Article
DOI | 10.21680/1981-1802.2024v62n73ID36272
Revista Educação em Questão

Games in Mathematics Education and the constitution of students in neoliberal society

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Abstract

This article aims to highlight statements about the use of games in mathematics education, considering the constitution of students as persons in neoliberal society. The theoretical and methodological framework is found in discourse analysis, as discussed by Michel Foucault. The materials used were scientific works obtained from a digital repository and the two most cited research studies in these documents, characterizing it as a bibliographic study. Through a qualitative approach, it is shown that the student as person, as constituted through the current discourse of mathematics education, likes games because they are sources of pleasure and motivation – factors that mitigate the inherent difficulty of the subject –, while still developing intelligence and the affective/emotional aspect that make up cognition. This strengthens the thesis that games used in mathematics education have functioned as tools for the constitution of persons aligned with the neoliberal premises and immersed in their demands.
Keywords: Education. Games. Mathematics. Neoliberalism.

Jogos na Educação matemática e a constituição de sujeitos-alunos na sociedade neoliberal

Resumo

O presente artigo tem por objetivo evidenciar enunciados sobre o uso de jogos na Educação matemática, tendo em vista a constituição de sujeitos-alunos na sociedade neoliberal. O referencial teórico e metodológico se encontra na análise do discurso, como discutido por Michel Foucault. Os materiais

utilizados foram trabalhos científicos obtidos em um repositório digital e as duas pesquisas mais citadas nesses documentos, caracterizando-se como um estudo bibliográfico. Mediante uma abordagem qualitativa, mostra-se que o sujeito-aluno, tal como constituído mediante o discurso da Educação matemática atual, gosta de jogos porque são fontes de prazer e motivação – fatores que mitigam a inerente dificuldade da disciplina –, sem deixar de desenvolver a inteligência e o aspecto afetivo/emocional que compõem a cognição. Assim, fortalece-se a tese de que os jogos utilizados na Educação matemática têm funcionado como ferramentas para a constituição de sujeitos alinhados às premissas neoliberais e imersos nas suas demandas.

Palavras-chave: Educação. Jogos. Matemática. Neoliberalismo.

Los juegos en la enseñanza de la matemática y la constitución sujetos-alumnos en la sociedad neoliberal

Resumen

El presente artículo tiene como objetivo poner de relieve los enunciados sobre el uso de juegos en la enseñanza de la matemática, con vistas a la constitución de sujetos-alumnos en la sociedad neoliberal. El marco teórico y metodológico se encuentra en el análisis del discurso, como lo analiza Michel Foucault. Los materiales utilizados fueron trabajos científicos obtenidos de un repositorio digital y de las dos investigaciones más citadas en estos documentos, caracterizándose como un estudio bibliográfico. A través de un enfoque cualitativo, se muestra que el sujeto-alumno, tal como se constituye a través del discurso de la enseñanza de la matemática actual, gusta de los juegos porque son fuentes de placer y motivación – factores que mitigan la dificultad inherente de la disciplina –, sin dejar de desarrollar la inteligencia y el aspecto afectivo/emocional que componen la cognición. Esto refuerza la tesis de que los juegos utilizados en enseñanza de la matemática han funcionado como herramientas para la constitución de sujetos alineados con las premisas neoliberales e inmersos en sus demandas.

Palavras-clave: Enseñanza. Juegos. Matemática. Neoliberalismo.

Introduction

It is known that the rise and effects of neoliberalism have been widely debated in recent decades. Although the discussions on the subject start from different perspectives, there seems to be a consensus in the understanding that it is not only an economic regime, but a rationality, a way of existing in the world that encompasses all areas of life and the population (Foucault, 2008; Dardot; Laval, 2016). This means that, in the globalized neoliberal world, there is no subject that is not of interest, since any manifestation must converge towards the consolidation of the fundamental principles of neoliberalism – such as competitiveness, individuality, innovation, creativity, entrepreneurship, seduction and happiness (Han, 2020; Lipovetsky, 2020; Cabanas; Illouz, 2022).

