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"Social Media Puppeteers", "Social Media Fake News" and "Data Defenders": Games and video games to promote youngsters' information and media literacy

"Social Media Puppeteers", "Social Media Fake News" and "Data Defenders": giochi e videogiochi per promuovere la media e information literacy nei più giovani

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ABSTRACT Video games have acquired heightened relevance following the experiences endured during the pandemic, notably concerning personal well-being and social connections. This contribution presents the tangible outcomes of the project YO-MEDIA – Youngsters' Media Literacy in Times of Crisis, specifically the board games "Social Media Puppeteers" and "Social Media Fake News", and the video game "Data Defenders", which are the result of the design and production efforts of the project team. The article focuses on the mechanics, graphic choices, characters, and atmospheres of games. The ultimate goal of the products is to support the development of skills in young people through play, engagement, and direct participation, while introducing key techniques underlying pre-bunking and the strategies for debunking fake news, through the characters' actions. During the games, the participants are called upon to produce information, deconstruct it, and verify sources.

KEYWORDS Game-Based Learning; Media and Information Literacy; Fake News; Disinformation; Serious Game.

SOMMARIO I videogiochi hanno acquisito un nuovo respiro a seguito delle esperienze vissute durante la pandemia, in particolare per quanto riguarda il benessere personale e la connessione sociale. Il contributo presenta i risultati tangibili del progetto YO-MEDIA – Youngsters' Media Literacy in Times of Crisis, in particolare i giochi da tavolo "Social Media Puppeteers" e "Social Media Fake News" e il videogioco "Data Defenders", frutto degli sforzi di progettazione e produzione del team di progetto, con particolare riferimento alle meccaniche, alle scelte grafiche, ai personaggi e alle atmosfere delle proposte ludiche costruite. L'obiettivo ultimo dei prodotti è di sostenere le competenze dei ragazzi attraverso il gioco, il coinvolgimento, la

partecipazione diretta, incontrando le principali tecniche alla base del pre-bunking e le logiche di smascheramento delle fake news, attraverso la scelta delle azioni dei personaggi. Nel corso dei giochi, i ragazzi sono infatti chiamati a produrre informazioni, scomporle e verificare le fonti.

PAROLE CHIAVE Game-Based Learning; Media and Information Literacy; Fake News; Disinformazione; Serious Game.

1. Introduction

The contemporary youth cohort is confronted with many transformative dynamics and adversities, which have garnered significant attention in the media landscape. Cultivating dynamic literacies (Potter & McDougall, 2017) emerges as imperative for navigating through the deluge of information and discerning falsehoods, particularly when news is accessed through unfiltered social media channels (Lauricella et al., 2020; Krumsvik, 2023; Santos et al., 2023). In particular, Meta's recent decision (January, 2025) to review and remove third-party independent fact-checking organizations seems to support this need.

Since the early 20th century, historical tradition – exemplified by Marc Bloch's (1921) studies on fake news during World War I – and the tradition of communication sociology, including Walter Lippman's (1922) journalistic sociology approach, Harold Lasswell's (1927) political analysis of media content, and Sergej Tchackotine's (1939) psychological analysis of Nazi propaganda techniques, have emphasized that the democratic function of the media (Mannheim, 1940) is undermined during wars and other crises. These periods are marked by an increased use of manipulative strategies to shape human behavior and social relations (Gili, 2001). In reality, the media cannot escape the suspicion of manipulation, historically situated in specific contexts, throughout the century, and it is partly to respond to this suspicion that Media Education emerged in the second half of the 20th century, based on education in critical thinking (Carenzio, 2024; Rivoltella, 2017).

However, with the new informational ecosystem defined as the "infosphere" by Floridi (2014), this disciplinary field needs to complement education in media consumption with education in media production and responsibility – that is, evaluating the consequences of one's actions in the social web – a concept that becomes central in the prevention and contrast of behaviors associated with cyber stupidity (Pasta, 2018). The individual who must resist media and manipulative attempts is no longer just a spectator but has become a "prosumer" (Pasta, 2021). The result is a profound sense of inadequacy regarding literacy, a perspective that has been present and highlighted for at least a decade (Banzato & Midoro, 2013), considering literacy as a "complex phenomenon" (Banzato, 2011 and 2013) in a plural and multi-multi-dimensional framework (The New London Group, 1996).

