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GAMIFICATION AND GENERATIVE ARTIFICIAL INTELLIGENCE IN THE TEACHING OF PHILOSOPHY, MATHEMATICS, AND PORTUGUESE: A REPORT ON AN INTERDISCIPLINARY EXPERIMENT IN A FULL-TIME HIGH SCHOOL PROGRAM

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Abstract: This article presents an interdisciplinary pedagogical experiment developed at the Mayor Joaldo Lima de Carvalho Center of Excellence in Itabaianinha, Sergipe, which integrated elements of gamification and generative artificial intelligence into the teaching of Philosophy, Mathematics, and Portuguese Language in full-time high school. The study is grounded in Deci and Ryan's Self-Determination Theory, Stanislas Dehaene's contributions from the neurosciences of learning, and Dermeval Saviani's historical-critical conception of education, linking these frameworks to contemporary literature on gamification. Methodologically, this is a qualitative case study conducted throughout the 2024 school year, involving gamified activities, educational games, collaborative challenges, and the use of artificial intelligence tools to enhance learning. Notable among the implemented actions are interdisciplinary seminars, digital quizzes, the original game "Philosophical Treasure Hunt," and a solidarity campaign structured around game mechanics. The observed results point to increased engagement, active participation, and collaboration among students, fostering the mobilization of cognitive, socio-emotional, and communicative skills. It is concluded that the integration of gamification, artificial intelligence, and teacher mediation can contribute to the creation of more meaningful, personalized educational experiences aligned with the demands of contemporary schools.

Keywords: Gamification; Generative Artificial Intelligence; Full-Time High School; Active Learning; Philosophy; Interdisciplinarity.

1- Between reward, punishment, and belonging: the challenge of motivation in contemporary schools

Imagine two groups of students performing exactly the same activity. Both receive the same content, the same amount of time to complete the task, and the same challenges. However, only one of the groups receives immediate *feedback* on their performance, seeing their progress in successive stages and clearly recognizing each milestone achieved. Which of these groups will perform better in terms of learning retention and even personal fulfillment? This question inspired, in the 1970s, the experiments conducted by Edward Deci (1970), later incorporated into the Self-Determination Theory developed by Deci and Ryan (1985).

The results of this experiment are presented in the article "Effects of Externally Mediated Rewards on Intrinsic Motivation" and were later elaborated upon in the book "*Motivation and Self-Determination in Human Behavior*," in which the author, together with his colleague Richard Ryan, developed the Self-Determination Theory (SDT), whose pillars are based on offering a thorough analysis of basic and innate psychological needs, namely: autonomy, defined as the need that every human being has to feel in control of their own destiny, so that they have the freedom to make decisions, acting in accordance with their own values and interests; the second is competence, understood as the need to feel capable, to be effective, mastering skills that are mobilized when the individual interacts with the environment and takes on challenges; last but not least, the need for

relatedness, or as the authors emphasize, the need for belonging, defined as every human being's desire to feel connected, noticed, understood, and accepted through social and emotional bonds with others. Thus, healthy development, intrinsic motivation, and psychological well-being depend on the fulfillment of these three pillars: autonomy, competence, and relatedness

In traditional educational models, student motivation is strongly driven by external factors: grades, scores, passing, failing, and penalties. However, upon further analysis of human behavior based on Self--Determination Theory (SDT), Deci and Ryan (1985) argue that intrinsic motivation may not be as relevant when based on these control mechanisms, but rather arises more significantly from the psychological needs for competence and self-determination. According to the authors, "Intrinsic motivation is based on the organismic nee s to be competent and self-determining[1]" (DECI; RYAN, 1985, p. 5). Furthermore, they state that "the needs for competence and self-determination keep people involved in ongoing cycles of seeking and conquering optimal challenges[2]" (DECI; RYAN, 1985, p. 33). Thus, educational environments that promote autonomy, a sense of competence, and a sense of belonging tend to foster more enduring forms of engagement than those based exclusively on external rewards.

Based on these experiments and the study published by DECI and RYAN (1985), it is possible to understand how individuals tend to exhibit greater persistence, engagement, and dedication when they perceive concrete progress in their actions. In other words, the sense of competence and progress produces a significant motivational effect on learning. The study not only provides an understanding and description of these three basic needs for maintaining human motivation and engagement, but another factor, perhaps even more important, is the critique arising from the same experiment and its elaboration in the article and subsequently in the authors' book, namely: the critique of factors aimed at motivation that rely on external mechanisms, such as monetary rewards, and even the attempt to shape behavior through the use of punishment.

