

## FROM ANALOG TO DIGITAL: PANDEMIC GAME AS PEDAGOGICAL POTENTIAL FOR TEACHING SCIENCES IN DIGITAL ENVIRONMENTS

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### ABSTRACT

Since the Covid-19 pandemic, there has been a noticeable growth in the sale/interaction with digital games. This study analyzed the contributions of digital games that incorporate health-related information into their narratives, specifically focusing on the epidemiological aspects of a pandemic. Based on a literature review regarding the relationship between digital games and digital teaching spaces, the game *Pandemic* was chosen as the object of study due to its hybrid nature (Analog/Digital), and it was analyzed through the

principles of Gameplay Heuristic Evaluation. After analysis, the potential of this digital artifact for discussing the Biology curriculum was highlighted, as well as the specific development of a didactic sequence linked to the contents of the field. It was observed that games like *Pandemic* are capable of contributing to the development of pedagogical interventions that address both directly and indirectly the health issues surrounding a health crisis, such as a pandemic.

**KEYWORDS:** Digital Games, Hybrid Games, *Pandemic*, Science Teaching, Biology Teaching.

## DO ANALÓGICO AO DIGITAL: O JOGO *PANDEMIC* COMO POTENCIAL PEDAGÓGICO PARA O ENSINO DE CIÊNCIAS EM AMBIENTES DIGITAIS

### RESUMO

Desde a Pandemia da Covid-19 vem sendo registrado o crescimento da venda/interação de/com jogos digitais. Este estudo analisou as contribuições dos jogos digitais que trazem em suas narrativas informações vinculadas à Saúde, neste caso, aos aspectos epidemiológicos de uma pandemia. Para isso, com base em um levantamento da literatura, referente à relação dos jogos digitais e espaços digitais de ensino, o jogo *Pandemic* foi escolhido como objeto de estudo por sua característica híbrida (Analógica/Digital), sendo analisado através dos

princípios da Avaliação Heurística de Jogabilidade. Após análise foram apontadas as potencialidades deste artefato digital para a discussão do currículo de Biologia, além do desenvolvimento específico de uma sequência didática articulada aos conteúdos da área. Foi possível perceber que jogos, como o *Pandemic*, são capazes de contribuir para o desenvolvimento de intervenções pedagógicas que tratem direta e indiretamente das questões sanitárias que envolvem uma crise sanitária, como uma pandemia.

**PALAVRAS-CHAVE:** Jogos Digitais, Jogos Híbridos, Pandemia, Ensino de Ciências, Ensino de Biologia.



## 1 INTRODUCTION

The mediation of digital games in different teaching processes has been consolidating over the last ten years in the Brazilian scenario, especially through postgraduate research highlighting the contributions of these interactive environments. However, contemporary literature still indicates that such results do not effectively reflect in school practices (Meira & Blikstein, 2019). In other words, there is a lack of continuity in the school organization, in the medium to long term, regarding actions initially developed during investigations or academic studies. Therefore, it is important to understand that "the organization of the school space does not change by itself through the use of video games in school, or even any other technology [...] this type of reductionism is [therefore] common" (Meira & Blikstein, 2019, p. 27).

Even in the face of this reductionist practice, the interaction of people of different age groups with these cultural artifacts has been growing every day (Sioux Group, 2020), especially since the onset of the Covid-19 pandemic in 2020. This situation is due to the isolation and social distancing measures, which have favoured the increase in sales of digital games, marking a unique scenario for this industry in history (Perrin, 2020).

This growth can also be evidenced in the interaction of players with massive multiplayer games, which according to Verizon in March 2020, saw a 75% increase in online players (Cantagesso, 2020b). Valve Corporation also recorded that on the 15th of the same month, Steam (an online gaming platform) reached a record of 20 million players logged in simultaneously (Cantagesso, 2020a).