This shift also affects Information Literacy (Ferrari & Pasta, 2023), as one of the novelties introduced by the web is the proliferation of data and information in digital form, requiring new types of literacies. Competency is no longer so much about finding and accessing sources but about evaluating them, facing information overload, fragmentation, decontextualization, mutability and transience (sources can be continuously updated), unpredictability, and qualitative inconsistency. The web confronts us with the impossibility of total knowledge, shifting the aim of education to creating a coherent framework for "meaning making", a process that is particularly delicate, and necessary at the same time. This is especially important in the current geopolitical climate as, for example, the war in Ukraine provides strong motives to spread misinformation and propaganda.

In this scenario, Media and Information Literacy is even more relevant and should be fostered with different perspectives and approaches, such as ludic tools, games and video games. Video games, in particular have acquired a increased recognition following the experiences endured during the pandemic, notably concerning personal well-being and social connection (Cauberghe et al., 2021; Johannes et al. 2021; Kriz, 2020). As we will see in the next section, games and video games support a critical and participatory engagement among youth, facilitated by narrative immersion, identification mechanisms with characters or stories, interactive elements coupled with the allowance for failure, and the necessity to formulate strategies applicable beyond the gaming realm (Bunt & Grosser, 2020; Moro et al., 2022).

The contribution presents the tangible outcomes of YO-MEDIA, Youngsters' Media Literacy in Times of Crisis (Carenzio et al., 2023 and 2024), specifically the board games and the video game designed within the project funded by the European Media and Information Fund (EMIF), which involved partners from Italy, Portugal and Spain to design and implement games focusing on misinformation/disinformation, and information literacy in times of crisis.

The structure of the contribution presents four main sections: the first is dedicated to the framework, discussing the role of games in engaging young people. The second section presents three ludic products to support Media and Information Literacy with different structures and game experiences. Social Media Puppeteers is a micro TTRPG (tabletop role-playing game) adapted and customized to create an educational experience focused on media literacy, critical thinking, and social media dynamics. Social Media Fake News is a card game designed to help players recognize the features that can make a news story misleading or false. The goal is to be the first to run out of cards by constructing a fake news story. Data Defenders is a tower defense digital game that blends narrative and engaging mechanics to highlight media literacy during crises, where players become defenders of global data servers amid an alien invasion and a devastating pandemic. The third section presents the methodological framework with the study protocol of the games, while the fourth is dedicated to the main results. The contribution is concluded with final reflections.

2. Games to engage young people

A challenge in contemporary education is implementing innovative teaching methodologies that can effectively keep pace with rapid societal changes (Martinez et al., 2022), including swift advancements in digital technology and recent global crises, such as health and geopolitics. This challenge is particularly pertinent given the characteristics of today's young people, who demand engaging educational approaches. The interactive nature of games, and in particular the immersive nature of video games (García-Gilet al., 2023), have proven particularly captivating for youth, presenting an opportunity to make learning and personal development more appealing and effective. The incorporation of gamification strategies, such as point systems, achievement badges, competitive rankings, and progressively challenging difficulty levels, has been demonstrated to encourage students to engage more deeply and meaningfully with learning materials (Harrison, 2022; Martins et al., 2024).

Studies have shown that well-designed educational games can significantly enhance interdisciplinary learning and boost cognitive skills, improving academic performance across various subjects, including mathematics, history, and English (Martinez et al., 2022; Tuan et al., 2024). For instance, several studies highlight the use of Minecraft: Education Edition to engage young people in co-constructing knowledge and peer teaching (Holik et al., 2024; Hughes et al., 2024; Sulaiman et al., 2024).