Regarding the factor of punishment as an element linked to grades and their reward factor, or to any need for behavior shaping, it is crucial to note what DEHAENE (2020), a more recent author, states: "Repeated punishments lead to discouragement, a type of physical and mental paralysis associated with stress and anxiety that, as has already been shown, inhibits learning" (DEHAENE, 2020, p.266).

Today, given this scenario, the implications of DECI and RYAN's findings seem to make more sense than ever, taking into account a society and a way of life in which, according to HAN (2015), functioning has shifted from being primarily driven by discipline to being driven by performance, the constant pursuit of positive stimuli, pleasure, and recognition. In this sense, it is not merely the profile of an organism that has evolved over the course of the species' refinement to face environmental challenges and perpetuate itself; it is its ultimate manifestation in a society that encourages " "

[1] Our translation: Intrinsic motivation is rooted in the fundamental needs to be competent and self-determined.

[2] Our translation: The convergence of evidence from various academic studies suggests that there are three needs of this nature: self-determination, competence, and interpersonal relationships.

behaviors, and in which people voluntarily become productive because they are enticed by symbolic rewards, likes, visibility, social approval, and a sense of fulfillment.

For adolescents who have grown up immersed in a digital culture characterized by immediacy, online interaction, and a focus on social recognition, traditional strategies for motivating students—such as the promise of future rewards ("this will be important for the ENEM" or "studying will lead to social advancement")—tend to have less impact than they did on previous generations. This scenario calls for the creation of educational experiences capable of offering meaning, a sense of belonging, and an immediate perception of progress. And this scenario is justified when, in Brazil alone, we observe the reality that nearly 90% of Brazilians over the age of 10 own a cell phone[3] and that, on average, Brazilians spend about 9 hours a day on their cell phones, with more than half of that time dedicated to entertainment and gaming[4].

According to Saviani (2025, p. 13), "educational work is the act of producing, directly and indirectly, in each individual, the humanity that is historically and collectively produced by the whole of humanity." To this end, it is necessary to define, through the curriculum, which elements of human culture should be socialized by educational institutions. In this sense, the development and implementation of the National Common Core Curriculum (BNCC) represent an effort to systematize the knowledge and learning considered essential for Brazilian Basic Education. Although debates remain regarding its theoretical foundations, limitations, and pedagogical implications, the BNCC constitutes a milestone in the attempt to clarify what all students have the right to learn, contributing to the curricular organization of education systems and to the guarantee of common educational standards at the national level.

Regarding this objective, progress can be recognized. However, when the focus shifts to what Saviani (2025, p. 13) identifies as the second object of education—namely, the "discovery of the most appropriate ways to achieve" the development of the skills and knowledge outlined in the curriculum—the scenario becomes more complex. Today we have a wide range of teaching methods, strategies, and tools at our disposal, yet their understanding and application still face numerous obstacles in school settings. Part of these difficulties relates to the growing commodification of education, in which approaches such as active methodologies, hybrid teaching, STEAM, and project-based learning are often presented as universal solutions and turned into showcases of innovation by companies and consulting firms detached from the daily reality of public schools and teaching practice—entities that commodify education, transforming it into lucrative business models where teaching becomes a mere commodity and undermines the work of teachers[5].

[3] Data provided by the Brazilian Institute of Geography and Statistics (IBGE). Nearly 90% of Brazilians over the age of 10 own a cell phone. Available at: https://educa.ibge.gov.br/jovens/materias-especiais/23125-quase-90-dos-brasileiros-acima-dos-10-anos-possuem-celular.html. Accessed on: June 1, 2026.

[4] Survey published by the G1 portal. Survey shows that Brazilians spend 9 hours a day on their cell phones or other electronic devices. Available at: https://g1.globo.com/hora1/noticia/2023/08/25/pesquisa-mostra-que-brasileiros-passam-9h-por-dia-ao-celular-ou-em-outros-aparelhos-eletronicos.ghtml. Accessed on: June 2, 2026.