Given this, it is no surprise that changes in the educational field have traces of neoliberal rationality (Laval, 2019). In fact, in recent years, we observed the emergence and appreciation of teaching and learning techniques immersed in neoliberal assumptions that guide contemporary society. Some researchers have critically analyzed practices such as Entrepreneurial Education (Petrini, 2022) and Active Methodologies (Longo, 2023), demonstrating their strong associations with the neoliberal project.

Among these educational methodologies is the use of games, which we explore in this work – a strategy so old that it could even be considered traditional, were it not for its prominence in society and in neoliberal education. The logic of games, long explored and theorized (Huizinga, 2019; Caillois, 2017), was appropriated by Design and has been used as a strategy for modulating human motivation (McGonigal, 2012). Among the school subjects, it seems that the presence of games becomes even more significant in the subject of Mathematics, selected as the focus of this investigation.

Following recent debates, aligned with the field of Ethnomathematics, it can be understood that the discourse of mathematics Education has been composed of a set of truths mostly supported by the existence of school Mathematics, that is, a specific type of Mathematics guided by Eurocentric knowledge, by an alleged universality, by asepsis, by order, by perfection (Giongo, 2008). Based on the assumption that *Mathematics is difficult* (Knijnik; Wanderer; Giongo; Duarte, 2012), people build truths such as: *to learn*

Mathematics, it is necessary to use concrete materials (Knijnik; Wanderer, 2007), *to learn Mathematics, it is necessary to explore the student's reality* (Duarte, 2009) and *to learn Mathematics, it is necessary to explore the playful* (Sartori, 2015). All these statements allude to emblematic characteristics of the games, which led to the notion that *it is important to use games to teach Mathematics* (Wanderer; Bocasanta, 2022).

Although the appreciation of games in the discourse of mathematics Education has been demonstrated, we did not find research of similar theoretical record that showed the truths that circulate on the subject, the description of the statements about games that constitute the discourse of mathematics Education. Given this scenario, we outline this investigation, whose theoretical-methodological assumptions are presented below.

Theoretical-methodological notes

The ideas elaborated by Michel Foucault throughout his scientific trajectory have been used as a matrix of intelligibility to trace the history of the present. In particular, we highlight his way of understanding social relations and analyzing the discourses, the theoretical and methodological foundations of his investigations. Although it is not the intention of this work to strictly adopt one or the other method – which would not be possible within this theoretical record –, we start from the reflections on the modes of research used by the French philosopher to constitute the investigative paths of this analysis.

Michel Foucault dedicated himself to analyzing problems such as power relations and the constitution of the individual. Unlike what other thinkers thought about power, Foucault (1995) understood that it was not a unitary and universal construct that was held by some individuals, but heterogeneous, volatile, and historically forms constructed by society. It is in the exercise of power that marks are produced in individuality, culminating in the production of *individuals*. According to the philosopher, the individual is "[...] trapped in his own identity by a consciousness or self-knowledge" (Foucault, 1995, p. 235). By approaching the idea that truths are contingent, the author shows the existence of mechanisms capable of modifying the configuration of these truths

and producing guidelines on what everyone says or fails to say in certain contexts, that is, strategies that modulate the *conduct* of the individuals.

At this stage of his work, Michel Foucault produces philosophical arguments from an *analysis of the discourse* guided by the assumptions mentioned so far. The main concepts of his approach are those of discourse, enunciation, and enunciation, detailed in the book *The Archaeology of Knowledge* (Foucault, 2015). According to the researcher Rosa Maria Bueno Fischer, the author stands out for the proposal of a displacement on the way of conceiving the history, then seen from the perspective of a theory of discursive practices – archaeology –, marked by the "[...] description of events, the description of the transformations of statements, of discourses" (Fischer, 2012, p. 24).

Unlike the conception of other epistemological domains that understand discourse as a product of human relations, Foucault (2015) describes it as a *producer*. In this perspective, the individuals are constituted through the discourses by which they are captured, that is, the *discourses* are considered as "[...] practices that systematically form the objects of which they speak" (Foucault, 2015, p. 16). According to the philosopher, nothing exists outside the discursive plots, nor in the dark; the objective is to bring light and describe the events that are often invisible because they are very superficial.