Additionally, game-based learning enhances young people's critical thinking, media and digital literacy, enabling them to evaluate multimedia information critically (Fadhli et al., 2023; Mao et al., 2022). Games can incorporate specific media literacy content, such as identifying false information, addressing digital security and privacy issues, and developing media skills (Contreras-Espinosa & Eguia-Gomez, 2023). This approach provides players with new experiences that prepare them for real-life problem-solving, especially during crises (Moro et al., 2022). While the potential benefits of game-based learning are numerous, it is essential to recognize that many educators may face challenges implementing these approaches in their classrooms (Diehl et al., 2024). These challenges can arise from a variety of factors, in particular when digital devices are needed:

Limited access to digital devices or outdated equipment can hinder the implementation of game-based learning (Shen et al., 2023).

The financial burden of purchasing educational games and technology can be prohibitive for many institutions, limiting their ability to implement game-based learning (Kraff et al., 2023).

The potential need for more necessary skills or the unwillingness of some educators to adapt to new teaching methodologies. This resistance to change can stem from various factors, including insufficient training, lack of confidence in using digital tools, or skepticism about the effectiveness of game-based learning approaches (Diehl et al., 2024; Misra et al., 2022).

Providing educators with comprehensive support that addresses pedagogical and practical challenges is essential to implementing effective game-based learning strategies in the classroom (Martinez et al., 2022). This support should encompass a range of resources, including access to appropriate technological equipment, well-designed lesson plans, and ongoing technical and pedagogical support. Additionally, it is crucial to offer continuous professional development opportunities to educators, and to refine their skills in implementing these innovative teaching methods (Baek & Ward, 2023).

Furthermore, even if not applicable in this project and specific case, game-based learning methodologies allow involving educators and students in co-creation of games, significantly enhancing the effectiveness of these initiatives (Fernandes et al., 2020; Weitze, 2018). This collaborative approach not only allows for the development of computational thinking skills and creativity among teachers and youth but also helps to maximize the educational potential of games by ensuring that they are tailored to the specific needs and interests of the student population (Sousa et al., 2023). By fostering a sense of ownership and engagement among all stakeholders, this participatory approach can help to overcome resistance to new teaching methods and create a more dynamic and effective learning environment.

In the following sections we will focus on the three products designed within the project.

3. Description of the games

3.1. Social media puppeteers and social media fake news

Two different board games have been designed.

The first is Social Media Puppeteers, a micro tabletop role-playing game incorporating elements of character creation and dice rolling found in traditional RPGs. Players assume the roles of politicians, journalists, scientists, or influencers, competing on a fictional social media platform to gain influence and promote media literacy. During the game, players earn points when they achieve goals related to their character's role and special abilities. Players take turns posting messages or content, trying to gain influence. To post content, players roll a D6 and add their character's specific bonus, according to their role. The player with the highest roll gains influence points and can spend them on special abilities or save them for later. Other play-

ers can comment or respond to the post and form alliances or rivalries by collaborating or challenging each other's posts. The game ends after 4 rounds or when a player reaches a predetermined influence goal. At the end of the game, the player with the most influence points wins. There is no losing condition.

Players can take on the roles of politicians, journalists (Figure 1), scientists, and influencers competing to capture the masses' attention and influence collective perceptions on the social media platform "Y".

Designed for 3 to 6 players, it can be adapted to accommodate larger groups if needed, in particular at school. The estimated time range is 60 minutes (including character selection, gameplay, and discussions), the time to play can vary depending on the group's familiarity with the game and the depth of the discussion phase during gameplay and postgame. However, it can be shorter (or longer) depending on the gameplay pace and the extent of classroom discussions and reflections, as it can also be played without classroom post-game discussions.

As the facilitator, teachers or educators play a crucial role in ensuring a smooth and educational gaming experience, establishing a respectful and inclusive environment from the start where respectful communication is key. Guidelines for implementation at school and extra-school contexts are included. For example, a school class can be involved in a sort of pre-game phase, introducing the concept of media literacy and discussing it in today's digital landscape. During gameplay, facilitators are suggested to periodically pause the game to support discussions, asking students how their character's actions on the 'Social Media Platform Y' align with their objectives and values. Recent examples of social media influence, misinformation, or viral content are also encouraged to draw connections between these real-world examples and their in-game experiences. After the game, teachers and educators can lead a reflective discussion, passing from the board game to real social media campaigns.

