

Putting CAOS to the test: using cards as an ideation tool for proposing creative classes

Colocando o CAOS à prova: uso de cartas como ferramenta de ideação para proposição de aulas criativas

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creative thinking,
design intelligence,
ideation tool, education

This article focused on tests reports conducted by elementary and high school teachers on a tool designed to help them developing classes that encourage creative thinking in students. It is a set of 32 cards, called CAOS, based on ideation techniques commonly used in Design and related fields. The research is characterized as qualitative and applied. Data collection was carried out through workshops held in educational institutions. As a result, we found the use of the cards promising and identified four different ways of using them to structure and propose creative classes.

*pensamento criativo,
inteligência de design,
ferramenta de ideação,
educação*

Este artigo relata os testes feitos, por professores do Ensino Básico e Superior, em uma ferramenta destinada a auxiliar a proposição de aulas que instiguem o pensamento criativo nos alunos. Trata-se de um conjunto de 32 cartas, denominado CAOS, embasado em de técnicas de ideação características das áreas de Design e correlatas. A pesquisa se caracteriza como qualitativa e aplicada. A coleta dos dados se deu por meio de oficinas, realizadas em contextos de instituições de ensino. Como resultado entendemos o uso das cartas como promissor e observamos quatro maneiras diferentes de possibilidades para sua utilização na estruturação e proposição de aulas criativas.

1 Introduction

There are several initiatives aimed at introducing design intelligence processes into teaching and learning environments for children, with the goal of stimulating creative thinking. However, such initiatives are, in their vast majority, led by professionals and researchers from design-related fields and primarily focus on the students' actions rather than the teacher's role in the process (Zimmermann, 2024).

There is also a myriad of national and international research institutions dedicated to offering programs, training, and infrastructure to foster more innovative lesson planning. Yet, most of these innovations occur without adequate support or structure for teachers within the school environment itself (Robinson, 2019). This situation goes against the expectations of an education that aims to promote students' creative thinking, as teachers

are the key players in guiding classroom practices. In other words, it is not enough to simply ask teachers to “be more creative.” A foundation and direction for creative practices are necessary (Beghetto et al., 2017).

Even so, around the world, teachers and educators are working in highly creative ways in classrooms, studios, and laboratories. When we observe such practices, it becomes clear that they closely resemble design methodologies. However, they often fail to tap into the full potential that design intelligence offers when used intentionally and in a structured manner (Fontoura, 2002).

In light of this scenario, drawing from the design field, we developed through doctoral research (Zimmermann, 2024) a set of cards called CAOS.¹ The aim is to offer, in a structured and intentional way, an alternative that supports teachers in implementing creative practices in the classroom without overburdening them.

This artifact has been tested by teachers in workshops offered by educational institutions. The results and findings obtained so far will be presented in this article, along with the theoretical foundations behind the tool.

¹ The card set is licensed under Creative Commons and available for free on the MEC RED (Education Social Network) portal. It can be downloaded and assembled by anyone interested. Available at <https://mecred.mec.gov.br/recurso/363414>

2 Design to promote creative thinking in schools

The essence of creative and design-oriented thinking lies in the act of creating something. Often, design-based solutions are intertwined with possibilities arising from the intentional use of creativity and vice versa. It is fairly common to understand design as one of the most creative human activities, and its creative nature is seldom questioned. However, the applicability of creativity is not limited to so-called creative fields. On the contrary, it is present and desirable across disciplines from the exact sciences to health studies and the humanities. Whenever a new perspective or solution is sought for a wide variety of problems, creative thinking is welcome (Lawson, 2006).

Encouraging design intelligence in schools is justified by its potential to promote the development of critical and creative thinking, as well as to stimulate problem-solving, conflict resolution, negotiation, and both verbal and visual communication skills (Fontoura, 2002).

Furthermore, design intelligence involves a form of reasoning distinct from logical cognition. It represents a way of thinking and problematizing that works by considering diverse references, while also “articulating subjects, languages, emotions, and aesthetics – it deserves to be learned in the school context as a way to offer students a sensitive perspective on the needs of contemporary life” (Martins, 2016, p. 177, our translation).