Working in this way implies "[...] establishing relationships between several layers of plots, between distinct (and communicable among themselves) layers of multiplicities; that is, it is always, for him, a matter of describing events" (Fischer, 2012, p. 25). These discursive events are permeated by a dispersion of *statements*, that is, the discourse is considered as a "[...] limited number of statements for which we can define a set of conditions of existence" (Foucault, 2015, p. 143). In other words, it can be assumed that the statements are "[...] manifestations of knowledge and, therefore, [are] accepted, repeated and transmitted" (Veiga-Neto, 2014, p. 94). The circulation of statements, according to Foucault (2015), occurs through *enunciations*, that is, acts of speech or actions performed by the individuals.

Performing a discursive analysis of Foucauldian inspiration – the theoretical and methodological framework that guided the writing of this article – presupposes evidencing statements through the identification and description of four properties defined by Foucault (2015): the *referential*, a context that

marks the conditions for the statements to emerge, gain meaning and enter circulation; the *individual of the statement*, seen as a position to be occupied by certain individuals; the *associated domain*, correlation of the statement in question with other utterances; and *materiality*, composed of the set of signs that will support the statement. For this, it is proposed to locate recurrences in profuse enunciations that emanate from multiple sources, in order to highlight a limited number of statements which are part of an even smaller set of discourses.

Works such as those by Kendall and Wickham (1999) are dedicated to the analysis of the methodological procedures of Foucauldian research, which find significant interfaces with the methodologies of Cultural Studies (Pickering, 2008) and post-critical research in Education (Meyer; Paraíso, 2012). Operating with this theoretical-methodological record involves investigating the past to understand the present through a skepticism about the great truths that are presented, that is, with a *hypercritical* look (Veiga-Neto, 2020) that suspects everything, even itself.

Therefore, it would be inconsistent to think that the adoption of some method recognized in the scientific field – therefore, a metanarrative – would be enough to demonstrate, without a shadow of a doubt, that the study would be valid. Research like the one we present here is usually unique, contingent, unrepeatable, built along the way. Although there are several theoretical assumptions and an initial planning, it is based on the idea that the execution of a plan does not guarantee fruitful discussions that meet the proposed objective (Paraíso, 2012). Instead, as postulated by André (2013), methodological rigor is found in the detailing of each of the stages performed and the meanings that were produced during the investigative path.

Having made the delimitations described at the beginning of this text on the subject and the objective of this investigation, our first research action was to select the materials that composed the empirical analysis. For this, we evaluated the repositories of academic works available in Brazil and opted for the Digital Bank of Dissertations and Theses (BDTD, the acronym in Portuguese), as it is a platform maintained by the Federal Government that brings together works from all Brazilian universities, public and private. In November 2021, we carried out two searches covering only the "Title" field and works published between 2017 and 2020. The first one was with the descriptor "playful AND

Mathematics", which resulted in six records – two (2) dissertations and four (4) theses. The second was with the descriptor "games AND Mathematics", from which we obtained 52 records – 5 (five) dissertations and 47 theses.

Of the 58 works found and read in full, the most cited author was the Brazilian Regina Célia Grando, mentioned in 25 of these studies. Given this significant number, we understand that it would be interesting to make a detailed reading of Grando's thesis and dissertation (1995, 2000), to understand the ideas addressed by the author. Next, we began to observe whether such truths resonated throughout the 58 works, paying attention to the truths related to games in mathematics Education. Thus, we constituted the *corpus* of this research, composed of the works of Grando (1995, 2000), 51 theses and 7 (seven) dissertations. It should be mentioned that, as this is bibliographic research that does not involve contact with the authors, according to National Health Council (CNS, the acronym in Portuguese) Resolution No. 510/2016, it was not necessary to register and evaluate it with a Research Ethics Committee (Brasil, 2016).

As previously presented, the analytical strategy put into operation on the empirical materials was the analysis of the Foucauldian-inspired discourse. The process consisted of reading the materials and identifying recurring enunciations, which could suggest the existence of statements that regulate them. If there is evidence, we started looking for other sources – articles, books, laws, guidelines, *etc*. – that would show more enunciations to reinforce/refute the argument about the existence of the statement in question. The expectation was that all these findings could bring light to the truths that are present in the discourse of mathematics Education about games and that, therefore, modulate the conduct of the students in contemporary neoliberal society.

