno, Ayrton Olivares, and Marcinho Mercês Brito, published by Editora do Brasil; *Teláris Essencial: Matemática* [Essential Teláris: Mathematics], by Luiz Roberto Dante and Fernando Viana, published by Ática; and *Geração Alpha Matemática* [Alpha Math Generation], by Carlos Nely Clementino de Oliveira and Felipe Fugita, published by SM Educação. The four collections were published in 2022 and were evaluated and distributed by the *Programa Nacional do Livro e do*

Subsequently, meetings were scheduled, totaling six, held between August 5th and 23rd, 2024, with an average duration of 1 hour and 30 minutes each. All meetings were held remotely due to the teachers' unavailability to attend in person; they were also recorded, and the enunciations were transcribed and translated into text.

Scripts were developed for each meeting. The first meeting included a presentation of the study proposal, the group's purposes, and the development of the agenda for subsequent meetings. We discussed the teachers' reflections on games, their strengths and weaknesses, and the guidelines in curriculum materials. The second meeting discussed the content approach and its indicators, considering the materials previously provided to the teachers. The third meeting focused on student organization, how they appear in the guidelines, and their reflections. The fourth meeting focused on the role of students related to the guidelines. Similarly, the fifth meeting focused on the role of teachers. The sixth and final meeting discussed the source of knowledge in pedagogical approaches.

It is important to note that, in the fifth and sixth meetings, one teacher was unable to participate at the previously agreed-upon date and time, citing a meeting at the school where she taught. To avoid impacting data collection, we chose to conduct the interview in person and also via WhatsApp.

## **Analysis**

Based on the data production during the group meetings, the textualizations were carefully read to identify similarities in the three teachers' enunciations. Consequently, the teachers' enunciations were organized into four categories: *content approach*; *student organization*; *student and teacher roles*; and *source of knowledge*. Classification into categories allowed us to identify excerpts from the enunciations that express the teachers' perceptions regarding the use of games in curriculum materials, particularly in Teacher's Manuals. This explains how they read, interpreted, and evaluated these enunciations, as we will now present.

## **Content approach**

Grando (2000) believes that games, as pedagogical resources in Mathematics classes, can play a fundamental role in the teaching and learning processes, facilitating concept formation, a fact also emphasized by the teachers participating in the study.

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*Material Didático* [National Book and Teaching Material Program — PNLD]. An analysis of the game indicators in these collections is in Durães (2025).

In their enunciations, Dolaci and Doladei present similar opinions regarding students' concept formation through games. The teachers mention that, for such development to occur, students need to be encouraged by rewards, through competitions, which will imply the participation of most of them. Dolanei, in turn, adds to this by citing points. For her, even with points awarded, competitions, and prizes, students end up not participating when using games: *“If there are no prizes, it doesn't work either. There's no point in giving points. They don't care about points”*.

All three teachers emphasized the possibility of students forming concepts through games. Grando (2000) argues that using games can help systematize knowledge. Teacher Dolaci seems to corroborate this idea by stating that, in the trail game<sup>5</sup>, *“concept formation can occur”*. She adds that the game is effective for reinforcing previously taught content, *“it's good for recording”*, further stating that she uses it to systematize what has already been worked on theoretically. Similarly, Doladei also mentions the trail game and confirms that it aids in concept formation: *“It's good. I think they can record with this little game. They can record”*.

Still mentioning the trail game, the teachers mentioned some concepts formed, such as positive and negative, distance, and modulus. Doladei and Dolanei emphasized that, for their students, there would be some adaptations of this game, incorporating racing or something outside the classroom. According to Smole, Diniz, and Cândido (2007), the use of games is a pedagogical support that can promote the development of mathematical skills, especially when well-directed. In this sense, the teachers mentioned that the trail game helps students consolidate concepts and consider skill development.

Regarding the discussions about the students' strategies, algorithms, or problem-solving techniques, the teachers discussed the motivating approach, providing examples from the school environment and highlighting the importance of some incentive, such as prizes, points, dividing the class into teams, as well as clearly highlighting the objective.