[5] An in-depth discussion on the spread of active methodologies, hybrid teaching, and the relationship between pedagogical innovation and the commodification of education can be found in Silva (2022) in the

Added to this context are the profession's historical challenges: low salaries, little time for research and continuing education, work schedules spread across different institutions to supplement income, and difficulties in accessing the latest contributions from the learning sciences and neuroscience. Such studies have expanded our understanding of how the brain learns, what sparks students' curiosity, and which factors foster engagement in curricular subjects such as Mathematics, Philosophy, and Portuguese Language. Given this scenario, the question facing educators becomes increasingly urgent: how to teach in this context? How to promote meaningful learning for students who have such distinct demands, expectations, and ways of interacting? And how to design pedagogical experiences that take into account fundamental psychological needs—such as autonomy, competence, and belonging, highlighted by Deci and Ryan—in both planning and daily classroom practice?

2. From the desire to know to problem-solving: cognitive foundations of learning

In his work Metaphysics, Aristotle makes one of the most emblematic statements in the philosophical tradition, one that will certainly resonate to this day, making so much sense in the contemporary world: "all men by nature have a desire to know" (πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει); in stating this, he reinforces the understanding of many authors who write about what stimulates our learning—namely, curiosity—which is by no means an accident of the human condition, but one of its most fundamental characteristics. Right in the opening lines of Metaphysics, the philosopher states: "All men have, by nature, a desire to know: proof of this is the pleasure of sensations, for even apart from their utility, they please us in themselves." (ARISTOTLE, 1973, p.211).

This natural inclination toward knowledge finds support today in contemporary neuroscience research. In investigating the brain mechanisms of learning, Stanislas Dehaene (2020) argues that curiosity constitutes one of the fundamental drivers of cognitive development. For the author, "one of the foundations of active engagement is curiosity—the desire to learn or the thirst for knowledge" (DEHAENE, 2020, p. 255). More than a psychological trait, curiosity acts as an adaptive mechanism, guiding the organism toward the exploration of the environment and the acquisition of information relevant to survival. In the words of Dehaene (2020), "curiosity is a fundamental impulse of the organism: a driving force that compels us to act, just like hunger, thirst, the need for safety, or the desire to reproduce" (DEHAENE, 2020, p. 256).

By bringing neuroscience and learning together, Dehaene effectively updates Aristotle's assertion in *Metaphysics*, stating that "as Aristotle noted, we humans are born with a passion for knowledge, and we constantly seek out the new, actively exploring our environment to discover things we can learn" (DEHAENE, 2020, p. 256). In this vein, learning does not merely mean receiving information; it involves acting upon it, formulating hypotheses, experimenting with solutions, and reconstructing mental models of the world. For this reason,

thesis "EdTech and the Platformization of Education," which critically analyzes the influence of private foundations and institutes on the formulation and dissemination of these educational proposals in Brazil.

the author himself highlights the nature of curiosity as the "direct manifestation of children's motivation to understand the world and construct a model of it" (DEHAENE, 2020, p. 259); that is, knowing is, above all, an active attempt to produce explanations about reality.

This understanding helps explain why learning based exclusively on the passive presentation of content tends to produce limited results. The human brain learns most efficiently when called upon to actively participate in the construction of knowledge. As Dehaene points out, "to assimilate new concepts, active students constantly reformulate them in their own words or thoughts. Passive students, or, worse, distracted ones, will not benefit from any lesson, because their brains will not update their mental models of the world" (DEHAENE, 2020, p. 245). Learning, therefore, depends on the active mobilization of the student's cognitive structures, as the student moves from a merely receptive position to becoming a subject in the process of inquiry.

This active involvement also explains why concrete problems, challenges, and contextualized situations tend to produce more lasting learning. Dehaene presents experimental evidence that "deeper processing leaves a stronger mark on memory because it activates areas of the prefrontal cortex" (DEHAENE, 2020, p. 246), adding that "making a lesson deeper and more engaging facilitates the subsequent retention of information" (DEHAENE, 2020, p. 248). In other words, the depth of cognitive processing is directly influenced by the meaning the student attributes to the object of knowledge. It is no coincidence that the author states that "there is no single miracle method, but a whole range of approaches that force students to think for themselves" (DEHAENE, 2020, p. 248), such as practical activities, guided discussions, and problems that challenge students to formulate hypotheses and seek solutions.