This interaction was not only about consuming existing games for entertainment, staying close to friends, and/or making new friends, but also reflected in the production of games whose narrative theme was Coronavirus, such as Coronavirus Quarantine Simulator (available for PC and Steam) and Heroes of the *Pandemic* (available for mobile - Android and iOS - and Web), among others. Beyond these examples, it is worth noting the emergence of actions by young people who also see games as a space for production and protagonism, such as the case of an 11-year-old teenager residing in the metropolitan region of Porto Alegre, who won the National Games Contest: All Together Against the Coronavirus, created by the Supergeeks company. The game in question aimed to rescue the elderly walking the streets to their homes, administer vaccines, and fight the virus itself.

In this sense, based on the context presented above, it is possible to infer different practices present in Game-Based Learning. This includes interacting with commercial games with different themes, as well as creating space to develop and/or interact with games with more educational themes, characterizing what has been called in the literature as Serious Games.

These possibilities can expand the meaning attribution to teachers and students in the didactic-pedagogical scenarios adopted in schools, especially now that those in the private network, are conducting their practices remotely (Brazil, 2020). Games constitute an interactive environment that arouses the interest of different generations, challenging their players to think of different ways to solve problems, raising and testing hypotheses, and acting in a participative and collaborative manner, being protagonists of their own formative paths.

Therefore, it is understood that games can constitute spaces of multiple meanings and significances regarding the current context in which they are immersed, marked by sanitary, public health, economic, educational, cultural, psychological, among other issues, which have been intensified due to the pandemic that has affected humanity since December 2019, intensified from March 2020 onwards, and still causes continuous effects in interaction with digital media. In this sense, acknowledging this conjuncture, the present study aimed to analyze the contributions of digital games that bring in their narratives information about different aspects of public health, mainly linking to the process of teaching natural sciences. For this purpose, the hybrid game Pandemic (which has analog and digital versions) was credited as the main object of study and analysis.

## 2 THE ADOPTION OF DIGITAL GAMES SINCE THE PANDEMIC

According to research in the gaming sector by Superdata company (Superdata Research, 2020), "digital game revenue totaled \$10.2 billion in May, a 3% decrease from the record total of \$10.5 billion in April" during the period of social isolation caused by Covid-19. In this sense, the adoption (purchase and consumption) of digital games in the entertainment realm has been surpassing unprecedented numbers in this business sector ever since.

However, are digital games effectively integrated into the educational process during training processes? This question focuses on two common possible paths: a) digital games used only as asynchronous supplements or dissociated from the discussions obtained during classes, and to a lesser extent, b) as guiding artifacts for interventions conducted on virtual platforms, with students being active users of such games, often with a discursive character, meaning interaction occurs critically throughout the course of the class.

The number of games created and distributed across various stores or app storage platforms has been growing not only in the entertainment sphere but also provides valuable insights into the characteristics of contemporary society. Games created by educational institutions and private companies, such as Coronavirus Quiz (Dor Consultoria), Virus Combat (Lizards Games), Covid-19: Did you know? (UFMG), Operation Antivirus (UNICEF and FGV), And among many others already mentioned in this study, they stimulate information through challenges ranging from more modern styles to the classic question-and-answer mechanics regarding health-related issues.

In addition, within this context, researchers in the fields of Health and Education are increasingly focusing on sharing experiences regarding the potential of integrating digital games into pedagogical practices related to teaching processes in digital environments. Thus, the present study conducted a simplified literature review (Flick, 2009) of this research, using the Capes Periodicals Portal and Google Scholar as search platforms. The search was based on the descriptors Digital Games, Pandemic, and Digital Education (Table 1), considering only peer-reviewed articles to ensure greater rigor in the quality of the identified corpus.

