

Serious games and media literacy: developing critical thinking in the digital information society

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Abstract: The evolution of the digital landscape, from the rise of Web 2.0 to the Internet of Things (IoT), has led to an unprecedented production and accessibility of information, radically transforming the educational and social context. However, this abundance has introduced a pressing challenge: the ability to discern truthful and relevant information from fake news. This educational emergency calls for innovative approaches to foster users' critical thinking. In this context, serious games emerge as promising tools, capable of leveraging intrinsic motivation derived from play to support learning and the acquisition of crucial skills. This article aims to examine the effectiveness of serious games in helping users recognize fake news and develop a critical perspective on media content. To this end, it analyzes the experiences of three serious games — MathE, Bad News, and JEDi — highlighting how their gameplay dynamics contribute to raising awareness about the mechanisms of false information dissemination and strategies for autonomous identification. The findings from the reviewed studies reveal both the potential and the limitations of these tools. Ultimately, this study may serve as a foundation for future analyses regarding the use of serious games as instruments to support the development of critical thinking and media literacy.

Keywords: serious games; fake news; critical thinking

1. Introduction

The evolution of the digital landscape, accelerated by the advent of Web 2.0 and subsequently the Internet of Things (IoT), has generated an unprecedented informational condition characterized by an almost unlimited availability of content. However, this democratization of access does not coincide with a parallel growth in critical skills necessary to assess the quality of information. The spread of false, manipulative, or decontextualized news—commonly referred to as fake news—has posed new educational and social challenges, prompting reflection on media literacy processes and the development of critical thinking as essential conditions for exercising informed digital citizenship.

In this context, innovative tools capable of combining playful dynamics with educational objectives have emerged, including serious games—games designed with educational as well as recreational purposes. These are based on experiential and interactive pedagogy, capable of fostering active learning, metacognitive reflection, and intrinsic motivation, all crucial elements in the formation of critical competencies.



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Several recent studies highlight how serious games, when applied to the domain of disinformation, can help players become more aware of manipulative mechanisms behind fake news, enabling them to deconstruct such content (Axelsson, Nygren, Roozenbeek & van der Linden, 2024).

This article aims to examine the potential of serious games in the field of media literacy, with particular attention to three significant experiences: MathE, Bad News, and JEDi. Through an analysis of theoretical foundations and documented results in the literature, the study seeks to evaluate the extent to which these tools can be considered effective in promoting critical thinking and the ability to identify disinformation strategies. At the same time, methodological limitations and future research perspectives will be discussed, with the goal of offering a theoretical and operational basis for integrating serious games into both formal and informal educational pathways.

2. The digital context and the challenge of disinformation

The advent of Web 2.0 introduced a participatory paradigm in which each user, once a mere consumer, became a producer of content. This shift generated a new communicative ecosystem, marked by the decline of traditional epistemic authorities and the emergence of a fragmented infosphere, often lacking editorial filters. As noted by Chopra, Gupta, and Lambora (2019), the increasing interconnection between devices and digital platforms, facilitated by the IoT, has amplified the speed and pervasiveness of information circulation, while simultaneously increasing the risks associated with the virality of false news.

The crisis does not concern source verification alone; it also affects the cognitive and social dimensions of users, who are frequently exposed to confirmation bias, echo chambers, and polarization phenomena. In this scenario, discerning truth is no longer solely dependent on knowledge availability but requires the acquisition of critical and metacognitive skills, which must be intentionally cultivated through educational practices.

Media literacy, understood not only as the ability to access content but also to interpret it critically, represents the cornerstone of contemporary educational policies aimed at fostering digital citizenship. It entails understanding the logic behind information production, identifying manipulations, and adopting a reflective stance toward media. However, teaching media literacy through traditional methods has often proven insufficient in the face of the persuasive dynamics of the digital environment.

It is within this framework that serious games emerge as an alternative pedagogical possibility, capable of simulating disinformation scenarios and engaging users in decision-making processes that promote the development of complex cognitive strategies. These games operate according to a learning-by-doing logic, offering experiences that combine competence, interaction, and reflection.