According to Resnick (2020), teaching through design thinking involves planning activities and actions based on the belief that, in order to foster children’s creativity and critical thinking, it is necessary to support them as they develop these capacities. Even though human nature, especially in childhood, is inherently curious and inquisitive, sustaining these qualities requires a balance between structured activity facilitation and the freedom for autonomy, imagination, sharing, creation, and reflection.

In alignment with this view, authors such as Archer (2005), Cross (2006), and Fontoura (2002) also advocate for consciously bringing design thinking into schools, as it gives students the opportunity to develop a wide range of skills related to non-verbal thinking and communication, while also supporting innate abilities for solving real-world problems.

2.1 Creativity in schools

Creativity in education has long been a topic of discussion. However, conversations around the subject and efforts to prioritize creativity in schooling have intensified in recent years. Today, there is global consensus that creativity is a fundamental competence for innovation and, consequently, for society's survival in political, social, and economic terms (Patston et al., 2021).

Observations made by institutions such as the Organization for Economic Co-operation and Development (OECD), as well as other global entities like the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the National Research Council (NRC), among others, have associated creativity with the need for innovation and with the essential ability to solve complex problems. Gradually, creativity is ceasing to be viewed as a “marginal topic or a luxury in school curricula,” and is instead increasingly seen as a core capacity that should be cultivated across all subject areas (Patston et al., 2021).

In Brazil, creativity is included in the National Common Curricular Base (BNCC) as a desirable trait or skill in an educational process aimed at:

(...) exercising intellectual curiosity and applying the scientific approach, including investigation, reflection, critical analysis, imagination, and creativity, to examine causes, formulate and test hypotheses, solve problems, and invent solutions based on knowledge from different subject areas (Brasil, 2018, p. 18, our translation).

Although creativity is repeatedly and officially cited as necessary and desirable in schooling, its meaning and the implications of its development are not always clear. The understanding of how creativity can be translated into teaching and learning practices, and formative assessments, remains vague. Perhaps as a result, the concept often meets with resistance, particularly among teachers, when it comes to implementation (Vincent-Lacrin et al., 2019).

One way to approach this issue is to acknowledge that even the most creative students express their creativity in different ways. Sometimes, highly creative students pose curricular and classroom management challenges, just like any other student. At other times, they simply express their creativity in different but still school-appropriate ways. However, shedding light on the negative perception of creative individuals, Jónsdóttir (2017) argues that creativity requires guidance.

A pedagogical approach that fosters creativity allows students considerable freedom to take risks, make choices, and autonomously determine what they want to do. Nevertheless, it also demands that teachers develop the sensitivity to step back and let students create and follow their own learning processes. In this context, the teacher must discern when to intervene to provoke, clarify, support, expand, or challenge, in pursuit of creative thinking (Jónsdóttir, 2017).

In line with this view, Beghetto and Kaufman (2014) propose a general framework to support creative practices:

1. Teach explicitly for creative thinking;
2. Provide opportunities for choice and discovery;
3. Encourage students' intrinsic motivation;
4. Create a learning environment that supports creativity;
5. Provide opportunities for students to use their imagination while learning.

This structure reinforces the importance of focusing on the key actor capable of making this possible in the classroom: the teacher. However, as observed in the field during our immersion in teachers' daily routines throughout the research, although they acknowledge the importance of fostering creative thinking in the classroom and there are teaching initiatives that touch upon design thinking, they state that they are not entirely sure how to effectively bring creative thinking into their practice (Zimmermann, 2024).

In line with the field findings, Miyata and Maia (2021) point out that, during teacher education, the availability of studies on creativity for classroom application is insufficient. Furthermore, upon entering the teaching profession, the school environment does not always welcome more creative approaches from these teachers.

Along the same lines, Negreiros, Scarparo, Wechsler, and Silva (2022) highlight the considerable challenge of “sparking teachers' enthusiasm” (p. 3) to design more creative lessons, since, according to the authors, there is a lack of sufficient content in their training and the very concept of what constitutes the desired creativity is not clearly defined for teachers.