*Kids these days don't worry about recording content anymore. They'll play, they'll play, they'll do things, but if there isn't something more playful, more dynamic, they won't take it very seriously. (Teacher Dolaci's enunciation)*

*When the objective and explanation are well conveyed to them, they can do it. But strategies, algorithms, or resolution techniques? Resolution techniques. Algorithms are too difficult for them. (Teacher Doladei's enunciation)*

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<sup>5</sup> Indicated in the 6th grad volume of the *Teláris: Essencial* material.

Doladei cited the care taken with the game implementation. For her, *“you have to be very careful with this approach to games”*. Doladei spoke about student concentration, the importance of them understanding that it's not just a game, and of using a sequence, meaning continuity: *“get them to focus, get them to realize that it's not just a game. There has to be a sequence of learning, of resourcefulness”*.

When asked whether games enable the expression or development of values, norms, or principles, the three teachers emphasized the need to divide classes into teams or groups, as most classes have many students. They believe this is the only way to achieve meaningful class participation. The teachers cited respect for rules, orders, and commands, highlighting that disrespect makes it impossible to achieve the proposed objectives or leads to punishment. From this reference, we infer that these are attitudinal contents, discussed by Zabala (1998) as the formation of attitudes and values in relation to the information received, aiming at student intervention in their reality. Dolaci emphasized the importance of presenting objectives clearly, stating that *“if the objective is not defined for them, and in clearly explained language, they will not understand”*. She also commented that it is difficult for students to mobilize algorithms through games alone.

The teachers emphasized prioritizing a conceptual approach to content, emphasizing the prior introduction to theory so that students can develop concepts through exploring games.

Throughout the group discussions, the teachers expressed their enjoyment of working with games. However, they commented that the games presented in textbooks, when recommended, most need to be adapted to the students' needs. This highlights the participating teachers' perception that students are unable to complete the tasks on their own due to their socioeconomic conditions. They believe that, although the games are interesting, the books are generally designed for students with well-developed reading skills and family support, which contrasts with the reality faced in the schools where they work or in those where colleagues report similar perceptions.

### **Student organization**

When commenting on the plays and corresponding task resolutions, teacher Doladei stated that *“Never give them a game without first explaining the rules, because otherwise it won't be effective”*. When discussing pedagogical approaches, Remillard and Kim (2020) state that the teacher plays an important role in explaining

the task and its purpose, which can ensure that students understand the information and apply what they know to solve the problems. Doladei, in her enunciation, demonstrates a similar mindset.

Regarding student organization, teacher Dolaci stated that she identified different organization patterns in the instructions, *“so, some are in pairs, others in teams. Each game has its own structure”*. She cited the trail game as an example, mentioning the organization in pairs. Dolaci added that the game in question can be played like a championship, with one pair against another. Doladei and Dolaci highlighted the issue of management, which is necessary when using games. This, in turn, includes timing, moves, and even proposed objectives. Doladei shares that *“this combination of skills makes games a powerful tool”*. Dolanei, in turn, emphasized that *“although I don't practice, I haven't done it. But I believe it's powerful for learning”*.

Dolanei doesn't use games in her classes, which limits her practical experience with this approach. She recognizes the potential of such resources for learning, although she hasn't implemented this strategy in her teaching practices.

Regarding individual organization, Doladei spoke about Sudoku: *“These individual games are even easier”*. The three teachers cited bingo as an example of this type of organization. They report positive experiences implementing it in their classes, adding that, when choosing whether bingo will be played on a full or diagonal card, some students may have difficulty understanding, for example, what a diagonal is.

Overall, the three teachers emphasized the importance of student organization, mentioning that there are few games offered for students to play alone. They believe most games are designed to be played in pairs or groups, mentioning computer games, which are generally played individually. According to Brousseau (1996), individual student organization is complex and depends on the epistemological conflict generated by encountering challenging problems, which forces students to review and reorganize their own thinking and problem-solving strategies. This organization values the active role of students in learning, emphasizing that each student organizes their own strategies and ways of reasoning, often different from the teachers' plans, requiring teaching that considers these individual variations.

The teachers noted that, by reading the selected guidelines, they were able to identify three types of student organization. They believe that adaptations are sometimes necessary depending on the availability and materials for creating the

games and the class size, emphasizing that motivation is essential for student participation, as are planning and organization.