Among the works exemplifying these studies, which serve as a basis for reflection on the development of possible intervention plans grounded not only in digital games but also in other contemporary digital artifacts, the following could be listed:

**Table 1: Examples of studies discussing the mediation of remote teaching amid the Covid-19 pandemic through digital games**

Productions Type	Article Title	Themes / Area
Article from <i>LAGOS Magazine</i>	<i>The New Normal of Education, When the Virtual is Not Fictional</i> (Oliveira & Carreiro, 2020)	Blended Learning, Human Health and Society (Humanities)
Article from <i>Research, Society and Development Magazine</i>	<i>Teaching Practices and Literacies in Times of the Covid-19 Pandemic</i> (Sampaio, 2020)	Dissemination and Scientific Literacy (Natural Sciences)
Article from <i>Encantar Magazine - Education, Culture and Society</i>	<i>Education and Covid-19: Digital Technologies Mediating Learning in Times of Pandemic</i> (Júnior & Monteiro, 2020)	Digital Technologies, Remote Inclusion (Special Education)
Article from <i>Brazilian Journal of Development Magazine</i>	<i>Use of the Plague Inc. Game: a possibility for Science Teaching in times of Covid-19</i> (Nascimento; Benedetti & Santos, 2020)	Epidemiology and Virology (Biology); Chemical Reactions (Chemistry)

Source: Authors

In summary, the articles portrayed in the table above provide only a few examples of how digital games have been considered, among so many contemporary technological artifacts available, in the increase of the still disordered interaction with digital environments (Morais, 2020). However, the variety of teaching fields that are focusing on investigating new (and old) (re)active forms of student participation is a mark of this period of paradigmatic rupture in which the teaching process has undergone profound changes (Morais, 2020). This includes intensified interactions among participants within the school environment, including the family sphere itself.

Studies, such as the one by Oliveira and Carreiro (2020), rightly praise the possibility of a future hybrid education, in which digital artifacts, such as games, are no longer mere didactic tools (Rodrigues, 2017), dissociated from the very essence of teacher planning. Instead, they assume a prominent role, even in discussions of topics related to Human Health.

In addition, Sampaio (2020) is more incisive in stating that digital games are potential sources of appreciation for the scientific literacy process, based on the need to encourage the safe and reliable discussion of important topics, in this case, linked to the Natural Sciences. In an era in which the so-called Fake News (Dantas & Rocha, 2018) question scientific pillars and compromise advances in the field of Public Health, digital games can help to counterbalance the teaching process in an engaging perspective.

On the other hand, teaching processes that occur through digital artifacts are distant from the principles of traditional distance education, but they incorporate the use of both asynchronous and synchronous tools in their mechanics (Júnior & Monteiro, 2020). Given this context, how could digital games integrate into these practices? At this point, it is crucial to highlight the role of teacher mediation in understanding the appropriate moment to use the gameplay/narrative from games

without harming the very viability of the formative process, considering factors such as available time and the conditions established in the teacher-student communication, whether direct or indirect.

Finally, the object of study used by Nascimento et al. (2020), the digital game *Plague Inc.*, similar to the present study, also serves as a kind of simulator for discussions on epidemiological issues since the Covid-19 pandemic. However, unlike the game *Pandemic*, the former does not have a hybrid characteristic, thus limiting its exclusive use in the classroom. Additionally, its theoretical approach does not delve deeply into the different terms and contexts related to the major areas of Epidemiology and Virology.

Even so, studies such as that of Nascimento et al (2020, p. 25909) place the game in a position of "student engagement and involvement with multiple contents of the discipline of Biology and other disciplines, such as Geography, Mathematics, among others; assuming an interdisciplinary aspect", a factor of paramount importance in contemporaneity. Therefore, games such as *Plague Inc.* and *Pandemic* are understood as more opportunities to stimulate this student engagement in this period.