This process is closely linked to the very functioning of the brain's reward systems. Contrary to common belief, dopamine is not activated solely by material rewards. Dehaene shows that "the discovery of previously unknown information brings its own reward: it activates the dopamine circuit" (DEHAENE, 2020, p. 256), and adds that "humans' appetite for knowledge passes through the dopamine circuit even when it involves strictly intellectual curiosity" (DEHAENE, 2020, p. 257). More than that, the anticipation of discovery is already capable of triggering this mechanism: "even before your curiosity is satisfied, the simple fact of knowing that you will soon have the answer excites the dopamine circuits. The anticipation of a positive event brings its own reward" (DEHAENE, 2020, p. 257). In this regard, the satisfaction produced by solving a problem or overcoming an intellectual challenge stems not only from external factors but from mechanisms intrinsic to the very functioning of the human brain.

This finding has crucial pedagogical implications. If the brain learns by anticipating, formulating hypotheses, and seeking answers to knowledge gaps, then teaching must be organized in a way that creates these cognitive gaps, transforming school content into a tool for interpreting and solving meaningful problems. This is not about abandoning the systematization of knowledge, but about reorganizing it around conceptual blocks capable of serving as intellectual tools for understanding reality. Curiosity itself, according to Dehaene, emerges "whenever our

brains detect a gap between what we already know and what we would like to know—a potential area for learning" (DEHAENE, 2020, p. 259). The pedagogical problem, in this sense, functions precisely as this "gap" that drives the student to mobilize knowledge and construct new explanatory models.

However, advocating for active learning does not imply relinquishing the teacher's organizing role. On the contrary, Dehaene criticizes both the passivity of exclusively expository teaching and the illusion of completely spontaneous discovery-based learning. For him, "explicit pedagogical guidance is indispensable" and "the most effective teaching strategies are those that lead students to become actively engaged, while offering a well-founded pedagogical progression, closely monitored step by step by the teacher" (DEHAENE, 2020, p. 252). Meaningful learning therefore requires qualified mediation, capable of organizing the student's journey, offering gradual challenges and conceptual tools that allow for advancement to increasingly complex levels of understanding.

In this sense, curiosity itself can be understood as a regulatory force of learning. For Dehaene, "curiosity is the direct manifestation of children's motivation to understand the world and construct a model of it" (DEHAENE, 2020, p. 259), occurring whenever "our brains detect a gap between what we already know and what we would like to know" (DEHAENE, 2020, p. 259). This formulation aligns directly with what Deci and Ryan (1985) describe as the basic psychological needs for competence and self-determination: the satisfaction derived from overcoming a challenge, understanding a phenomenon, or making progress on a task does not stem solely from external rewards, but from the very functioning of the human organism in the face of acquiring new knowledge.

From this perspective, problem-based learning ceases to be merely a methodology and comes to represent a way of organizing instruction in harmony with the way the human brain has evolved to learn. The problem acts as a trigger for curiosity; investigation mobilizes concepts; resolution produces a sense of competence; and the perception of progress reinforces continued engagement. More than a teaching resource, it is a strategy capable of preserving and enhancing a disposition inherent to the human condition: the desire to know. Thus, the school can transform the knowledge historically produced by humanity into living tools for understanding and acting upon the world, approaching what Saviani (2025) understands as the very purpose of educational work. Consequently, approaches such as gamification can be understood not as a replacement for the curriculum or teacher mediation, but as a way to organize pedagogical experiences that respect the learner's cognitive functioning, integrating curiosity, progression, a sense of competence, and active participation in the construction of knowledge.

3. Methodology

This research is characterized as a qualitative, applied study, which takes the form of a pedagogical experience report, developed within the context of Full-Time High School. It was conducted throughout the 2024 school year with students in the 1st, 2nd, and 3rd grades at the Prefeito Joaldo Lima de Carvalho Center of Excellence, located in Itabaianinha, Sergipe, involving the curriculum components of Philosophy, Mathematics, and Portuguese Language.

The data analyzed were derived from participant observation of the teachers involved, records of the activities carried out, student work, and monitoring of the teams' performance and engagement during the implementation of the gamified approach.

4. Gamification of an Academic Year for the Curriculum Components of Philosophy, Mathematics, and Portuguese Language

This section of the present article examines and presents the application of an innovative pedagogical proposal that seeks to address the challenges listed above through the integration of gamification with other teaching methodologies. Furthermore, at the end of this section, we will demonstrate how we aligned the use of generative artificial intelligence with the practice of gamification.