The discussion among the teachers highlights the importance of organizing students in learning, demonstrating that multiple work styles enhances the educational experience. Adapting teaching practices to students' needs is important to foster a collaborative and dynamic environment.

### **Role of students and teachers**

In the school environment, interaction between students and teachers plays an important role in the teaching and learning processes. One example is environments that utilize playful and collaborative approaches. For Remillard and Kim (2020), the teacher's task is to create a classroom environment in which students model, explain, or discuss strategies as a community.

By exploring nuances regarding the roles of students and teachers, based on the three participants' reading and interpretation of the selected game guidelines, we sought to understand how these roles are signified. Dolaci and Doladei discussed the roles students can assume in mathematics classes, particularly those that use games as a resource.

*Well, from what I've noticed, they have predefined roles; however, they can change throughout the game. They can have different perspectives on the game and be more inquisitive or offer a strategy for solving it. It depends on what I require of them at the time. (Teacher Dolaci's enunciation)*

*They can be an inquisitive one or they can think about what they can do. They can describe what they did to their teammate. Something like that. They can really assimilate the play, the things, and have a strategy, develop a strategy. With each game, the player gets to know the game's characteristics and develops skills as well. (Teacher Doladei's enunciation)*

When asked whether games contribute to student learning, teachers commented that, when they finish implementing a given game, they conduct a questionnaire with students, in which they report what they did during the game; and systematically, they share what they learned. In some cases, according to Remillard and Kim (2020), concepts can be previously taught and developed; in others, they can be reviewed and practiced. For the authors, it is in teaching practices like these that teacher-student interactions reveal the roles they can assume.

*It helps because when we do... Because usually at the end of the game, we do a quiz, we write a report. It depends on what the game offers. So, when we do this report, when we answer this quiz, they*

*end up including what they did during the game, they automatically include what they learned. (Teacher Dolaci's enunciation)*

*Without us asking too many questions, they can describe what they did. So, like that, I usually ask, "What did you do to win? What was your strategy?" I don't use those words, because we use the smallest details as a basis. But, like, what did they do to win? So, they'll usually describe the strategy they used. And then, I already draw the hook from what they learned. According to the theory we're exploring. So, that makes our work much easier. (Teacher Doladei's enunciation)*

In their enunciations, Dolaci and Doladei express the perception of students' roles in game indicators, highlighting the role of descriptor through a process of stimulating reflection on actions performed while playing. Remillard and Kim (2020) argue that the roles assigned to teachers and students in the Teacher's Manual appear to moderate task performance, and the indicators can range from telling to showing, guiding, facilitating, orchestrating, and retreating. In the two previous enunciations, we can perceive the indicator *orchestrating* as referring to stimulating. Analysis of the following two enunciations shows that the roles are not isolated; students can assume different interactions within the same teaching practice:

*Each game has a strategy, right? Some will just respond, others will describe what they did. And others will argue. (Teacher Dolaci's enunciation)*

*I think that in games, we can... We can... Respond... Here, the student responds, describes, and argues, you know? Because when you... Any... These games. When you tell them about... Or about them making a comment... Some will respond, right? More easily. Others will describe their play and everything. (Teacher Doladei's enunciation)*

*I think that in games, we can promote different forms of interaction. Students can respond, describe, and argue. For example, when you present a game, some students will respond more easily, while others will describe their play. This allows each student to express themselves according to their understanding and experience. (Teacher Doladei's enunciation)*

When beginning their reflections on the different roles of teachers, the teachers discussed the importance of explaining the rules before starting the games. They believe that many students have difficulty understanding the rules.