The second game (Social Media Fake News) is a card game designed for 2 to 6 players, although it is recommended to have more than two. The components required to play include a board (Figure 2), News Construction Cards, Action Cards, and Counterattack Cards, with Topic Cards being optional.

The game typically lasts about 30 minutes, but the duration can vary depending on how familiar the group is with the game and whether it's used in a classroom setting, where discussions may extend the time. However, it can also be played without classroom discussions. The player who has the most cards remaining at the end of the game loses.

To start, all the cards are shuffled together, and each player is dealt six cards. The remaining cards form a 'News Construction' pile, placed face down. The game begins with the first player drawing a News Construction Card to determine the news topic. The order of the columns in the game, dictating the sequence in which players must play their cards during the first round, starts with "Sensationalistic Headlines". For example, in this step players use eye-catching and exaggerated headlines to immediately capture the reader's attention, even at the expense of accuracy or neutrality. This is followed by the "Exaggeration of Facts" where players amplify or distort information to make it more sensational or dramatic than it truly is. Once the black line on the board is reached in the first round, a news headline is considered created, and players begin a second round.

The columns for creating news are based on the code of the Federación de Asociaciones de Periodistas de España, FAPE[1] (Spanish Journalists' Associations Federation), and the World Ethical Charter for Journalists (June 2019) from the International Federation of Journalists[2].

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[1] Federación de Asociaciones de Periodistas de España, FAPE: https://fape.es/home/codigo-deontologico/

[2] International Federation of Journalists. https://www.ifj.org/es/quien/reglas-y-politica/carta-mundial-de-etica-para-periodistas

social media puppeteers

JOURNALIST CHARACTER SHEET

Character description:

Name:

Background:

Appearance:

Attributes:

Impact	Reputation	Luck	Influence

Backstory:

Note: Create a brief backstory for your character, outlining their motivations and values.

Influence points:

Current influence:

Note: Use this section to record your character's posts on "Social Media Platform Y". Describe the content, strategies, and objectives for each post. You may use additional sheets if needed.

Character's posts

Content: 1	Content: 2	Content: 3
Objective:	Objective:	Objective:
Strategy:	Strategy:	Strategy:

Allies

Rivals

Figure 1. Example of a character sheet.