Statements on games in mathematics Education

To undertake the discussions of this analysis, we take as a guiding thread the ideas of Grando (1995). The teacher begins her thesis by explaining the reasons why she felt motivated to write about games in mathematics Education. When reporting a practice, she performed with children in a school project, she found that they felt happy and were always vibrating with

the proposed games. They felt motivated enough to devote long periods to building strategies to defeat their opponents.

Among the ideas that stand out in this narrative is that *Mathematics students like games because it is something that gives them pleasure*. In her writing, the author maintains that the game shows itself "[...] as a dynamic and pleasure activity, triggered by its own movement, challenging and motivating players to action" (Grando, 1995, p. 60). Likewise, the aspect of pleasure is also found in 51 of the analyzed researches, as shown in the following excerpts:

> Many students feel challenged with the game, they go beyond their limits and it is this "going beyond", this certainty of *having advanced in the development zone that reflects the student's joy in learning* (Gasparello, 2018, p. 71, emphasis added).
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> [...]
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> [...] the game *reduces the severity that the error can cause*, when it proposes to the player *the pleasure of a new game* with a reflection of his move or even in the interaction with the other participants, he manages to perceive the error and correct it (Lins, 2019, p. 34-35, emphasis added).

In general, the works analyzed are consistent with the premises defended by researchers of psychogenetic theories, synthesized in the article by Ribeiro, Castro and Lustosa (2018). Gasparello (2018), for example, relies on Lev Vygotsky's theorizations about human development to justify the pleasure inherent in the game: there is a joy in learning, because the student realizes that he has advanced in the development zone. In addition, Lins (2019) points out the learning that results from frustration and the construction of affective and cognitive elements, points discussed by Jean Piaget and Henri Wallon.

In the search for educational policies on the subject, we used documents from the Ministry of Education of Brazil. The National Curricular Parameters (PCN, the acronym in Portuguese) of the Mathematics subject, for example, include discussions that accompany psychogenetic theories, especially when it is stated that games "[...] are a source of meanings and, therefore, enable understanding, generate satisfaction, form habits that are structured in a system" (Brasil, 1997, p. 35). In the National Common Curricular Base (BNCC, the acronym in Portuguese), it is also possible to find

mentions of pleasure, especially when it presents the notion of *mathematical literacy*, understood as that which is responsible for making the student perceive Mathematics "[...] as an aspect that favors the development of logical and critical reasoning, stimulates research and can be pleasurable (enjoyment)" (Brasil, 2017, p. 266).

In the search for other statements already described on the subject, we located Alice Stephanie Tapia Sartori's thesis. In it, the researcher investigates the effects of playful in mathematics Education, also through a discursive analysis of Foucauldian inspiration. Among its findings, it mentions that the playful associated with pleasure is something extremely recurrent in the materials it analyzed, so that the teachers point out a "[...] concern in teaching mathematics so that the student feels pleasure in learning, and point out the playful activities as the main resource that *seduces* the child for the pleasure it provides" (Sartori, 2015, p. 124, emphasis added).

The seductive role of games and the relevance of pleasure in learning are points that find support in the work of Lipovetsky (2020), who describes the existence of a society of seduction that is established in contemporary times, based on current neoliberal values. For the author, we are at a time when the basic rule is "to please and impress," with the primacy of happiness, well-being, anesthetization of oneself and the other, personal experiences and pleasure. This social displacement, far from being naive or accidental, constitutes what Lipovetsky (2020, p. 28) calls *the system of hyperconsumption*, that is, "[...] dominated by the imperative of capturing desires, attention and affections". In this sense, we agree with the author who conceives pleasure as part of a set of strategies that aim to conduct of neoliberal individuals – in the case of Education, using games so that students themselves enjoy and feel motivated to learn the contents proposed by the teacher.