*When you implement a game in the classroom, the first thing you have to show them before handing out the games is the rules. Because today's students are struggling with rules, right? But then you have to be prepared for a student who doesn't understand the game. So, you have to explain it again. (Teacher Dolaci's enunciation)*

*Never give them a game without first explaining the rules, because otherwise it won't be effective. (Teacher Doladei's enunciation)*

To illustrate different interactions teachers have when implementing a given game, they mention the importance of knowing how to manage time efficiently, achieving the objectives proposed with the game and its moves:

*I think... In this case, I think it's essential, right? For management. Time, right? Of the game, that students need to be efficient, their moves, right? I think that's it to achieve the proposed objectives. This combination of skills makes games a powerful tool, right. (Teacher Dolaci's enunciation)*

*I only use bingo, so I can't even talk about that. I can talk about that one. Because bingo is too practical, right? It's too practical. And bingo, I like to work with bingo like this, for example, let's just mark the diagonal cards, you know? I do it like this with them. (Teacher Dolane's enunciation)*

The teachers commented on the presence of different roles they can assume; among them, that of transmitter, facilitator, reproducer, or coordinator. They also observed all of these, or some of them, in the instructions. In the following enunciations, when commenting on student organization, there is evidence that teachers assume autonomy in organizing teaching practices, considering their daily experiences with the class. This autonomy is associated with the role of facilitator.

*Yes. It has to be. It has to be organized. It has to be organized. Because some games are played... There are few games that are played individually. Most of the games I use are paired. Now, only when it comes to computer games, which we can play individually, like sudoku, I have a lot of difficulty with sudoku. Because depending... Some are very difficult, right? And they can't do it. And they also don't have the patience. If the game... If 10 minutes go by, they see that the game isn't working, then it gets messed up, you know? It seems to demotivate them. Most are played in pairs, either in pairs or individually. We can form teams and alternate like a tournament. The loser leaves, the winner is the one who stays, and everyone participates. And then the winner of each team goes to the final. I think the best way to work on games is to form teams. Because then the kids have that feeling of one team against another, and they'll be more motivated to play. I think a team is better. (Teacher Dolaci's enunciation)*

*So, I prefer to work in groups. A maximum of four people. I don't put more than that, no. And I try to form groups like this... I like to form the teams myself, so we pair one with a better reading ability with another with more difficulty. I always like to mix my groups. I don't like to form them myself. The organization... I think like this. There's no point in having the material all nice and separate the groups if you don't have a plan, a script. You have to have a script. You have to follow the entire script. If you skip rules or skip something, the game has an effect. Not for you, not for the students. Because, in truth, we*

*want them, at least, to have better logical reasoning. I think games are more for that. You have to show your students that you have organization. If you don't show it to them, they'll start off unmotivated. (Teacher Doladei's enunciation)*

*So, I think like this. Organization must be based on planning. It's no use having all the material nice and organized if you don't have a plan. And you have to know how. You use each game differently. For example, some games are better for groups. So, I think it depends on what you're going to apply. Sometimes, in a group, the same effect won't be achieved for each pair. But in groups, so far, for me, in a group, everyone performs better. The final result must be evaluated based on the decisions made throughout the game. (Teacher Dolaneis's enunciation).*

The teachers' reflections highlight the importance of organization and planning when using games in classroom pedagogical practices. To achieve these objectives, it is essential that they assume different roles to stimulate and motivate student participation. The combination of a well-planned structure with a flexible approach to games can result in more meaningful and engaging learning experiences, contributing to student learning. As Brown (2009) discusses, curricular resources tend to represent complex and multifaceted ideas succinctly. Teachers need to read and interpret a variety of curricular resource components and determine their meanings and implications for the teaching context (Souza, 2024). Engaging in this type of analysis requires substantial skill on the part of teachers. Brown (2009) introduced the term pedagogical design capability to refer to a teacher's ability to perceive and mobilize curriculum resources to “*create teaching episodes*” (p. 29).

### **Source of knowledge**

Considering the dimensions of analysis and their indicators, the source of knowledge was discussed in the last focus group meeting. Through the interpretations and reflections of the three teachers on the game indicators, it was possible to observe that they identified this source in the students, the teachers, and the curriculum material. The teachers began their reflections by citing examples of the indicators, emphasizing the type of knowledge involved:

*There's this Tower of Hanoi, which involves a lot of strategy. But it's strategy and logic. But I think it is. It's more strategy and logic. Strategy, logic, logical reasoning, ordering, coordination. Orientation of the dots too. It has a little bit of geometry, a lot of logic too. I think geometry predominated more. This game of three hundred, which has statistics, has tiles that involve a bit of geometry, and also involves notable products. Let me see what else. Of what's left... Of divisibility? It's really what's left, which is divisibility. Sudoku. It requires a lot of strategy, a lot... You have to observe very carefully.*