What emerges, therefore, is that the journey from openly recognizing the importance of creativity to systematically supporting its promotion in the classroom is a long one—passing through school curricula (Patston et al., 2021), teacher education (Beghetto & Kaufman, 2014), and the provision of a conducive environment (Belotto, 2020).

2.2 What kind of creativity are we talking about?

There is much confusion surrounding what it means to be creative. While most teachers value creativity, few of them want to “invite chaos into their classrooms” (Runco, 2014). It is common to see creativity viewed positively in theory, but not in practice, especially when faced with the idea of a classroom full of creative students. Teachers often associate creative personality traits with disruption, imagining that a classroom full of creative individuals might spiral out of control (Runco, 2014).

In this regard:

Creativity is often associated with freedom of expression, and some people find it problematic to encourage the development of this ability too much in schools. They imagine children running wild, shouting, and breaking everything in sight, rather than quietly doing their homework. But being creative often involves playing with ideas and enjoying the process. It also involves working hard on ideas and projects, developing them to the best they can be, always evaluating along the way which ones are best and why. In every subject, creativity is grounded in skill, knowledge, and control. Creativity is not just fun; it is also about focus and effort (Robinson, 2019, p. 20, our translation).

Following Robinson's reasoning, we draw on the work of cognitive science professor and researcher Margaret Boden, who categorizes creativity into P-creativity (Psychological creativity) and H-creativity (Historical creativity). This distinction aims to demystify the notion that creativity is a special gift reserved for a few, and instead frames it as a facet of human intelligence that manifests in everyday life (Boden, 2004).

Boden's concern lies in the challenge of determining whether something is truly creative, noting that creativity consists of three elements: novelty, surprise, and value. But how much? Under what circumstances?

To address these questions, she proposes the following distinction:

- P-creativity refers to ideas or creations that are new to the person generating them, even if others have had the same idea before. This form of creativity happens routinely and is particularly relevant to the field of education.
- H-creativity, on the other hand, refers to ideas that are new to the world, that is original contributions that (as far as we know) had never been conceived before.

Both types of creativity involve producing something new, valuable, and surprising. However, H-creativity can be seen as a special case of P-creativity.

For the purposes of this research, we are particularly interested in P-creativity the kind of creativity that emerges in everyday life, where the originality of the idea lies not in whether it is historically unique, but in the fact that the individual was able to think of it for the first time. It was based on this premise that the CAOS card set was developed and is now being shared.

3 Method

To put CAOS to the test, we introduced and proposed the use of the card set through workshops offered to teachers from different educational stages, as shown in Figure 5. However, before we explore the teachers' interaction with the card set during these workshops, it is important to introduce the tool itself.

3.1 The construction of CAOS

The acronym CAOS is formed from the initial letters of eight verbs in Portuguese:

- *Combinar e Conectar* (Combine and Connect) – activities aimed at exploring ideas and possibilities;
- *Aprender e Avaliar* (Learn and Assess) – activities focused on discovering new things and recording them, recognizing successes and failures, and identifying opportunities for improvement;
- *Observar e Organizar* (Observe and Organize) – activities that aim to identify patterns, plan based on research findings, or prepare a plan prior to starting a research process;
- *Solucionar e Surpreender* (Solve and Surprise) – activities dedicated to proposing and generating solutions to a challenge or problem, adapting ideas, and creating new ones with room for both success and error.

The primary verbs, which name the actions proposed in each card, are aligned with the competencies listed in the Brazilian National Common Curricular Base (BNCC) (Brasil, 2018; Movimento pela Base, 2018). These verbs are directly associated with actions that have the potential to stimulate creative thinking. Each pair of actions is also accompanied by a list of derived actions (see Figure 1), which complement the main verbs.

In broad terms, action is synonymous with activity, and when it comes to design activities, Fontoura (2002) argues that they are always guided by a motive, an intention, goal, or need. To execute them, it is necessary to integrate a set of intermediate actions. Supporting this assertion and linking it to the creative process, Lupton (2011) affirms that the design process follows a “predictable path” (p. 4), and these paths typically appear in design and creative fields as tools and techniques to help professionals think, create, prototype, or research.