3. Media literacy and the development of critical thinking

In today's context, characterized by the democratization of information access and the increasing algorithmic personalization of content, media literacy stands as a fundamental educational process to counter manipulation and distortion of reality. Media literacy goes beyond the ability to decode a message; it includes understanding

its purpose, communicative intentions, and the persuasive strategies underlying information production.

Education for digital citizenship therefore requires training programs that extend beyond traditional functional literacy to embrace forms of critical and reflective literacy. This approach involves integrating cognitive, ethical, and emotional aspects into the analysis of media content, promoting a vigilant and conscious attitude toward communicative dynamics. In this sense, serious games offer an innovative pedagogical response, as they integrate the cognitive dimension with experiential learning, providing a protected space where users can concretely experience the consequences of choices related to information production and consumption.

Critical thinking is commonly defined as the ability to analyze, evaluate, and synthesize information in order to formulate autonomous and well-founded judgments. In the fight against disinformation, this skill becomes central, as it enables individuals to recognize inconsistencies, argumentative fallacies, and misleading content. Learning critical thinking cannot rely solely on theoretical exposure; it requires real or simulated situations in which individuals can exercise their judgment.

Serious games, within this perspective, provide simulated environments where players are called upon to make decisions, evaluate sources, and manage the consequences of their actions, thereby developing a situated awareness of informational dynamics. The playful component, far from being a distraction, becomes a motivational catalyst capable of sustaining cognitive engagement through challenge, immediate feedback, and interactive storytelling.

4. Serious games as tools for critical education

The term “serious games” refers to digital games designed with educational, formative, or awareness-raising purposes, in which the playful component is closely integrated with cognitive or behavioral objectives. These games are based on a pedagogical model that combines learning by doing and immersive learning, offering interactive experiences that promote the acquisition of knowledge and skills through experimentation.

Compared to traditional teaching methods, serious games introduce an experiential dimension that allows users to take on active roles, explore complex scenarios, and confront decision-making dilemmas. This form of engagement produces situated learning, in which knowledge is not passively transmitted but constructed through action. According to Axelsson et al. (2024), the use of serious games in the context of disinformation education enables players to explore manipulative strategies from within, increasing their awareness of the persuasive mechanisms used in the spread of fake news.

One of the foundational elements of serious games lies in their ability to activate intrinsic motivation—that is, motivation derived from personal interest and satisfaction. The gaming experience, thanks to its challenge-oriented and reward-based structure, provides fertile ground for self-directed learning and the development of metacognitive skills.

In educational settings, motivation is a determining factor for the effectiveness of learning processes. Serious games leverage dynamics such as immediate feedback, interactive storytelling, and gradual difficulty progression, facilitating cognitive engagement and encouraging players to persist in achieving objectives. Moreover, error, far from being perceived as failure, becomes a constitutive element of the learning

experience, as it stimulates reflection and the restructuring of decision-making strategies.

The application of serious games in the fight against disinformation is based on their ability to simulate realistic situations in which users can observe and experience the dynamics of fake news creation and dissemination. These games do not merely provide theoretical notions but invite players to take on the role of manipulated content creators or fact-checkers, thereby promoting a deep understanding of disinformation techniques such as sensationalist headlines, context distortion, or the use of false testimonies.

Through these simulations, serious games foster a form of critical learning that engages not only the cognitive sphere but also the ethical and emotional dimensions. Users are called upon to confront the consequences of their choices and reflect on the responsibility of information in shaping public discourse.

An emerging aspect in the design of serious games is the use of narrative as a pedagogical tool to encourage identification and critical reflection. Persuasive storytelling—defined as the construction of emotionally engaging stories—has proven particularly effective in countering disinformation, as it allows players to explore the motivations and consequences of communicative actions in a simulated context (Devasia, 2024). Integrating narrative elements into serious games not only increases engagement but also promotes deep understanding of informational dynamics, stimulating processes of deconstruction and cognitive re-elaboration.