The experience described was conducted with students in the first, second, and third grades of full-time high school at the Prefeito Joaldo Lima de Carvalho Center of Excellence, a full-time high school located in the city of Itabaianinha in the interior of Sergipe. However, it is important to note that a significant portion of the gamified activities took place with first-grade classes. Our main objective with this methodological approach is to make the teaching of Philosophy, Mathematics, and Portuguese more accessible and engaging, as well as to foster critical reflection on the implications of these technologies in contemporary society.

The relationship between games and education is not a contemporary innovation, but rather dates back to the pedagogical tradition of Classical Antiquity. Studies on the history of play show that, since Ancient Greece, play and games have been understood as important educational tools (ESPÍRITO SANTO, 2012).

Plato, for example, argued that children's education should occur in a manner compatible with their nature, valuing playful activities as preparation for civic and philosophical life. Aristotle, in turn, recognized the importance of play and leisure (scholé) as necessary elements for human development and the balance between effort and rest, also attributing to them a preparatory role for adult life.

It is no coincidence that the word "school" has its etymological root in the idea of entertainment, leisure, time for recreation—an activity vital to the organization of Greek society and the class distinctions within it. On this point, we turn to an illustrative passage from Saviani's text (2025):

> School, in Greek, means "the place of leisure." The time set aside for leisure. Those who had leisure, who did not need to work to survive, had to occupy their free time, and this occupation of leisure was expressed by the term school. In the Middle Ages, the Latin expression otium cum dignitate, or " "—"leisure with dignity"—came to the fore, that is, the way of occupying one's free time in a noble and dignified manner. The word "gymnasium" has a similar origin. A gymnasium was, and still is, the place where games and gymnastics are practiced; it was, therefore, the place used by those who had leisure, free time, and idleness. Saviani (2025, p. 81).

The use of games in Greek education, which, like school, was intended only for the landowning class—those who did not need to work. Furthermore, this type of education was not limited to entertainment; it was a way to prepare students for the complexities of logical thinking and the practice of politics. Through games involving logic and reasoning, young students were gradually introduced to abstract thinking and moral issues, essential skills for studying and exercising citizenship.

The ability to operate with abstract concepts is a central feature of both Philosophy and Mathematics. In turn, the Portuguese language plays a fundamental role by providing the linguistic tools necessary for the interpretation, communication, and argumentative construction of these concepts, aiming for the most appropriate rules of communication so as not to create bottlenecks. However, even in the study of the Portuguese language—which is commonplace, as it is part of our daily lives—students complain about the difficulty in understanding grammatical rules and the rules of textual construction. Introducing multiple forms of literacy—beyond those that rely on text and oral expression—is a way to incorporate, as DEHAENE (2020) defines active strategies, multiple approaches that enable students to think independently and view certain concepts in mathematics, philosophy, and the Portuguese language from different perspectives.

It was with this goal in mind that, during the 2024 school year, we developed a gamified methodological approach at that educational institution for the subjects of Mathematics, Portuguese Language, and Philosophy. The proposal encompassed both the use of games such as Kahoot and a gamified design of pedagogical practice in these subjects. This consists not only of using games as teaching resources but also of incorporating the concept of games that involve certain skills and attitudes that are mobilized, according to KAPP (2012):

> The skills required include higher-order problem-solving skills. While playing the game, the player must: Think strategically about positioning, analyze opponents' strengths and weaknesses, plan how to achieve game objectives, and execute those plans; Master resource management—managing people, money, food, and natural resources—and learn to acquire and apply force multipliers such as knowledge and technology; Interact with systems and understand the interaction of variables; multi-task, manage complexity, respond to rapidly changing scenarios, and make decisions; learn to make compromises and trade-offs in satisfying the needs of diverse constituencies; manage complex relationships; and exercise leadership, team building, negotiation, and collaboration.[6] (KAPP, 2012, pp. 110–111).