C	A	O	S
COMBINE/ COMBINAR CONNECT/ CONECTAR	LEARN/ APRENDER ASSESS/ AVALIAR	OBSERVE/ OBSERVAR ORGANIZE/ ORGANIZAR	SOLVE/ SOLUCIONAR SURPRISE/ SUPREENDER
adapt/ adaptar enlarge/ ampliar play/ brincar experiment / experimentar formulate/ formular interact/ interagir mix/ misturar relate/ relacionar	study/ estudar expand/ expandir formulate/ formular internalize/ internalizar think/ pensar ask/ perguntar try/ tentar test/ testar	collect/ coletar explore/ explorar identify/ identificar investigate/ investigar look/ olhar research/ pesquisar predict/ prever	get it right/ acertar build/ construir create/ criar elaborate/ elaborar make mistakes/ errar make/ fazer generate/ gerar imagine/ imaginar invent/ inventar propose/ propor

Figure 1 Main and derived verbs for each card category.

To build a clear and applicable path, we mapped ideation techniques (Lupton, 2011; Baxter, 2011; Stickdorn & Schneider, 2014; Pazmino, 2015; Moritz, 2016; Brown, 2020; Cagan, 2021; Padovani & Bueno, 2022; Design Kit, 2023; Nielsen & Norman, 2023; Service Design Tools, 2023) and adapted them. Including renaming them to suit the school context, applying principles of plain language (Fischer, 2018). This resulted in 28 tools, 7 for each activity category, summarized in Figure 2.

<p style="text-align: center;">C</p> <p style="text-align: center;">COMBINE/ COMBINAR CONNECT/ CONECTAR</p> <p>Explore ideas and possibilities.</p> <p>Scenario/ Cenário Forced Connections/ Conexões Forçadas What if.../ E se... Figures of Speech/ Figuras de Retórica Icon, Index and Symbol/ Ícone, Índice e Símbolo Mind Map/ Mapa mental Reconstruction/ Reconstrução</p>	<p style="text-align: center;">A</p> <p style="text-align: center;">LEARN/ APRENDER ASSESS/ AVALIAR</p> <p>Discover new things and record them. Recognize successes and mistakes. Point out improvements.</p> <p>How I think/ Como eu penso What would it be like if.../ Como seria se... Story board/ Figurinha com legenda Card sorting/ Jogo de cartas Scene map/ Mapa de cenário What would you do?/ O que você faria? Asking/ Perguntação</p>	<p style="text-align: center;">O</p> <p style="text-align: center;">OBSERVE/ OBSERVAR ORGANIZE/ ORGANIZAR</p> <p>Identify patterns. Plan what will be done based on the research.</p> <p>Snooping/ Bisbilhotando Expert Box/ Caixa dos Especialistas What if it were different?/ E se fosse diferente? What do I know?/ O que eu sei? Visual research/ Pesquisa visual Shadow/ Sombra Let's go out!/ Vamos pra rua!</p>	<p style="text-align: center;">S</p> <p style="text-align: center;">SOLVE/ SOLUCIONAR SURPRISE/ SUPREENDER</p> <p>Propose and generate solutions to a challenge/ problem.</p> <p>Brainstorm/ Chuva de Ideias Drawings and Scribbles/ Desenhos e Rabiscos Idea Diary/ Diário de Ideias Future Headlines/ Manchetes do futuro Different Materials/ Materiais diferentes Mockups/ Modelos Redo/ Refazer</p>
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Figure 2 Creative tools included in each card category.

These techniques were formatted into 28 activity cards (creative tools), plus 4 introductory cards representing each verb pair, forming a set of 32 cards organized into 4 decks. The graphic design of the cards is illustrated in Figures 3 and 4.

Choosing a card format was not arbitrary. We understood the need to present the information in a visual format that clarified that each activity is independent but can be freely combined according to the user's interest.

Petterson (2016) notes that it is not always obvious where to look for information, and that a systematic approach can increase the chances of success in this search. He also argues that our prior experiences can guide us to look in the right places, and that a comprehensive view of available information helps both the search and understanding process.