Narrative acts as an interpretive framework that guides content perception and facilitates memory retention. In games like *Bad News*, building a fictional news outlet enables players to directly experience the logic of virality and manipulation, generating situated awareness of persuasive techniques. Interactive storytelling thus becomes a didactic device that supports transformative learning, in which the subject does not merely acquire information but restructures personal beliefs through experience.

Beyond the cognitive component, serious games can activate the socio-emotional dimension of learning, contributing to the development of critical and responsible attitudes. As highlighted by Oppedisano (2025), exposure to discriminatory or polarizing scenarios within games stimulates ethical reflection on the use of information and the individual's role in shaping public discourse. Interaction with virtual characters and the management of moral dilemmas foster empathy and understanding of the social consequences of disinformation, promoting active and conscious digital citizenship.

This perspective aligns with the paradigm of holistic education, which views learning as a multidimensional process involving cognitive, emotional, and relational spheres. Serious games, as complex simulated environments, offer opportunities to explore the ethical implications of digital communication, encouraging a reflective and responsible stance toward media.

5. Case study analysis: MathE, Bad News, and JEDi

5.1. MathE: information verification and news literacy

MathE – The Game represents one of the first systematic attempts to use a serious game to address the issue of news verification and the spread of fake news. The game, analyzed by Katsaounidou et al. (2019), was designed to raise user awareness of fact-checking practices through a participatory and interactive approach, in which

players are tasked with examining informational content, identifying errors, biases, or manipulations, and making decisions about its reliability.

A distinctive feature of MathE is its emphasis on source verification education, a central element of media literacy. The game promotes a cognitive practice based on critical analysis and evidence evaluation, offering scenarios that replicate the everyday digital context in which users must distinguish between verified information and questionable content. The game's structure enhances the reflective dimension of learning, as each decision made by the player is accompanied by feedback that clarifies its correctness, thereby reinforcing critical reading strategies.

According to the studies conducted, MathE proves particularly effective in stimulating selective attention and increasing awareness of false correlations, contributing to the development of a cautious attitude toward digital information. However, some questions remain regarding the transferability of these skills outside the gaming environment, requiring further longitudinal studies to assess their lasting impact (Katsaounidou et al., 2019).

5.2. Bad News: simulating disinformation from within

Bad News is a paradigmatic example of a serious game designed to directly tackle the problem of fake news through a reverse pedagogical strategy: instead of assuming the role of a fact-checker, the player becomes a creator of disinformation. This approach is based on the principle of prebunking, which suggests that understanding manipulative mechanisms can be enhanced by allowing users to experience firsthand the strategies used to create false content (Roozenbeek & van der Linden, 2019; Axelsson et al., 2024).

During gameplay, users build their own “news outlet” and produce fake news using techniques such as alarmist headlines, fake accounts, or ideological polarization. The goal is to increase the number of followers, replicating typical mechanisms of digital virality. Through this simulation, players develop a deep understanding of persuasive strategies and the ease with which deceptive narratives can spread and gain credibility.

Studies conducted by Axelsson, Nygren, Roozenbeek, and van der Linden (2024) show that the gaming experience in *Bad News* significantly enhances participants' ability to recognize disinformation techniques, improving their critical competence. However, the game's effectiveness largely depends on educational mediation: the absence of a reflective context or guided discussion may limit the ability to transfer acquired knowledge to real-world situations.

5.3. JEDi: educating against disinformation in lusophone contexts

JEDi – Jogo Educacional Digital represents a further development in the use of serious games for media literacy, with a specific focus on the Portuguese-speaking context. The game, analyzed by Oliveira Moreira et al. (2024), has been implemented in various educational settings—high schools, university courses, and training programs—with the aim of evaluating its effectiveness in supporting students' ability to identify fake news written in Portuguese.

Unlike MathE and *Bad News*, *JEDi* places strong emphasis on the socio-cultural contextualization of disinformation, integrating narrative elements that reflect current events and political phenomena in Lusophone countries. The game presents complex

scenarios in which players must examine multimedia content, verify sources, and interact with characters representing different actors in the digital media landscape.