[6] Our translation: The required skills include higher-order problem-solving competencies. During gameplay, the player must: Think strategically about their positioning, analyze opponents' strengths and weaknesses, plan how to achieve the game's objectives, and execute those plans; Master resource management—managing people, money, food, and natural resources—and learn to acquire and apply force multipliers, such as knowledge and technology; Interact with systems and understand the interac-

Our proposal aimed to integrate gamified thinking into the teaching process, fostering lessons and moments of interaction with students that incorporated challenges, tracking of learning progress and student achievements, an understanding of games, and how to use competition in a fair and healthy way, as well as the development of a sense of cooperation. All of this initially began to be implemented in the very first days of class, when the concept of gamification was explained to the students. The concept of gamification that guided our work proposal was the one coined by (LEE; HAMMER, 2011, p.01): "gamification, defined as the use of game mechanics, dynamics, and frameworks to promote desired behaviors.[7]" in which game elements are inserted into non-game spaces, with the purpose of fostering greater motivation and engagement in school settings, aiming to thus, in line with the concepts of Deci and Ryan, address those needs inherent to human beings.

Having established this initial discussion, we proceeded to reflect with the students on what games are, how they are part of their daily lives, and how their dynamics could be incorporated into the school environment and the practices of the Philosophy, Mathematics, and Portuguese Language curriculum components. Based on this dialogue, we presented the activity plan to be developed throughout the school year, with the Classical Knowledge Seminar as its starting point.

In this activity, students were organized into teams of five to six members and received detailed instructions on how the seminar would work, the evaluation criteria, and the scoring rules. Each group was challenged to create a poster, using collage techniques, textual organization, and the interplay between images, words, and graphic elements, to serve as the basis for a presentation on the emergence of Philosophy and Mathematics in Antiquity. To this end, we provided poster board, blunt-tipped scissors, glue, printed images, textbooks, and supplementary materials in the fields of Philosophy, Mathematics, and History. After two weeks of preparation, the teams presented their work, establishing connections between the materials they produced and the content studied in class.

The presentations lasted fifteen to twenty minutes and were evaluated by a panel of judges composed of high school sophomores. These students were selected in advance and participated in a training session to understand the pedagogical proposal and the evaluation criteria. All participants received, in advance, a rubric containing the indicators that would be considered during the activity, ensuring transparency and clarity in the process. At the end, the top-ranked teams (first, second, and third place) were awarded prizes. To make this stage possible, we established partnerships with local businesses, including pizzerias, açaí shops, restaurants, and snack bars, which collaborated by offering discounts and, in some cases, free prizes.

The points earned in each challenge did not end with the seminar itself but were incorporated into a continuous progression system that accompanied the entire gamified proposal. These points were added to

tion between different variables; Multitask, manage complexity, respond to rapidly changing scenarios, and make decisions; Learn to make concessions and weigh choices to meet the needs of different groups; Manage complex relationships; and Exercise leadership, teamwork, negotiation, and collaboration.

[7] Our translation: Gamification, defined as the use of game mechanics, dynamics, and structures to promote desired behaviors

the other activities carried out throughout the year, including the Philosophical Treasure Hunt, a board game created and refined together with the students themselves. In this activity, the classes were organized into teams that had to solve challenges related to the content covered during the semester, involving topics such as the pre-Socratic philosophers, the philosophy of Plato and Aristotle, the definition of philosophy, and other topics included in the curriculum.

All team performance was recorded in a leaderboard shared weekly with the leaders of each group; for better understanding, we have included an image of the leaderboard in Figure 1. In addition to their scores, each team chose a name, a symbol, and a battle cry, strengthening their sense of belonging and collective identity. Throughout the school year, new gamified activities were incorporated into the school's dynamics, including investigative challenges, clues scattered throughout the school grounds, and missions related to the content of the subjects. Starting in the second semester, the students' own grades in Philosophy, Mathematics, and Portuguese Language were incorporated into the scoring system, strengthening the connection between the playful activities and academic performance. During this same period, the challenges became more complex, and the competition expanded beyond teams within the same class to include different high school grade levels.

Figure 1 – Arena Table, where students' scores were displayed. Table for the 10th grade of the Full-Time High School Program.

Source: Authors' collection (2024).

Figure 2 – Construction of the mural/poster for the seminar.

Source: Authors' collection (2024).

It is important to note that all gamified activities were designed based on the curriculum content of the relevant subjects, so that the playful and competitive elements did not replace learning but rather served as strategies to stimulate interest, a sense of competence, cooperation, and student agency.