To align with the prior experiences of our intended users, we drew on Roy and Warren (2019), who highlight that in design research, cards are effective because they are:

engaging objects that summarize information, methods, or best practices in an accessible way that designers can absorb and act on; they can be shuffled and combined in multiple ways; serve as a shared reference among designers, users, and others to facilitate discussion; provide structure to a design process; and offer words and images that broaden the search space and overcome design blocks. (Roy & Warren, 2019, p. 131)

In this research, we understand that the “designers” referred to by the authors are, in fact, teachers, since they are the ones designing, discussing, and evaluating these design tools adapted to the school context.

The cards were laid out to distribute information in a way that guides the teacher in using the tool and allows them to quickly find what they need, following the hierarchy illustrated in Figure 3.

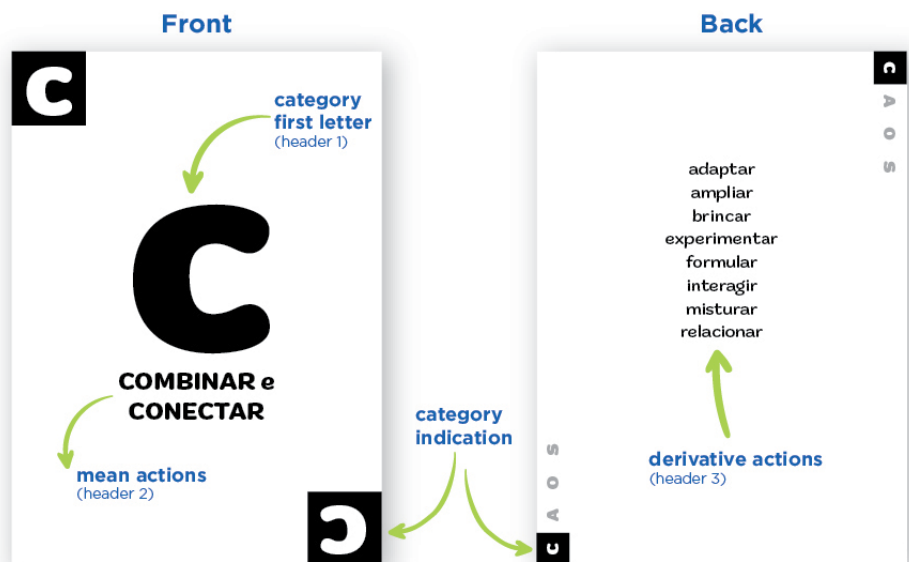


Figure 3 Information hierarchy in the creative tool cards.

The introductory cards in each deck aim to list the actions a teacher will find in that category, as shown in Figure 4.

We emphasize that categorizing the activities was intended to help teachers finding them based on the kind of student action they wish to encourage. For example, it is not necessary to use “Combinar e Conectar” activities before “Aprender e Avaliar” ones, nor are the categories sequential or dependent on each other. Each activity stands on its own, and can be combined with others, offering flexibility and greater possibilities for creative lesson planning.

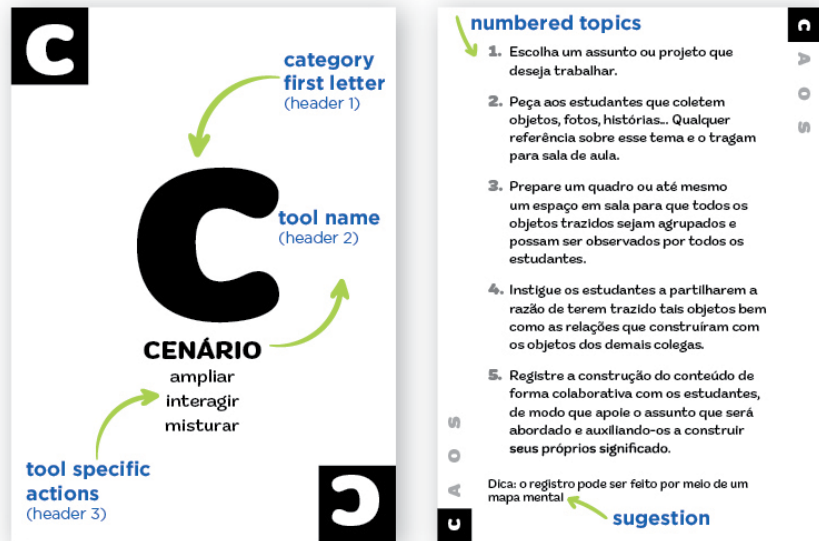


Figure 4 Information hierarchy in the deck opening cards.