The results of the studies conducted indicate that JEDi fosters not only the development of critical skills but also ethical awareness regarding individual responsibility in the dissemination of online content (Oliveira Moreira et al., 2024). However, the authors emphasize the need for structured integration of the game into educational curricula, suggesting that its impact is maximized when accompanied by debriefing activities and collective discussion.

5.4. New models of instructional design

Integrating serious games into educational pathways requires a revision of instructional design models, aimed at enhancing the gaming experience as a tool for meaningful learning. As highlighted by Kiili, Siuko, and Ninaus (2024), the design of educational games must consider learners' cognitive characteristics, educational goals, and assessment methods. Specifically, it is necessary to define clear objectives, construct scenarios aligned with the skills to be developed, and include moments of reflection and feedback.

Instructional design based on serious games also entails a redefinition of the teacher's role, shifting from content transmitter to facilitator of the learning experience. The educator must guide students in decoding game dynamics, stimulate critical dialogue, and foster connections between gameplay and reality. In this sense, the serious game is not merely a technological tool but a formative environment that requires careful and conscious pedagogical orchestration.

6. Pedagogical impact and methodological perspectives

The use of serious games in educational contexts fits within a broader theoretical framework rooted in experiential and constructivist pedagogies. Through the simulation of realistic scenarios, these tools allow players to engage with complex problems, stimulating processes of reflection and self-assessment that form the basis of metacognitive development. Learning does not occur through mere content transmission but through direct involvement in situations that require analysis, decision-making, and revision of one's cognitive strategies.

In this sense, the playful dimension is not an end in itself but a didactic means that fosters emotional and cognitive engagement. As observed by Axelsson et al. (2024), interaction within Bad News activates a process of cognitive immunization, whereby players, by voluntarily exposing themselves to manipulative content, develop greater psychological resistance to disinformation. This process highlights how serious games can contribute not only to knowledge acquisition but also to the formation of critical and cautious attitudes in navigating the digital infosphere.

The adoption of serious games can be further enhanced through integration with e-learning strategies, which amplify their reach and facilitate accessibility. Digital platforms enable the large-scale distribution of educational games, monitoring of user interactions, and personalization of learning paths. As emphasized by De la Fuente et al. (2024), e-learning based on interactive games fosters engagement, motivation, and the development of critical thinking, especially in non-traditional educational contexts.

The synergy between serious games and e-learning opens new perspectives for media literacy education, allowing educators to overcome the limitations of frontal

teaching and build dynamic, participatory learning environments. However, it is essential to ensure content quality, pedagogical coherence, and platform inclusivity so that technological innovation translates into genuine educational value.

Despite the transformative potential of serious games, numerous studies underscore the importance of educational mediation to ensure their effectiveness. Game-based learning must be accompanied by moments of reflection, discussion, and collective re-elaboration, so that experiential knowledge acquired in simulated environments can be translated into real-world competencies. Without such mediation, there is a risk that the gaming experience remains confined to the domain of play, without influencing users' informational behaviors.

The role of the teacher or facilitator thus becomes central in transforming the gaming experience into meaningful learning. They must guide students in deconstructing the manipulative strategies encountered in the game, linking simulated dynamics to real phenomena in the media and social landscape. In this sense, the serious game does not replace the educator but supports them as a powerful didactic tool aimed at stimulating dialogue and critical reflection.

Serious games are particularly well-suited to support an integrated model of digital citizenship education, in which technical, critical, and ethical skills are developed jointly. Through interactive storytelling and the simulation of complex social contexts, they foster a situated understanding of contemporary informational dynamics, allowing users to explore the individual's role in the collective construction of truth.

The emerging perspective from the literature suggests that the future of media literacy education lies not solely in the acquisition of theoretical knowledge but in the ability to critically navigate a fluid and participatory informational space. The gaming experience, enhanced through tools like MathE, Bad News, and JEDi, thus presents itself as a viable pedagogical pathway for shaping conscious digital citizens capable of recognizing, deconstructing, and countering disinformation phenomena.