Given this statement, we return to the premises of Grando (1995), especially to the idea that students feel motivated when they are in contact with games. Thus, we think not only that games work as sources of pleasure, but also that *Mathematics students who play are more motivated to learn*. Grando (1995, p. 95) seems to sustain this truth throughout his text, stating that "the use of games is a motivating factor for students [...]". Likewise, this truth finds strength in 50 of the works reviewed, as presented below:

> […] activities related to mathematics such as calculus and problem solving do not always produce the same *euphoric effects of digital games* in students. It is impressive how *a game manages to seduce a player* to such an intensity as if it were [under] the effect of some magic or enchantment (Siena, 2018, p. 20, emphasis added).
>
> […]
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> The playful, in school contexts, plays an important role in the *transformation of little stimulating activities into something more motivating for those who study* (Pereira, 2020, p. 51, emphasis added).

Siena (2018) mentions the ability that games – especially digital ones – must seduce students and lead them to a state of euphoria, comparing this result to a kind of magic. Apparently, the researcher refers to the flow theory, developed by psychologist Mihaly Csikszentmihalyi and commented on by game designer Jane McGonigal. According to these authors – also supported by psychogenetic theories – the most significant type of motivation is *intrinsic motivation*, that is, produced by the individual himself. In this regard, the games would be highly relevant, given their motivating characteristics and potential triggering flow state. McGonigal's (2012) proposal is to reform the exhaustive and little stimulating reality that is currently posed through games and gamification, which is in line with Pereira's (2020) statements about the transformation of traditional school practices in favor of more stimulating and motivating activities, such as games. Csikszentmihalyi (2020, p. 16), in his analysis of the state of flow, "[…] examines the process of achieving happiness through the control of the inner life", understanding that the control of intrinsic motivation through certain psychic mechanisms produces the happiness so desired by the human being.

Cabanas and Illouz (2022) counter the idea that happiness is something naturally sought by humans. They maintain that it becomes a model to be followed and the image of a good citizen that are established from the emergence of the field of Positive Psychology. For the authors, conceiving happiness – and, consequently, motivation – as personal achievements that can be obtained through certain individual psychic competencies legitimizes the notion that the individual is responsible for their success and failure. In the way it is currently presented, "[…] happiness almost always acts as little more than

a lackey of the values that gave rise to the radical revolution of the Chicago School and other neoliberal economists" (Cabanas; Illouz, 2022, p. 20). Thus, we consider that the practice of modulating motivation and happiness through games proposed by Csikszentmihalyi (2020) and McGonigal (2012) – which finds resonances in the empirical materials of this research – is very close to the neoliberal values that permeate contemporary society.

The effects of these ideas are also found in Brazilian educational policies. The National Common Curriculum Base defends the existence of essential learning, which materializes only through decisions. One of these decisions is "[...] to conceive and put into practice situations and procedures to motivate and engage students in learning [...]" (Brasil, 2017, p. 17). In the National Curriculum Parameters of Mathematics, it is stated that "[...] the game is a natural activity in the development of basic psychological processes; it supposes a 'doing without external and imposed obligation', although it requires requirements, norms and control" (Brasil, 1997, p. 35). According to these guidelines, we reinforce the vision of the game in Education as a pleasurable and motivating element that, as an essential phenomenon in human development, described by psychogenic theories (Ribeiro; Castro; Lustosa, 2018), has a significant role in the regulation of psychological processes and students' behaviors. Thus, there seems to be a call to the school community for the pedagogical processes to be reformulated to use games or playful elements in their proposals.

In fact, Sartori (2015, p. 111) mentions other researchers and his own research material to verify the imperative of using innovative strategies to guarantee learning that "[...] achieves a motivated student, stimulated to learn, because motivation [would be] a fundamental element in any human activity [...]". The author analyzes that, to be motivated, playful activities can be the safest way, capable of guaranteeing the student's engagement with their learning. Next, it resumes a statement already evidenced by other researchers in mathematics Education: that Mathematics is difficult. The playful is something light and pleasurable, so it would have the power to counterbalance the weight and difficulty of Mathematics.