3.2 The workshops

To observe how teachers interact with the tool, we structured workshops aimed at presenting the CAOS card set and gathering teacher feedback regarding its use. We asked participants if possible to use the cards to design an activity within their field of expertise.

So far, 80 teachers from both basic and higher education, divided across five workshops, have been introduced to the tool, as shown in Figure 5.

context	profile	stage of the educational system	participants
training week in educational company	teacher trainers	pre-school, elementary and middle school	14
training week at a higher education institution	social sciences courses professors	higher education	5
seminar in postgraduate program	master and doctoral students	elementary and middle school	5
special class in a postgraduate program	master and doctoral students and undergraduate students	pre-school, elementary and middle school	11
training week at a state elementary school	middle school teachers	middle school	45

Figure 5 Profile of the participant groups in each workshop for presentation and testing of the card set.

Despite the diversity of participants and contexts, the workshops were structured to provide the same information to everyone involved. The script followed consisted of three stages:

1. Presentation of CAOS and its theoretical foundation;
2. Interaction and testing of the card set;
3. Presentation of the activities developed and an open discussion with participants (see structure in Figure 2).

The workshops were not rigidly structured and lasted between 1.5 to 2 hours, depending on the number of participants and the depth of discussion in each group.

Step	Activity	Script	Mean duration (minutes)
1	Presentation of CAOS and the theory that underpins it.	<ol style="list-style-type: none"> 1. Brief presentation of the researcher. 2. Establishment of the definition of creativity that guided the proposal. 3. Presentation of actions (verbs) that categorize the proposed activities. 4. Set of card's presentation. 	20
2	Interaction and testing of the card set.	<ol style="list-style-type: none"> 1. Delivery of the set of cards to the participants. 2. Interaction with the cards. 3. Proposal of activities in your specialty, or related, based on one of the techniques. <p>At this stage, participants had the freedom to carry out the proposed activity individually or in a group.</p>	40
3	Presentation of the activities carried out and conversation with the participants.	In a conversation circle structure, participants who felt comfortable explained their activities to the others and made comments about the cards.	30

Figure 6 Workshop script.

Participant observation was conducted during the workshops. Additionally, we asked participants to write down the activities they proposed, either directly on the cards or on a separate sheet. The results obtained are presented in section 4.

4 Results

In the five workshops, participants presented classroom activities created using the CAOS cards. So far, no one has reported that the cards were unusable or somehow unsuitable for any subject or educational level. The participating group of teachers was quite diverse (as shown in Figure 5), representing a variety of disciplines, which resulted in a broad range of activity proposals.

With that in mind, this article presents results specifically related to the different ways teachers used the cards to support their lesson planning. During the workshops, we observed that participants structured their proposals in four distinct ways:

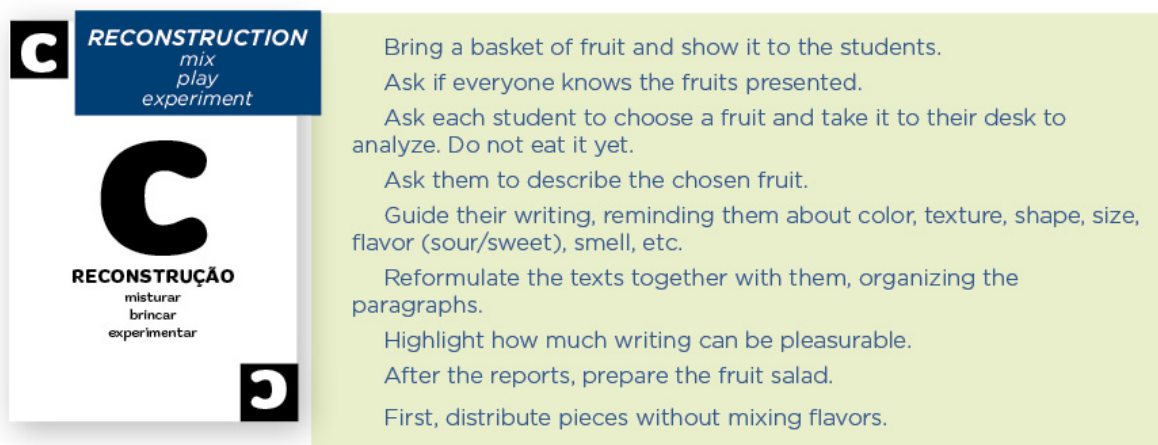
1. Use of a single card;
2. Cross-category combination of cards;
3. Design of a didactic sequence;
4. Adaptation of previously used activities.