From November through the end of the school year, the final phase of the initiative took place with our "Solidarity Christmas" campaign, which involved earning points by donating food. Each food item was worth a certain number of points, but in addition to food, points were also awarded for letters written to children, families,

and people in general who were in some state of vulnerability. The students got involved by collecting food at markets and asking relatives for donations; in total, we were able to put together 30 food baskets, collecting about 200 food items, including beans, rice, milk, couscous, and flour. And another 300 letters. The culmination took place on the last day of class, when the students, together with the teachers, delivered the food to several local communities and NGOs, such as the Fabinho do Abrigo Institute.

Figure 3 – Delivery of food and letters collected by students to the Fabiano do Abrigo Institute.

Source: Authors' collection (2024).

Figure 4 – Delivery to the community of the food and letters collected by the students.

Source: Authors' collection (2024).

Gamification, defined as the application of game design elements in non-game contexts, has gained prominence in education as an effective strategy for increasing student engagement and motivation. In the teaching of Philosophy, Mathematics, and Portuguese Language, this approach can be especially useful to help students grasp complex concepts, making learning a more dynamic and interactive experience.

Gamification promotes active student interaction, turning them into active participants rather than passive recipients of information. The introduction of game elements, such as points, levels, and rewards, transforms the learning process into an engaging challenge, encouraging students to continually push themselves. In education, this approach can help demystify difficult concepts and increase content comprehension and retention.

At the Prefeito Joaldo Lima de Carvalho Center of Excellence, gamification was implemented through activities that encourage active student participation. The Kahoot platform, for example, was used to create interactive quizzes that test students' knowledge of Philosophy, Mathematics, and Portuguese Language in a fun and competitive way. In addition, the game "Treasure Hunt," an original creation, challenged students to solve philosophical puzzles linked to mathematics and Portuguese language while participating in a group competition.

The "Philosophical Treasure Hunt" was developed as an interdisciplinary activity that combines philosophy with elements of traditional games such as cards, board games, and physical challenges, like hopscotch. Students were divided into teams and competed against each other to solve a series of challenges that required the application of philosophical concepts, mathematical formulas, and grammatical rules. Each challenge was linked to a philosopher or school of thought, encouraging students to delve deeper into the subject matter to advance in the game.

The game's structure was designed to promote collaboration, critical thinking, and the practical application of concepts learned in the classroom. Additionally, healthy competition among the teams increased student engagement and created a more dynamic learning environment. The impact of this activity was remarkable, with students demonstrating greater interest in philosophical topics, math classes, and writing and grammar rules.

The implementation of gamification in education raises a number of questions about the role of the teacher and classroom dynamics. While gamification can make learning more engaging, it is essential that teachers maintain a balance between entertainment and academic rigor. The use of games should be viewed as a complementary and y tool that aids in reinforcing content and motivating students, but does not replace the importance of philosophical debate and critical analysis.

Gamification, therefore, must be integrated in a conscious and planned manner, ensuring that pedagogical objectives are achieved. In the case of the "Philosophical Treasure Hunt," the activity was carefully designed so that each challenge served as an opportunity for reflection and the practical application of philosophical concepts, avoiding superficiality.

Generative artificial intelligence, such as advanced language models, has revolutionized the educational landscape by supporting the creation of personalized content, interactive tutorials, and adaptive learning environments. In education, these emerging technologies can play a crucial role by facilitating the understanding of complex concepts and promoting student engagement through innovative methods.

By integrating artificial intelligence into teaching, educators can use these tools to create interactive dialogues that simulate philosophical and mathematical discussions, helping students explore different perspectives on a specific topic. This approach not only stimulates critical thinking but also encourages students to formulate their own ideas and arguments, strengthening their reasoning and reflection skills.

One of the most promising ways to apply artificial intelligence in education is through platforms that offer personalized tutorials and immediate *feedback*. These platforms can analyze students' progress, identify areas of difficulty, and suggest study resources tailored to each student's individual needs. At the Prefeito Joaldo Lima de Carvalho Center of Excellence, experiments with the use of AI in teaching these curriculum components have proven particularly effective in reinforcing the learning of abstract concepts and in preparing students for exams.

For example, an AI system can be programmed to generate questions that challenge students to apply concepts learned in the classroom to new contexts. This type of interaction not only tests acquired knowledge but also promotes a deeper understanding by requiring students to think critically about how these concepts apply to different scenarios. Furthermore, AI can provide immediate, y *feedback*, allowing students to correct their mistakes and learn continuously and efficiently.