This statement seems to be reinforced by Grando (1995), who argues that mathematical language is usually difficult for the student to access and

understand, but can be easily translated through the game. According to Grando (1995, p. 133), the game becomes an auxiliary language that establishes "[...] a 'bridge' to the understanding of mathematical language, as a form of expression of a concept, and not as something abstract, distant, and incomprehensible [...]". Given this report, it is evident the notion that *students who play can better deal with the difficulty of Mathematics*. The same conclusion can be found in 39 of the works, as shown in the following highlighted excerpts:

> The game arouses pleasure, offers fun and can even improve the individual's relationship with Mathematics, a *subject still disliked by many*. The work with such methodology [the games] can help students in the *self-control of their reasons and emotions*, as well as contribute to awaken, more often, *the desire to learn* Mathematics, showing that learning this subject *does not mean memorizing formulas, applying them or performing a repetitive list of mechanical exercises without understanding them* (Silva, 2017, p. 24, emphasis added).
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> [...]
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> It is notorious that at some point in school life, for most Brazilian students, mathematics ceases to be a pleasurable study and *they begin to like the subject less* and less. Students begin to report *difficulties in learning new concepts, even the basic ones*, and the general grades begin to reflect this weariness. With all this scenario, *the games become a way of not letting all this stimulus, coming from previous years, dissipate and transform mathematics into an indecipherable and unbeatable "monster"*, capable of producing a feeling of hatred in those who suffer to understand it (Ferreira Junior, 2019, p. 5, emphasis added).

At first glance, the idea of making a difficult and abstract Mathematics into another palatable and concrete seems to be a contradiction: on the one hand, the abstract, distant and incomprehensible character of mathematical language is criticized, which makes difficult for students to access it, as expressed by Silva (2017), Ferreira Junior (2019) and Grando (1995). On the other hand, there is a wide recognition that Mathematics is an abstract science par excellence, whose results are irrefutably true after its rigorous demonstration (Brasil, 1997, 2017). However, what can be seen from the reports of these

authors is the existence of some elements – such as games – which enable the coexistence and stabilization of these divergent vectors.

The ideas that Mathematics is abstract and difficult, for example, are problematized in the work of Knijnik, Wanderer, Giongo and Duarte (2012). Situated in the field of Ethnomathematics, the authors argue that, in school Mathematics, knowledge from academically marginalized peoples, who practice equally useful and effective mathematical operations, but whose practices do not go against the traditional scientific-mathematical method, is not considered. It is understood, therefore, that it is not enough to mentally count or express oneself through approximations, since it is necessary to prove their calculations through the methods learned in this discursive order, recorded on paper through specific algorithms or strategies considered irrefutable. In addition, everything that is thought to solve a problem needs to go through processes that go from the concrete to the abstract, which is one of the main objectives of the subject – in fact, this applies to cognitive development, as described in psychogenetic theories (Ribeiro; Castro; Lustosa, 2018).

In his thesis, Grando (2000, p. 20) seems to corroborate the statements of the discourse of mathematics Education when he writes that it is "fundamental to insert children in activities that allow a path that goes from imagination to abstraction, through processes of hypothesis survey and conjecture testing, reflection, analysis, synthesis and creation [...]." The main way to operationalize this process, in his perception, is the use of games linked to problem solving. Thus, the author maintains that games have *cognitive objectives*, that is, they have strong similarities with the problem-solving process and have a range of resources capable of promoting the development of cognition.

A possible conclusion to this discussion is the proposition that games and Mathematics would make people more cognitively developed; with a greater repertoire of strategies for problem solving; more creative; in short, more intelligent. Although he makes a reservation to this conjecture, Grando (1995, p. 18) explains that, "in schools, for parents and students and for the community in general, 'knowing Mathematics' is synonymous with being intelligent!". This seems to converge on the proposition that *Mathematics students who play are smarter* – regardless of the meaning assigned to the adjective in question.

This idea finds strength in 51 of the works reviewed, represented by the following two excerpts:

> The games are very important in the *development of strategies*, to assist the student in *solving problems*, stimulate and motivate *creativity*, investigation to make the best move and develop *logical reasoning* (Farias, 2018, p. 220, emphasis added).
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> [...]
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> A fundamental process in the development of higher psychological processes is the formation of concepts that require *intellectual operations* (*such as: attention, memory, abstraction, etc.*); however, to learn a certain concept, it is necessary much more than a transfer of information, it is necessary an intense mental activity on the part of the individual, therefore, *this cannot be done in a mechanical and repetitive way* (Santos, 2019, p. 38, emphasis added).