It is important to note that the cards were designed for flexible use. Teachers are encouraged to appropriate them in whatever way best fits their needs. Not all usage types were anticipated. In fact, types 3 and 4 emerged organically, based on the teachers' experience, repertoire, and teaching context.

4.1 Use of a single card

CAOS does not require combining cards across categories, nor does it demand a sequence of steps. This characteristic was confirmed when we observed teachers using just one tool card to guide a classroom activity based on its suggested structure and prompts (Figure 7).

Theme: Text construction



Bring a basket of fruit and show it to the students.
Ask if everyone knows the fruits presented.
Ask each student to choose a fruit and take it to their desk to analyze. Do not eat it yet.
Ask them to describe the chosen fruit.
Guide their writing, reminding them about color, texture, shape, size, flavor (sour/sweet), smell, etc.
Reformulate the texts together with them, organizing the paragraphs.
Highlight how much writing can be pleasurable.
After the reports, prepare the fruit salad.
First, distribute pieces without mixing flavors.

Education level Middle school

Discipline covered Portuguese

Figure 7 Example of an activity proposed using a single card.

4.2 Cross-category combination of cards

This approach led to interdisciplinary and multi-grade proposals. From a common theme, the same sequence of cards was used to propose a shared activity. The depth and development of the activity could vary based on the students' grade level, and the activity could be implemented through collaboration between teachers from different subjects (Figure 8).

Theme: Monetary system

<p>O WHAT DO I KNOW? identify look</p> <p>O</p> <p>O QUE EU SEI? identificar olhar</p> <p>O</p> <p>How did currency and banknotes come about? What banknotes are there?</p>	<p>A ASKING expand ask</p> <p>A</p> <p>PERGUNTAÇÃO expandir perguntar</p> <p>A</p> <p>What would it be like to live without money? How do we use notes and coins today?</p>	<p>C MIND MAP enlarge formulate relate</p> <p>C</p> <p>MAPA MENTAL ampliar formular relacionar</p> <p>C</p> <p>Organize your ideas and relate the previous questions to future (current) propositions: - extinction of paper money - digital currencies - how much is our money worth</p>	<p>S BRAINSTORMING elaborate generate imagine invent</p> <p>S</p> <p>CHUVA DE IDEIAS elaborar gerar imaginar inventar</p> <p>S</p> <p>How would we live without the monetary system?</p>
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Education level Middle school

Discipline covered Multidisciplinary: mathematics and history

Figure 8 Example of an activity proposed through cross-category card combination.

4.3 Didactic sequence

Starting from a central theme chosen by the teacher, combinations of cards were used to build a didactic sequence that is a series of activities unfolding over several days or a week. These proposals were characterized by the need for extended reflection time and deeper student engagement. This usage type was most frequently observed among early childhood education teachers (Figure 9).

4.4 Adaptation of previously used activities

In some workshops, during open discussions, teachers noted that the activities on the cards resembled strategies they had encountered in previous training sessions or other educational contexts. The cards motivated them to adapt those activities and present them to their students (Figure 10).