*Let me see which one. The one with circles... It also involves whole numbers, percentages. I think that's it. (Teacher Dolaci's enunciation)*

*It's the tiles, the cube... It also involves articulation. Yeah. Bingo. Which involves numbers. The orders. I think that's it. There's the dominoes of polygons. There's geometry. But it works. As you get the hang of it, you can clearly identify which theory is involved. (Teacher Doladei's enunciation)*

When evaluating the game recommendations, the teachers agreed that both teachers, students, and the curriculum materials act as sources of knowledge. Teacher Dolaci emphasized that she uses the textbook first for any theory, emphasizing that the theory contained in the textbook is fundamental to implementing games in the classroom. We infer that the teacher mentions theory in the sense of the conceptual approach. She argued that, when planning a lesson, the teacher should base it on the theoretical part of the textbook that introduces the game, which makes this connection explicit. Dolaci also emphasized the importance of students having access to this theory, stating that “*you have to be able to analyze this theory there as well*”. Thus, the interaction between students' prior knowledge, the teacher's guidance, and the conceptual approach of the curriculum material proves essential to the learning process.

*Thus, you can see that the student will bring their prior knowledge... to everything. There's no escaping this. The teacher is a source of information for that game to work. Therefore, the student will need the teacher's source of information as well. But the textbook also includes theory. We see that the game is linked to theory. In all cases, it must be linked to theory. I think the teacher has it, it predominates because of the guidance they already have beforehand, and they've already done the studies. But the student, the student, has some knowledge. But I already think the book is predominant. Because the guidance in the book precedes the teacher's guidance. Because the teacher is the one who will decide how to approach that game and, also, will determine what needs to be adapted. I think it's explicit, because like the game, it's there in the middle of that lesson development, I think the book ends up being — you use it first for any theory. Because when the teacher plans that lesson, whether or not to use that game, they have to base their theory on the book that introduced the game. So, I think it's explicit. And it has to be there for the student, too. And they have to have it at hand. They have to be able to analyze that theory as well. Those who read. Because most... That's it. I think it's clear. (Teacher Dolaci's enunciation)*

*I also think it's clear, because, like, for example, there's a first-degree equation, and the games are already there, so we already know it's going to be a first-degree equation. So, it's already well explained. And understanding becomes easier. (Teacher Doladei's enunciation)*

Remillard and Kim (2020) argue that recognizing the affordances of designed curriculum resources, a key component of pedagogical design capability, involves identifying the underlying mathematical purpose or point of mathematical teaching objects, considering the rationale behind recommended pedagogical actions, and mapping the learning pathways underlying curricular sequences. When teachers recognize these affordances, even when not explicitly stated, they are better positioned to use them when planning teaching practices.

Mathematics teaching practices that utilize games and playful strategies can facilitate concept formation and the understanding of complex procedures. In the focus group meetings, the teachers' enunciations highlighted their experience with games such as Sudoku and the implementation of tasks related to operations with integers, emphasizing the importance of practical tips to help students. Teachers act as facilitators of the learning process, fostering an environment that allows students to develop skills.

*Students struggle with Sudoku and integer operations, but strategic tips, such as identifying repeating numbers and using colored tokens to represent positive and negative numbers, help with comprehension. Practice with games, such as the Tower of Hanoi and cards, allows students to develop their own strategies, while the teacher acts as a facilitator, introducing theoretical concepts before applying the games to systematize learning. (Teacher Dolaci's enunciation)*

The teachers' enunciations reveal the reflective and adaptive use of mathematical games as part of the educational process, highlighting both the importance of curriculum materials and playful practices. As teacher Dolaci mentioned, *“most of them use books as their source of knowledge, right? [...] because they precede the teacher's”*, emphasizing the importance of the conceptual approach in the materials to support teaching practices. However, there is room for more inferential practices, such as the dot game and the Tower of Hanoi, which, according to Dolaci, *“really focuses on logic”*, prioritizing logical reasoning skills.