Farias (2018) reiterates that the content of the Mathematics' National Curriculum Parameters (Brasil, 1997) relates games to the creation of strategies, problem solving, creativity and logical reasoning. Santos (2019), inspired by psychogenetic theories, points out that the progression of higher psychological processes depends on intellectual operations like those mentioned earlier by Grando (1995, 2000), arguing that this development should not be done with mechanical or repetitive strategies – such as those traditionally used in Mathematics' teaching –, but by problem solving and games. A similar conclusion is discussed by Rizzo (1996), who, based on psychogenetic theories, argues that problem solving and games are important tools in the development of *intelligence*. This is understood as a mental and voluntary competence characterized mainly by the ability to adapt to the challenges that are presented.

The society of cognition and the appreciation of adaptation are subjects addressed by Laval (2019). According to the author, neoliberal education becomes a product at the service of the market and, therefore, responsible for developing certain entrepreneurial skills of future-worker-students of this time. The investment in cognition derives from a change in labor relations, in which the employer does not expect from the employee a type of total and passive obedience, but the performance of individuals capable of facing a scenario of risks and uncertainties typical of neoliberal society. This strengthens the ideas of *learning to learn* – one of the commitments to integral education present in the

National Common Curriculum Base (Brasil, 2017) – and of *lifelong learning*, currently a constitutional right.

These phenomena are investigated by Petrini (2022), who describes the emergence of an entrepreneurial Education that makes the students heroes and despots of themselves. Among the practices valued in this context are the Active Methodologies, problematized by Longo (2023), with emphasis on Problem Based Learning – which is very close to the subject addressed here. In neoliberal society, learning ends up being located "[...] everywhere and nowhere [...]" (Laval, 2019, p. 74). Thus, the boundaries between professional and personal life are blurred and to the individual is given the duty to always be learning. For these authors, the neoliberal student is called upon to use all the tools at their disposal to value their human capital, including the management of their motivation and emotions.

In fact, Rizzo (1996) continuously reiterates the importance of affection, love, and wisdom in the development of intelligent students, pointing out that attitudes based on coercion and authoritarianism are harmful to children. It observes the positivity of empathy in the construction of the rules and social relations of the students, which is also endorsed by Grando (1995). For both, the development of self-confidence and a solid emotional structure is a product of games and is important for the individual to take risks and not be shaken when dealing with adversity. In this sense, the idea emerges that *Mathematics students who play are more emotionally developed*, corroborated by 42 of the works reviewed and represented in the following excerpts:

> [...] games are *natural* activities of human beings [...]. As the game is a playful way of teaching, it has a wide power *to develop the global psychological structures*, that is, not only the *cognitive ones, but also the affective and emotional ones* (Paulo, 2017, p. 17, emphasis added).
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> [...]
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> As important as [the] cognitive skills (calculating, interpreting, and writing), *socioemotional skills* (*making decisions, controlling emotions, achieving goals, maintaining social relationships*) correspond to personality traits of people who reach the flow in daily activities [...] *the game stimulates socioemotional skills*, such as optimism, resilience and decision making, which affect the intrinsic motivation of the player (Lucchesi, 2019, p. 15-16, emphasis added).

Paulo (2017) refers to psychogenetic theories to support that the game provides the global, affective, and emotional development of the individual – a fact reiterated in the Mathematics' National Curriculum Parameters (Brasil, 1997). Similarly, Lucchesi (2019) presents this set of knowledge as socioemotional skills, also present in the National Common Curriculum Base (2017). The capture of emotions and affections by the neoliberal logic is problematized by Han (2020), who maintains that the power relations and mechanisms of conduct of contemporary society operate in particular ways, constituting the so-called *psychopower*.

In the neoliberal performance society characterized by Han (2020), the individual does not question the system or society, but questions himself and is ashamed of it. There is no room for resistance, since everything is considered natural and universal – like games (Paulo, 2017). Aggressions are not external – if they were, they would be producing a negativity and attacking the freedom of the other – but directed by us to ourselves, in a process of constant self-blame for our failures or limitations, which prevent us from being more efficient. However, while psychopolitical techniques potentiate depression in people, the power of games presents itself as a solution and a "remedy" for these individuals. In McGonigal's (2012, p. 37) view, "[...] the game is the direct emotional opposite of depression [...]", operating on a positive and, at the same time, productive emotional level.