Thus, this brief analysis confirms what was stated earlier, namely, there is much discussion about the potential of digital games, but their presence in the school environment as a digital artifact with diverse potentialities is still limited. The articles propose to analyze in a more general way the presence of games in formative spaces, but they lack data and evidence on how they have been used. It is believed that this difficulty in establishing a space mediated by games is due to issues related to the lack of minimum infrastructure within schools (for face-to-face practices), in teachers' homes (in digital platforms), and their lack of experience with the gaming universe, thus not allowing them to attribute a relevant meaning to the narratives of these artifacts in their teaching practices.

## 2.1 Understanding the Hybrid Game Called *Pandemic*

Following the issues raised so far, the next sections of this article will detail a proposal for the elaboration of a didactic sequence that contemplates themes related to the areas that make up the Teaching of Natural Sciences, specifically, focusing on Biology. To achieve this, both the gameplay and the narrative of the hybrid game *Pandemic* will serve as guides. In short, the game adopted as the object of analysis of this study was created and published in a global print run in 2008 by game designer Matt Leacock, through the publisher Z-Man Games. It was subsequently released in Brazil by the publisher Devir and, more recently, by Galápagos Games.

In general, the game *Pandemic* has its origin as a modern (analogic) board game. However, in early 2019, Asmodee Digital, the new rights holder for the game, released the digital version on platforms such as Play Store, App Store, Steam, Xbox and Nintendo Switch. In both versions, up to four players play cooperatively to identify the cures for four deadly viruses afflicting the world.

In the game, the board represents all five continents and the main metropolises with the highest population density today. Each player chooses a character, in this case, a health professional (doctor, nurse, quarantine specialist, scientist, and other characters). The game



mechanics involve preventing or minimizing the level of contagion, while the conditions for enabling the cure are identified.

Thanks to its multiplatform characteristic and its affordable price (compared to other productions of the digital genre), as well as allowing the use of up to four people, the game *Pandemic* is justified as a potentially valuable artifact when it is inserted during mediation in the process of the Teaching of Natural Sciences. Finally, its narrative, despite its playful profile, is consistent with the veracity of the themes that involve, mainly, Epidemiology, Virology, Chemical Reactions and the Energy Need of Living Organisms.



Figure 1: The *Pandemic* hybrid game. On the left the analogic version and on the right the digital version. (Source: <http://tabulaquadrada.com.br/> and <https://store.steampowered.com/?l=portuguese>)

### 3 METHODOLOGICAL TRAJECTORY

Based on the narrative/gameplay highlighted earlier, it is possible to perceive the potential of the game for the development of pedagogical interventions consistent with the curricular demands present in the field of Natural Sciences, given the profound changes caused by the pandemic regarding interaction with digital artifacts. In summary, to present the possibilities of mediation of the Science Teaching process through the digital game *Pandemic*, the present study will be based on the methodological principles of Desurville and Charlotte (2009) of Heuristic Evaluation of Gameplay.

This methodological approach presents the following dimensions for the analysis of a digital game: a) Gameplay, b) Narrative, c) Mechanics and d) Usability. Each of these dimensions are used to evaluate the impact they have on their users, showing the influence and relevance of the game in question in the actions and, mainly, in the intrinsic (user x game) and extrinsic (user x beyond the game) experiences.

Based on the information obtained from the analysis of the *Pandemic*, we developed a didactic sequence by uniting the classic theoretical assumptions of Zabala (2015) with the curricular contents drawn from the Natural Sciences domain extracted from the narrative of the game itself. In short, based on Zabala (2015) it is possible to define criteria for the content adopted in the conceptual, factual, procedural, and/or attitudinal spheres, each varying according to the player's interaction with the game and how the information provided contributes to the user's

theoretical understanding of, in this case, the issues related to the thematic object under discussion.

Finally, following the principles of Science, Technology, Society and Environment (CTSA), an approach that associates the contents of Natural Sciences with discussions of a technological (digital) nature and its impacts on the social and environmental spheres, a didactic sequence was elaborated. Such production is restricted, both in the practical and theoretical spheres, to the possibilities of debating the narrative of the game with issues involving curricular objects that make up these sciences (Conrado; Nunes-Neto & El-Hani, 2015), specifically, in the field of Biology.