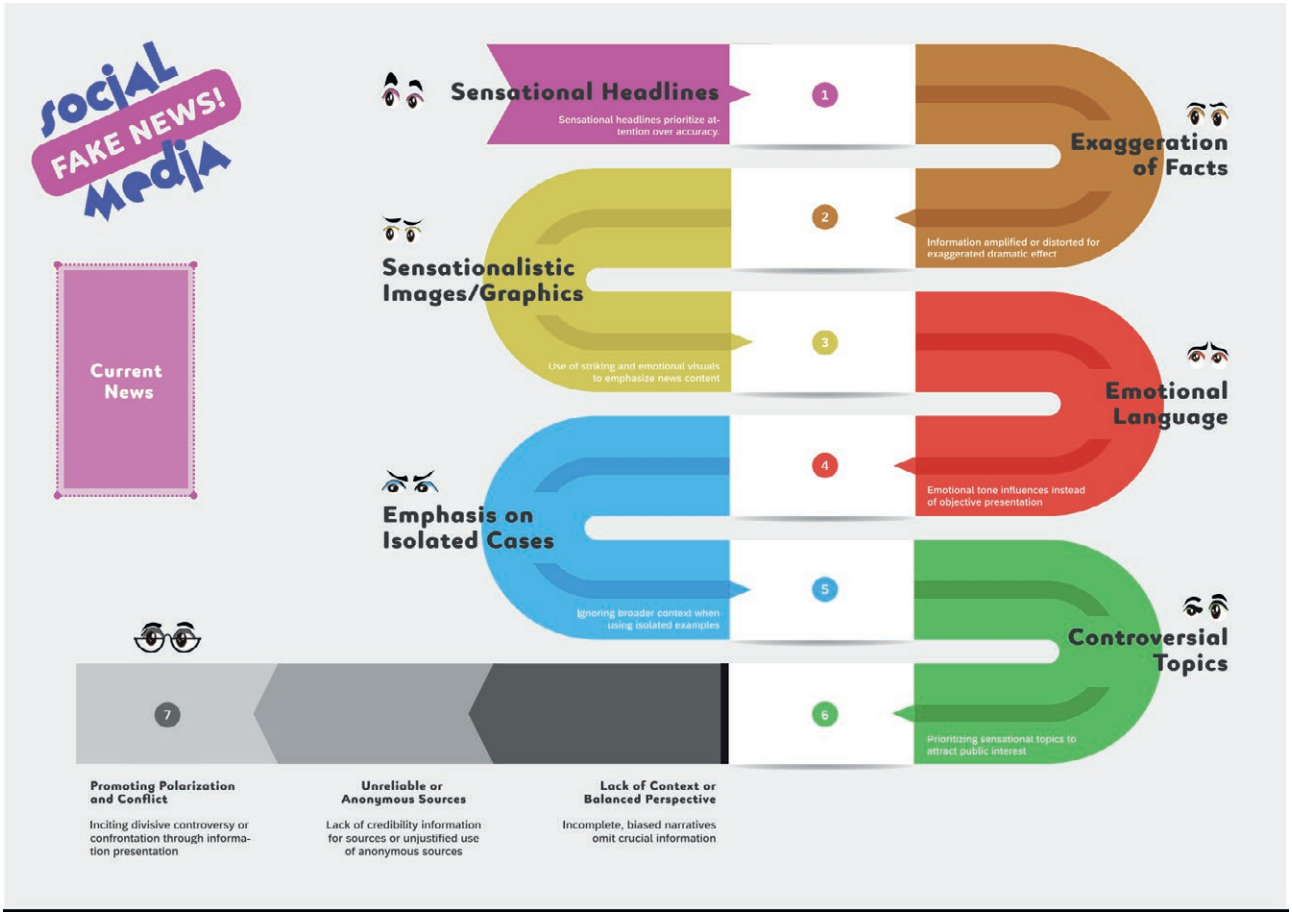

Figure 2. Board.

3.2. Data Defenders

In this digital game, Planet Earth is under attack by robots spreading false information through servers accessed by the Earth's population, causing widespread panic. The game unfolds across three islands, each featuring a unique playable character (see Figure 3): the Journalist Island – Chronicle Cove hosts Carlos Castillo, a journalist for Citizen's Current tasked with gathering information and reporting live from the scene; the Influencer Island – Iconic Bay with Ivy Ingram, an influencer recently hospitalized with the Alienfect-120 virus; the Politician Island – Ruler's Realm introduces President Robert Rogers, the most influential character in the game, aiming to uncover the aliens' motives and end the war (Figure 3).

The game is crafted with players aged 13 and above in mind, appealing to teenagers and young adults who enjoy mobile gaming experiences.

The game adheres to the core mechanics of a classic tower defense game. Robots move across a designated path, aiming for servers at the end. Players must eliminate multiple waves of alien robots, preventing them from breaching the servers and spreading false information on the Internet. Players strategically position various towers along the path to achieve this, utilizing their energy reserves to target and destroy the invaders.

Figure 3. Journalist, Politician, Soldier, Doctor and Influencer.

Beyond the tower defense mechanics, two innovative core mechanics define the gameplay experience: the Data Analyzer (Figure 4) allows players to dissect and assess various media content, including news articles and social media posts; the Crisis Impact Index, a dynamic meter reflecting the prevalence of misinformation in the game world and how effectively players manage the crisis.

The game is designed to enhance media literacy skills and promote critical thinking. By challenging players to analyze and evaluate information critically, the game aims to cultivate the ability to discern fact from fiction and make informed decisions. It empowers players to combat misinformation within the created universe, fostering a sense of agency in navigating digital media environments responsibly.