This discussion seems to resonate in the text of Grando (1995, p. 60, emphasis added), when she considers that "the need for self-knowledge (sic) of the individual – his capacities, limits and existence – is satisfied by the game activity, in a competition that *involves much more competing with himself than with the other*". Following the assumptions of Laval (2019) on neoliberal Education, the author seems to call on the student to take more risks that subject him to the consequences of their own decisions. Therefore, as the individual is responsible for his learning, he becomes aware of the advantages/disadvantages and the costs of learning for himself, being able to choose on his own the best paths that he himself deems relevant. In view of these debates, we conclude that games and playfulness in mathematics Education would be useful tools for addressing most of the neoliberal demands, such as self-regulation, competitiveness, creativity, resilience, freedom, and innovation – synthesized

in the five statements discussed in this analysis –, constituting students aligned with the neoliberal logic.

Final considerations

At the end of this article, we consider it pertinent to highlight some implications of the study for the area of Education, especially mathematics Education. First, it is important to say that our research did not seek to present major conclusions or prescriptions about the use of games in Mathematics classes, which would be contradictory to the assumed theoretical perspective. By taking discourse analysis as a theoretical matrix, as discussed by Foucault, we are aware that our work is centered on the problematizations about the scrutinized research object (Mathematics games) and its effects on the constitution of school individuals.

Thus, secondly, we resume the purpose of the research, which was to highlight statements about the use of games in mathematics Education, in view of the constitution of students in neoliberal society. To this end, we seek to show the four properties of discursive formation for each of the five statements described. All had in common the *individual of the statement* – the neoliberal student – and *materiality* – 58 dissertations and thesis on games in mathematics Education and the two (2) researches most cited by these works (Grando, 1995, 2000).

Although it was not possible to make a detailed analysis of the conditions of possibility for the emergence of these statements – the *reference* –, in the excerpt presented, we verified that the statements were based on psychogenetic theories (Ribeiro; Castro; Lustosa, 2018) and social theories of games (Caillois, 2017; Huizinga, 2019), later reconfigured from the rise of neoliberalism (Foucault, 2008; Dardot; Laval, 2016), reinforced by their fundamental premises (Laval, 2019; Han, 2020; Cabanas; Illouz, 2022) and by the theories of Positive Psychology (McGonigal, 2012; Csikszentmihalyi, 2020). Throughout the text, we present many other statements already described (Knijnik; Wanderer; Giongo; Duarte, 2008; Sartori, 2015; Petrini, 2022; Longo, 2023) and crystallized in the Brazilian educational guidelines (Brasil,

1997, 2017), which configured the *associated domains* of the identified statements.

After the analysis, we conclude that the student, as constituted through the discourse of current mathematics Education, likes games because they are sources of pleasure and motivation – factors that mitigate the inherent difficulty of the subject –, while still developing the intelligence and the affective/emotional aspect that make up cognition. More than that, we argue that all the characteristics evidenced support the thesis that games in mathematics Education have functioned as tools for the constitution of individuals aligned with neoliberal premises and immersed in their demands.

Given this, one can ask: What kind of society is built when the driving force of individual actions is positioned in the fulfillment of desires and not in concern for the common? What is the conception of humanity that defends itself when competitiveness is a peaceful point in all human relations? What kind of citizenship is produced when the narcissism and individualism of neoliberal logic prevail in a society?

The invitation we make is to reflect on what types of individuals we are constituting through our pedagogical practices, suspending the metanarratives that convince us of the existence of a unique solution and detached from systemic consequences. The intention to propose these questions is not a direct invalidation or criticism of the use of games, the research that debates them, the psychogenetic theories, the Brazilian educational guidelines, or any other production. On the contrary, inspired by the critics of neoliberalism mentioned in this article, we understand that one of the ways to find other ways out of the current neoliberal structure is in the appropriation of its instruments and in the production of disruptive ideas that show the detrimental effects that accompany its logic, that is, to implode it using its own tools. Finally, it is an attempt to seek alternatives for the development of another society, guided by values that are effectively humanistic and citizens who aim at the *common* rather than the individual.

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Received on 14 maio 2024
Accepted on August, 2024