#### 4 RESULTS AND DISCUSSION

The *Pandemic* game, as mentioned before, has a hybrid feature, featuring both analog and digital format. This condition provides continuity for teaching practices that do not focus exclusively on the classroom space. Thus, the themes presented here and the proposed didactic sequence that follows are feasible both in person and by providing students with formative interaction in digital environments.

In short, the National Common Curriculum Base itself (Brazil, 2017, p. 479) highlights the upcoming possibility: "digital technologies [...] allow everyone to be a potential producer, further imbricating the practices of reading and production (and of consumption and circulation/reception)". In this sense, digital games are understood within this teaching premise raised in the BNCC (2017).

Therefore, the digital game *Pandemic* and the others mentioned here come together as artifacts that allow, in fact, a space of catharsis for those involved in the teaching process. On the one hand, by the teachers, who systematize their curricular objects linked to Human Health, for example, and by the students who consolidate their knowledge. In these moments, both teachers and students have entertainment and learn through the gameplay and narratives present in the games.

Aware of these nuances for the immersion of digital games in teaching processes, the present study uses the *Pandemic* to present the possibilities of curricular association of the Natural Sciences with the dimensions (Desurvire & Charlotte, 2009) of the game in question. For this association, the study will reference the National Curriculum Parameters +: Natural Sciences, Mathematics, and its Technologies (Brazil, 2002), which will be used to describe the contents identified in the dimensions and in the teacher's own mediation in the game.

In the field of Chemistry, the game *Pandemic*, the Structuring Theme: Quantum Models and Chemical Properties (Brazil, 2002), is presented at a time in which players are faced with the need to understand how scientific research in the laboratory sphere is essential for the containment of viral organisms or the formulation of effective drugs and vaccines against such organisms. In *Pandemic*, the gameplay and mechanics dimensions are the ones that stand out the most in showcasing Chemistry content.

As far as Physics is concerned, the association is indirect when we consider in game mechanics that need to create and establish communication channels between the players and

their fictitious actions to facilitate the containment of viral organisms around the represented map. The Structuring Theme: Electrical Equipment and Telecommunications (Brazil, 2002) reaffirms the importance of contemporary communications not only in practice, but in the scientific essence behind them and underscoring the principles of a teaching focused on sharing and constant scientific literacy for/of students.

Finally, in the case of Biology, a separate topic is necessary to present the direct associations between the digital game in question and the diversity of themes linked to the Structuring Theme: Quality of Life of Human Populations (Brazil, 2002). These themes are closely tied to the fields of Virology, Epidemiology and Immunology. Furthermore, a didactic sequence capable of exploring the *Pandemic* in both digital and analogic versions was suggested.

#### 4.1 Deepening the Links with Biology

The choice to adopt the game *Pandemic* arises due to the characteristics listed before, such as its hybrid format and affordability, as well as its alignment with all dimensions of analysis (gameplay, narrative, mechanics and usability) with the different fields that make up the Biological Sciences. The game's narrative induces users to learn, from the beginning, basic concepts about Virology, Epidemiology, and Immunology, essential areas for accurately understanding information related to Public Health.

Issues related to the idea of containment of the so-called Outbreaks transfers are conveyed in both the narrative and in the other dimensions of the Heuristic Gameplay Evaluation, fostering a feeling of care in each round to the players. For instance, countries with a larger geographic area, along with the population number and without the presence of Advanced Research Centres, tend to be more prone to the occurrence of Outbreaks, bringing to the player the reasoning of the need for more energetic actions for more vulnerable regions, a reasoning often advocated in Epidemiology.

Another important point is the issue of time. The longer it takes players to act, both to reduce the spaces of contagion on the map and to obtain a vaccine, the greater the chance of mutations in the so-called viral strains. This situation, making an analogy with what has occurred and still occurs regarding variants of Covid-19, is capable of making viral organisms more virulent ("stronger") and more difficult to control, an intrinsic characteristic to the field of Virology.