Teacher Dolaci also emphasized that the most effective games are introduced *“more in the middle, at the end”* of the content, because this way *“the result [...] is better”*, suggesting that they work best to systematize concepts already covered. This practice of innovation and adaptation is a constant in school routines, often involving *“improvising with scrap materials, with whatever we can find”*, demonstrating the need to address structural challenges and strive to provide the best possible learning experience for students.

Educational games are not only learning tools, but also educational resources that, when integrated strategically and creatively, enhance student engagement and understanding, even when faced with the challenges of daily teaching.

### **Considerations**

With the goal of understanding and analyzing teachers' reading, interpretation, and evaluation of game-related content in mathematics curriculum materials, the study reported in this article sought to understand how three elementary school mathematics teachers read, interpret, and evaluate the game-related content incorporated into five collections of curriculum materials, particularly the introductory section of each volume of the Teacher's Manuals and the reproduced pages of the Student's Book, including the guidelines for implementing the games and corresponding tasks.

The focus group discussions with teachers Dolanei, Dolaci, and Doladei revealed different perceptions regarding the use of games in curriculum materials as pedagogical resources, in addition to highlighting aspects of their experiences implementing teaching practices with games.

According to Dolaci and Doladei, it is possible to promote concept formation during playful tasks with the support of games. During their participation in the focus group meetings, they emphasized that games are effective in reinforcing previously studied content, suggesting that their use can be implemented as a complement to exercise-type tasks, which can enable concept formation and generally reinforce procedural content.

We emphasize that, during the meetings, teacher Dolaci contributed the most with her enunciations, expressing reflections and insights on student organization, student-teacher interactions, and the source of knowledge. Teacher Doladei also contributed, although in some meetings, it was noticeable from her enunciations that she had not read the material provided in advance. This may be explained by her work routine, which implies little time to dedicate to reading. Teacher Doladei was not very participatory; She often mentioned that she didn't use games in her math classes, which limited her involvement in discussions. She frequently expressed insecurity regarding the implementation of playful tasks, claiming that her teaching practice was more focused on traditional teaching strategies. This attitude can be attributed to a lack of familiarity with games as pedagogical resources and the

perception that such resources don't align with the teaching approach she typically adopts in her classes.

Dolanei's participation, though tentative, highlighted the importance of considering teachers' experiences and perceptions regarding the use of games in Mathematics Education practices. His perspective highlights the need for ongoing training and support so that teachers feel more confident integrating other approaches into their practices, enabling the creation of a more dynamic and engaging learning environment for students. In this regard, it's worth reflecting that ongoing training alone is not enough. We know that teachers' working conditions and professional development are relevant issues that need to be addressed.

Dolanei, Dolaci, and Doladei demonstrated greater familiarity and comfort when interacting with the Teacher's Manuals; they recognized the potential of games for developing mathematical concepts and emphasized the importance of adapting the assigned tasks to their students' realities. They expressed a clear understanding of how games can facilitate learning, promoting content retention and knowledge construction. The reading and interpretation of excerpts from the Teacher's Manuals reflect a more critical and reflective approach, in which the guidelines are seen as opportunities to enrich their pedagogical practices.

Furthermore, Dolanei, Dolaci, and Doladei highlighted the need for incentives, such as prizes and competitions, to engage students in playful tasks using games. This perception suggests that they not only understand the meaning of mathematical content but also recognize the importance of creating a motivating environment that fosters active student participation, with competition being a strategy for such motivation.

The study highlights the need for an ongoing dialogue between theory and practice, promoting critical reflection on the use of games in Mathematics Education practices. In short, it contributes to understanding how teachers perceive and use games in their practices, converging on the importance of pedagogical support that fosters innovation and adaptation of teaching strategies, aiming for more meaningful and contextualized learning for students.

The study highlights the importance of curriculum materials that not only include games but also provide clear guidelines for their implementation in the classroom, demonstrating that the effectiveness of these resources depends on a strong teacher-curriculum relationship. Analysis of teachers' enunciations about game guidelines suggests that, to engage students and facilitate the construction of

mathematical knowledge, it is essential to improve teacher training and revise curriculum materials, aiming to create a more dynamic and inclusive learning environment that meets students' needs and interests.

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Submetido em: 07/12/2024

Aceito em: 01/09/2025