Theme: Nature in our city

	<p>Step 1</p>	<ul style="list-style-type: none"> • In a circle, present the theme “Nature in our city” • Ask the children to say what they know or what comes to mind when they hear this theme. • Be the class scribe and write on a poster: what we know; what we don’t know exactly; what we think... • Examine the poster with the children and ask if they think it turned out well, if they want to add other things.
	<p>Step 2</p>	<ul style="list-style-type: none"> • Go out with the children around the school. Observe carefully, collect elements from nature, take photos, record sounds... • When you return to the classroom, explore the materials, talking about the elements collected, the photos taken and the sounds recorded. Ask the children if they can establish a connection between what was collected, the photos and the recordings. For example, did the leaf we collected fall from the tree where we took the photo? Do the leaves make a noise? Does the noise appear in our recording? • Write a collective text with the children to document the movement they made. • Afterwards, write an invitation with the children to be given to the families so that they can live this experience with the children over the weekend.
	<p>Step 3</p>	<ul style="list-style-type: none"> • After receiving the materials produced by the families, invite the children to explore these materials. • Ask them how they think they could organize the materials. Do the organization proposed. • Invite the children to produce an illustrated album. They can draw, record with spontaneous writing and make collective texts to record what they discovered.
	<p>Step 4</p>	<ul style="list-style-type: none"> • Go back to the initial poster with the children and see if they discovered more about “what we don’t really know.” • Then go back to all the materials you produced and encourage the children to share what they learned. Record what they said. Transcribe it onto posters. • Ask the children if they would like to share what they learned with other people. • Organize an exhibition and prepare good questions to pique the curiosity of those who visit the exhibition.

Education level Pre-school
 Discipline covered Multidisciplinary

Figure 9 Example of a didactic sequence created by combining cards.

Diverse themes

O	S	C
<p>WHAT DO I KNOW? identify look</p> <p>O</p> <p>O QUE EU SEI? identificar olhar</p>	<p>BRAINSTORMING elaborate generate imagine invent</p> <p>S</p> <p>CHUVA DE IDEIAS elaborar gerar imaginar inventar</p>	<p>SCENARIO enlarge mix interact</p> <p>C</p> <p>CENÁRIO ampliar misturar rinteragir</p>
<ol style="list-style-type: none"> 1. Recycling theme - fill in the table 2. In pairs - fill in the table 3. Exchange of knowledge collectively 4. Recycling as a possibility of working with the monetary system 	<ol style="list-style-type: none"> 1. Sustainable financial education (Sebrae's project) What is it? Where is it present? 2. Grouping students to respond to the problem 3. Post-it panel 4. Debate/Vote 5. Select 5 - Transfer/combine 1 6. Bazaar with reusable toys 7. Follow the letter (C) Cenário 	<ol style="list-style-type: none"> 1. Recycling (REAPRO), money, toys 2. Toys that do not use recyclable material 3. Classification of toys - criteria chosen by students. - Classification and pricing. Monetary system/ Bazaar 4. Emotional history of each toy 5. Recording of stories, poems, drawings, nature leaves...

Education level Middle school

Discipline covered Multidisciplinary

Figure 10 Example of an adaptation of activities from other contexts using the cards.

5 Conclusion and future directions

CAOS is currently in a phase of testing and refinement, aligned with the understanding that design is an ongoing process that must always remain open to improvements and adjustments. So far, the five workshops have shown promising results, with participating teachers expressing interest in using the cards in their classrooms.

During the final discussion circles that emerged at the end of the workshops, it was common to hear from teachers who teach at more than one educational level. These teachers often expanded the potential applications of the cards beyond the intended audience of each specific workshop. For example, one teacher who teaches technical-level marketing courses stated that she could use the cards with her students, representing a new mode of application where CAOS functions as a classroom tool for students, not just a planning aid for teachers.

Similarly, higher education instructors also expressed interest in presenting the cards to their students as a tool to guide them in solving problems relevant to their academic disciplines. Future studies could therefore explore how students in technical and higher education settings interact with the CAOS card set.

Additionally, in the context of primary and secondary education, we aim to evaluate how students receive and respond to the activities designed using CAOS. However, this depends first and foremost on whether the card set is appealing and useful enough for teachers to adopt it in their own classroom practices.

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Submission date/*Artigo recebido em*: 1/7/2025

Approval date/*Artigo aprovado em*: 30/9/2025