Finally, one of the conditions for victory is to find the vaccine for each virus in the game. Overall, this premise alone leads the player to identify the importance of these discoveries for human health. However, the mechanics to make the vaccines in the base version of the game are very simple and lack the depth of laboratory research, requiring expansions so that players can immerse themselves in this common facet for professionals who work in the field of Immunology.

In view of the aspects exposed above, it was possible to develop a proposal for a Didactic Sequence that included three interventions in the field of Biology. This sequence uses contents suggested by the National Curriculum Parameters for High School + (Brazil, 2002) in articulation with the adoption of the digital game *Pandemic*. Each intervention raised in Chart 2 corresponds to the contents related to Virology (1st), Epidemiology (2nd) and Immunology (3rd), all mediated by the *Pandemic* game.



**Table 2: Didactic sequence and game-based dimensions of analysis *Pandemic***

<b>Human Health in Times of <i>Pandemic</i>: Knowledge and Responsibilities</b>	
<b>Abstract:</b> Human health is a theme that values not only the intra and inter human relationships themselves, but also how we direct our actions in the face of environmental needs. From this perspective, this didactic sequence aims to present basic concepts of Virology, Epidemiology and Immunology from the interaction with the digital game <i>Pandemic</i> . There are three interventions aimed at high school students, with an estimated duration of 60 minutes from classes that use remote platforms.	
<b>Final Assessment</b>	Analysis of the synchronous and asynchronous interaction of students with the digital game <i>Pandemic</i> , as well as review activity from the <i>Kahoot platform</i>
<b>Digital Artifacts</b>	<i>Pandemic</i> Game (Digital Version), <i>Kahoot</i> and Zoom
<b>1st Intervention – Understanding Viruses and their Effects on Human Health</b>	
<b>Abstract:</b> The intervention proposes to present the different factors that characterize viral organisms, in addition to exposing the main effects of these organisms on human health. Dynamics: the teacher will use the digital game <i>Pandemic</i> during the remote class, dividing the class into groups in which each one will take on the role of a health professional available in the game (dynamics that will be maintained in the next two interventions). In this first intervention, students will be introduced to the basic concepts present in the game, such as: what is a virus, forms of contagion, viral mutation and outbreaks.	
<b>Dimensions</b>	<b>Addressed Themes / Types of Mediation with the Game.</b>
<b>Gameplay</b>	What are viral outbreaks? / Resource management
<b>Narrative</b>	What is a virus? / Reading the cards and game components
<b>Mechanics</b>	What is a viral mutation? / Collecting and choosing the game cards
<b>Usability</b>	Laboratory Practices / Interaction with Laboratory Tools in the Game
<b>2nd Intervention – How do viruses spread?</b>	
<b>Abstract:</b> The intervention proposes to contextualize, in the face of the current <i>Pandemic</i> , how viral organisms spread among living beings. Dynamics: the teacher will use the digital game <i>Pandemic</i> during the remote class, dividing the class in the same way as the 1st Intervention. During the remote class, students will play the first phases of the game and seek to minimize or prevent the spread of the virus on the game map.	
<b>Dimensions</b>	<b>Topic Covered / Form of Mediation with the Game</b>
<b>Gameplay</b>	How to contain a virus? / Actions of each character (professional)
<b>Narrative</b>	How does the disease progress? / Actions between game levels
<b>Mechanics</b>	How does the virus spread? / Collecting and choosing the game cards
<b>Usability</b>	Government Actions (Public Health) / Animations present in the game
<b>3rd Intervention – Vaccines: What are they and how to produce them?</b>	