One of the major advantages of artificial intelligence in the field of education is the ability to personalize instruction according to each student's needs and pace. In the teaching of philosophy, this personalization is particularly valuable, as students often have varying levels of understanding and interest in philosophical topics.

AI can be used to monitor students' progress in real time, automatically adjusting the difficulty level of materials and exercises as needed. This ensures that all students, regardless of their initial abilities, can keep up with the content and progress at their own pace. Furthermore, by identifying areas where a student is struggling, AI can suggest additional activities or specific reviews, promoting more effective and targeted learning.

In the context of the Prefeito Joaldo Lima de Carvalho Center of Excellence, the use of artificial intelligence to personalize instruction allowed teachers to focus on more challenging aspects of the curriculum, while AI assisted students in reviewing and consolidating fundamental concepts. This not only optimized class time but also significantly improved student performance on assessments and in discussions.

Conclusion

The combination of gamification and artificial intelligence in the teaching of philosophy, as demonstrated by the experience of the Prefeito Joaldo Lima de Carvalho Center of Excellence, offers a model for the future of education. By integrating these technologies in a conscious and balanced manner, it is possible to create a more engaging, personalized, and effective learning environment that prepares students not only for academic challenges but also to critically reflect on the role of these technologies in society.

Although the reported experience was not structured as a quantitative experimental study, the observed results indicate that the integration of gamification, interdisciplinarity, and artificial intelligence can foster student engagement, collaboration, and autonomy . Looking ahead, we intend to expand the research by using systematic instruments to assess learning and student perception, producing empirical evidence that allows for a deeper discussion of the pedagogical potential of these strategies, as well as presenting in detail what the board game called "Treasure Hunt" is and how it works.

References

ARISTÓTELES. *Metafísica*. Tradução de Vincenzo Cocco. São Paulo: Abril Cultural, 1973. (Coleção Os Pensadores).

BRASIL. Ministério da Educação. *Base Nacional Comum Curricular (BNCC)*. Brasília: MEC, 2018.

DECI, Edward L. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, Washington, v. 18, n. 1, p. 105-115, 1971.

DECI, Edward L.; RYAN, Richard M. *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press, 1985.

DEHAENE, Stanislas. *Como aprendemos: por que o cérebro aprende melhor do que qualquer máquina... por enquanto*. Tradução de Rejane Rubino. Rio de Janeiro: Record, 2020.

ESPÍRITO SANTO, José Marcelo do. *A dimensão educativa dos jogos na Grécia Antiga*. São Paulo: Annablume, 2012.

HAN, Byung-Chul. *Sociedade do cansaço*. Tradução de Enio Paulo Giachini. Petrópolis: Vozes, 2015.

KAPP, Karl M. *The gamification of learning and instruction: game-based methods and strategies for training and education*. San Francisco: Pfeiffer, 2012.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA (IBGE). *Quase 90% dos brasileiros acima dos 10 anos possuem celular*. Educa IBGE, Rio de Janeiro, [s.d.]. Disponível em: https://educa.ibge.gov.br/jovens/materias-especiais/23125-quase-90-dos-brasileiros-acima-dos-10-anos-possuem-celular.html. Acesso em: 10 jun. 2026.

LEE, Joey J.; HAMMER, Jessica. Gamification in education: what, how, why bother? *Academic Exchange Quarterly*, v. 15, n. 2, p. 1-5, 2011.

PESQUISA mostra que brasileiros passam 9h por dia ao celular ou em outros aparelhos eletrônicos. G1 Hora 1, Rio de Janeiro, 25 ago. 2023. Disponível em: https://g1.globo.com/hora1/noticia/2023/08/25/pesquisa-mostra-que-brasileiros-passam-9h-por-dia-ao-celular-ou-em-outros-aparelhos-eletronicos.ghtml. Acesso em: 10 jun. 2026.

SAVIANI, Dermeval. *Pedagogia histórico-crítica: primeiras aproximações*. 12. ed. Campinas: Autores Associados, 2025.

SILVA, Paula Alves Pereira. *EdTech e a plataformização da educação*. 2022. Tese (Doutorado em Educação) – UERJ, Rio de Janeiro, 2022.