The game can be integrated into disinformation literacy sessions as an interactive learning tool. Participants engage with the game's mechanics and storyline, applying critical thinking skills to combat misinformation in a controlled environment. This interactive scenario provides a compelling basis for discussion and analysis, allowing participants to explore the motivations behind misinformation and strategize solutions to mitigate its effects. After gameplay, participants are encouraged to engage in reflective discussions to debrief on their experiences, share insights, and reinforce key media literacy concepts and critical thinking.

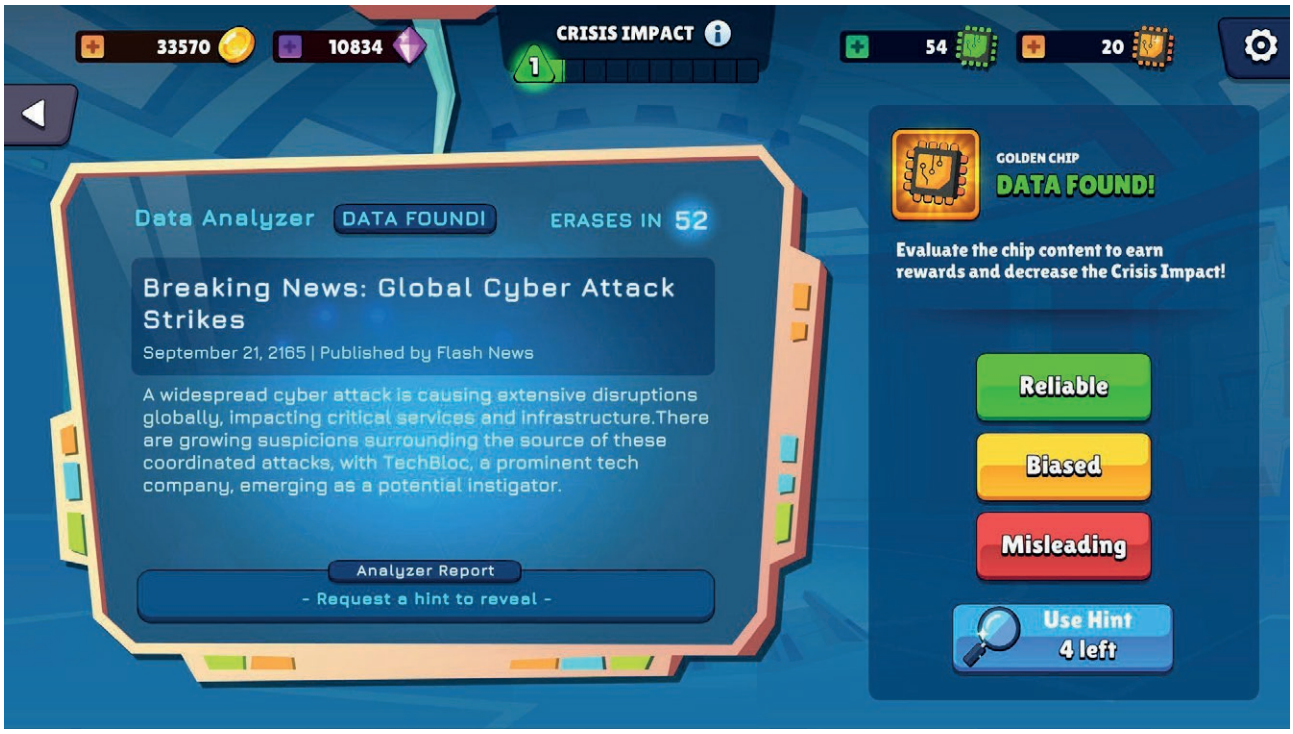

Figure 4. Data Analyzer.

4. Method

In this section, we will present the testing phase of the games, before the final concept and graphical design.