<b>Abstract:</b> The intervention aims to understand, in the face of the current <i>Pandemic</i> , how vaccines are produced and how they act in the human body. Dynamics: the teacher will use the digital game <i>Pandemic</i> during the remote class, dividing the class in the same way as the other interventions. During the remote class, students will play until the final stages of the game, seeking to produce the vaccines for each viral type in the game.	
<b>Dimensions</b>	<b>Topic Covered / Form of Mediation with the Game</b>
<b>Gameplay</b>	How to distribute a vaccine? / Movement of characters on the map
<b>Narrative</b>	What is a vaccine? / Dialogues between the characters present in the game
<b>Mechanics</b>	What is a vaccine used for? / Reading the playing cards
<b>Usability</b>	Where to produce a vaccine? / Construction of Advanced Research Centres

Source: Authors

In this sense, as described in the literature, such as the study by Martins *et al* (2016, p. 306), it is necessary to think about the use of these digital artifacts following the "bases, mechanisms and strategies belonging to the [own] games, whether applied to problem solving, in order to engage and motivate the individual in any context". These factors are even more necessary and crucial when in dialogue with digital technologies. For this reason, the encouragement to develop pedagogical sequences that allocate digital games as guiding objects in the presentation and discussion of curricular contents can minimize the difficulties faced in the digital environment since the beginning of the Covid-19 pandemic, and subsequently, when regular face-to-face activities were resumed, by articulating with analog mechanisms the characteristic hybridism, as mentioned, of the game *Pandemic*.

Integrated with such proposals, it is up to the teaching professional to mediate the practice implemented during the class. In the specific case of this study, this mediation is linked to the approach of the CTSA, a theoretical-practical field that guides different human actions, including education. It aims at "meaningful learning, so that students can make, based on the knowledge studied, decisions in the face of situations that may occur in the society in which they live and in the world in the same way" (Figueiredo; Rocha & Dutra, 2016, p. 4), in this case, it stimulates a reflection on the potential of digital artifacts for the formative process

In this way, the simplified representation of the highlighted didactic sequence seeks only to ratify the potentialities of the insertion of digital games, not only as complementary instruments, but as artifacts that guide interventions in their full organization. However, There is a need for a concise reflection, on the part of managers and teachers, regarding the intended objective in front of the integration of digital games, there is a need for detailed content and an examination of which dimensions of the game will be viable for what is proposed in the lesson



## 5 FINAL THOUGHTS

Building upon the findings of this study and the insights from what has been portrayed in other works about the exposure of the potential of digital games during teaching practices, it is possible to affirm that such games can offer mechanisms that articulate contemporary synchronous and asynchronous demands. In addition to entertainment and interaction without a direct purpose, it is understood that digital games need the mediation of the faculty to take advantage of all the dimensions that compose them.

The possibility of guiding discussions and presenting examples based on the mechanisms present during the phases of the *Pandemic* game is an opportunity to make digital learning environments more interactive for students and productive for teachers. Its narrative encompasses various discussions related to Public Health and Epidemiology, which can mitigate the harms caused by Fake News, for example, and complement the content of Natural Sciences, especially Biology.

However, it is necessary to understand that in pedagogical planning it is essential to prepare students for interaction with the game or whatever the digital artifact is in advance. It is not suggested here an (erroneous) process of instrumentalization of the students, but rather fostering their literacy to recognize the relevance of discussions during gameplay in class. It is crucial to highlight that the survey carried out by *Sioux Group* - PGB20, with 5830 participants, indicated that 39.2% of them in the age group of 16 to 24 years old, consider themselves hardcore players, indicating significant gaming experience. Therefore, we can assume that the students of the different educational institutions have a certain level of literacy in relation to the environment of the games, and do not need to be taught how to play, differing from their teachers, who often need to learn how to interact with these games.

Therefore, the *Pandemic* game can be a path with potential chances to present the curricular contents of the different areas of Natural Sciences, combining playfulness with a clear discussion about the concepts and knowledge proposed by the national teaching guidelines in the country.

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