7. Limits and challenges in Serious Games research

Despite growing interest in serious games, existing research still highlights significant methodological limitations, particularly regarding the difficulty of measuring the real and long-term impact of these tools. Many studies focus on immediate evaluations conducted at the end of the gaming experience, without considering the persistence of acquired skills over time. This limitation makes it challenging to determine whether the observed improvement in critical abilities among participants is lasting or confined to the experimental context.

Moreover, research samples are often small or limited to specific school settings, making it difficult to generalize the results. The need for longitudinal studies and mixed methodologies (both quantitative and qualitative) is therefore essential to deepen our understanding of the actual effectiveness of serious games in promoting media literacy (Katsaounidou et al., 2019).

Research on serious games for media literacy is still in a consolidation phase and presents significant methodological challenges. As highlighted by Kiili et al. (2024), it is necessary to develop valid and reliable assessment tools capable of measuring not only acquired knowledge but also critical, ethical, and emotional competencies. Furthermore, research samples must be expanded to include diverse educational contexts and heterogeneous populations to ensure the generalizability of findings.

Another challenge concerns the analysis of the long-term impact of serious games, which requires longitudinal studies and mixed approaches. Understanding the persistence of acquired skills and their transferability to real-world contexts is fundamental to evaluating the educational effectiveness of games. In this regard, research must adopt an interdisciplinary perspective, integrating pedagogy, psychology, sociology, and communication sciences.

An additional limitation involves issues of accessibility and digital inequality. The use of serious games requires adequate technological infrastructure and digital skills that are not evenly distributed across educational institutions and student populations. The risk is that tools designed to promote cognitive inclusion may, in the absence of proper technical and educational support, exacerbate educational disparities.

Finally, the use of serious games in the context of disinformation also raises ethical concerns. The adoption of prebunking strategies, as in the case of Bad News, involves the intentional exposure of users to manipulative techniques. Although this has shown immunizing potential, there is concern that some players may internalize these strategies without developing sufficient critical awareness. This necessitates a careful balance between immersive gameplay and pedagogical control.

8. Conclusions

The analysis conducted highlights how serious games represent a pedagogical resource of particular interest for addressing the educational challenges posed by the digital information society. In an ecosystem where disinformation dynamics operate rapidly and with complexity, media literacy can no longer be limited to the transmission of rules and notions but must be realized through formative experiences capable of developing active, reflective, and situated critical thinking.

Tools such as MathE, Bad News, and JEDi demonstrate that games can become a formative ground where individuals are confronted with cognitive and ethical dilemmas, called upon to deconstruct, simulate, or counter strategies of informational manipulation. The educational value of these experiences lies in the opportunity to internally experience the mechanisms of fake news, transforming risk awareness into metacognitive competence and cognitive resilience.

However, serious games cannot be considered self-sufficient solutions. Their effectiveness depends on an educational context that enhances their potential through debriefing activities, discussion, and contextualization. Likewise, it is necessary to acknowledge the limitations of current research, which still lacks longitudinal evaluations and shared tools for measuring educational outcomes. It remains a priority to reflect on the ethical implications of using games based on disinformation simulation, particularly regarding educational responsibility and the protection of vulnerable individuals.

An additional element to consider in this concluding reflection is the potential of serious games to promote a culture of informational resilience, understood as the individual and collective capacity to resist the effects of media manipulation. In an increasingly fluid and interconnected communicative context, resilience education does not merely involve identifying fake news but entails developing a critical and reflective stance that enables users to question sources, deconstruct dominant narratives, and recognize their own cognitive vulnerabilities. Serious games, thanks to their interactive and immersive structure, offer a safe environment in which to practice these skills, fostering transformative learning that goes beyond information to em-

brace ethical and relational dimensions. In this perspective, the game is not just a didactic tool but a symbolic space in which to train critical citizenship, stimulate epistemic responsibility, and build a learning community oriented toward truth and dialogue.

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