4.1. Testing the board games

Social Media Puppeteers and Social Media Fake News have been tested on different occasions, at the La Salle Training Center, at ENTI-UB Training Center, and at the Universidad de Guadalajara (this last venue only referred to Social Media Puppeteers). Students' profiles combined diverse educational backgrounds, with prior knowledge of technology and social media. Meanwhile, at the ENTI-UB Training Center, students were attending training related to technology and digital fields, demonstrating a clear familiarity with social media.

Regarding the first game, the micro tabletop role-playing game involved 30 students aged 16-19 years (12 F and 18 M). Students were divided into small groups of 5-6 students each. Social Media Fake News was tested with 16 students aged 16-19 years (9 F and 7 M), 19 students aged 18-20 years (9 F and 10 M), and 12 students aged 17-19 years (7 F and 5 M). These students were grouped into small teams of 3-4 members per team.

An exploratory and descriptive methodology was used, in which participants played Social Media Fake News and Social Media Puppeteers games during a controlled two-hour session, with four rounds played per group. The sessions were designed to observe how the participants interacted with the games, their level of understanding, and their reactions to the various scenarios presented. In terms of procedure, the steps included three levels:

1) A preparatory phase: Before the game, participants were informed about the objective of the games, their functionality, and the basic rules.
2) A core phase dedicated to gameplay: Each group played for approximately 20 minutes during the session. Parallel, non-intrusive observations were carried out to collect information about players' interactions with the interface, their approach to challenges, and group discussions.
3) Post-session discussion: Students participated in an open discussion to share their experiences and comments about the games.

Data were collected mainly via direct observation. During sessions, facilitators took detailed notes on players' interactions with the game, including response times, specific behaviors during the session, and the level of involvement. Informal interviews conducted at the end of the sessions explored participants' opinions about the games.

4.2. Testing the digital game

The digital game passed several testing phases, both on a technical and a gameplay level, regarding the structure and the mechanics. In this section we will present the study protocol developed to accompany the gameplay sessions with Data Defenders in schools.

The protocol includes pre-and post-tools and gameplay observation sessions to inform revisions and study students' feedback, according to three steps:

1) The first involves administering a questionnaire[3] to all students involved (15-18 years old) where the digital game has been introduced and tested. The questionnaire helped identify the students for the gameplay session (N=6), considering students' profiles, gaming experience (experienced gamers, casual gamers, or non-gamers), critical thinking ability, problem solving, and Information Literacy, and gender.

2) The second step comprises a gameplay session and the use of a grid (derived from game designers' observation practices) to observe students while playing, observing both students' interaction and their reaction to game mechanics with a qualitative approach.

3) The third step includes a post-gameplay session on two levels. The first individual data collection via a user experience form, coded with students' ID numbers. These forms provide insights into personal gaming experiences and perceptions. The second involves a plenary session with a group discussion aimed at exploring shared experiences and drawing collective insights.

Currently, the protocol has been applied in two occasions: in a secondary school in a district of Milan (Italy) during daily school activities, involving 6 school classes (3 fourth-year classes and 3 fifth-year classes of a Scientific High School – Sciences and Applied Sciences track), and within the National program "Cientificamente Provável" (Scientifically Probable) with 6 students and 3 teachers from a secondary school in the Aveiro region (Portugal). This initiative intends to create partnerships between schools, research units, and higher education libraries, enriching students' educational experience through direct experience with researchers and higher education institutions.

[3] https://shorturl.at/me7qT

5. Results and discussion

5.1. The board games

The results helped inform adjustments to improve gameplay balance and design of the board games.

In Social Media Puppeteers, observing group dynamics allowed game developers to adjust the recommended playtime and to define specific guidelines included in the support cards, such as instructions for "creating a digital adventure".

Modifications were made to the game elements to balance the mechanics and reinforce the educational goals, such as understanding how the media seek to maximize the impact of news. For instance, certain strategic points were assigned a value of 2 over others, encouraging players to prioritize these actions within the game.

In Social MediaFake News, prior to the testing sessions, we had a total of 167 cards, excluding the Crisis Cards. This made progress in the game challenging, so the set was simplified to a total of 108 cards, consisting of 72 construction cards and 36 action cards. This decision ensured a more equitable distribution, improving the overall game dynamics.

It was also observed that games with only two players slowed down the pace and limited the debate dynamics. In contrast, with a minimum of four players, richer discussions emerged about the creation of news within the game and the events represented. Students' insights include:

"The game feels like it takes forever to finish when it's just the two of us".
"When there are four of us, the conversations become much more interesting".
"It's more fun because we all contribute different ideas, and there's more debate about the cards".

This finding prompted the inclusion of new alternative dynamics in the game rules. For example, "Building Statements" challenges players to create coherent and creative statements using the available cards, while "Matching Colors" focuses on quickly pairing cards by color without requiring complex statements.

In both games, tests were also crucial in adjusting the graphic elements to align with the participants' communication needs and reduce cognitive overload (Kalyuga & Plass, 2009), beyond specific impairments. In Social Media Fake News, users reported difficulties in distinguishing the cards, leading to improvements in color contrast, requesting a reorganization of visual elements, and the addition of a distinctive design with eye illustrations in order to limit visual fatigue. This change aimed to facilitate card identification, particularly for colorblind players (Heron et al., 2018).

These modifications resulted in greater visibility and a significantly improved user experience, preventing the board games' feeling of "fiddliness" (Passarelli et al., 2024).

5.2. The digital game

The study on the video game is now ongoing. We will discuss the preliminary results from the Italian school. Even with a very limited sample size (N=6 students), the study protocol helped reach two goals. The first goal is connected to the testing of the protocol itself, evaluated according to the following criteria: completeness of the requests, logical order of presentation, coherence and clarity in the formulation of the questions, suitability of the response methods, effectiveness of the questions. Overall, the protocol showed to be robust and relevant, although the session led to one change in the section dedicated to the questions on Information Literacy.

The second goal is related to the game Data Defenders and its potential to support knowledge and skills, helping students reflect and promote critical explorations within the world of data and information today.

A few issues related to the game (not to the contents) were identified during the focus group.

The first issue is connected to Gee's work and the principle of exploration (Gee, 2013), emphasizing the role of active engagement and discovery as learning key components:

> *"In the second level I tried to focus more, and I looked at the archive of questions to try to better understand how to respond. For the second question, I was much more satisfied, I finally understood the logic".*
> *"At first I was a bit random in my choices, but then I realized that every resource mattered, and I adjusted my strategy to improve my score".*

The second issue refers to the role of immediate feedback, that is, the real-time responses or reactions provided to single actions, essential for guiding the player, reinforcing learning, and maintaining engagement:

> *"I also repeated the third level, and it didn't go very well. I had to adapt the strategy, but the lack of clear feedback made everything a bit frustrating. With notifications after each mission was completed, it would have been much more motivating".*
> *"I think notifications for progress and missions would make the game more motivating. Having continuous feedback would help better understand what to do".*

The third issue hits the core of the project: letting students' play, enjoy the game and learn new skills to be shared in everyday life:

> *"It made me more aware that every piece of information requires evaluation. Now, I think I'm more attentive even outside the game".*
> *"I've noticed that these literacy skills can be useful in many contexts".*

The analysis of the observation grid, even if preliminary and based on a single group, helped to assess several elements on a scale from 1 (low) to 4 (high) with qualitative observation notes: menu navigation, active engagement, emotional engagement, verbal communication, reaction to the game obstacles, attention to details, adaptability.

The interface was clear and easy (4 is the main score attributed to 4 students, 3 to the rest of the group), the engagement was deep (4 to all the students), with a single student showing distraction (score 2). The emotional level of students' engagements has been observed concerning facial expressions (smiles, surprised glances), and postural elements. However, in two cases, students expressed frustration while playing as they were not able to pass the level and win (score 2 and 1 referred to visual and sound elements). Verbal communication was relevant for four students, with comments and ideas expressed verbally and shared when playing, while playing was mainly a silent activity for 2 students. Mistakes and obstacles usually made players change their strategy, no one checked for support or help in the game tutorial. As for the attention to the details, except for one player who did not notice supporting elements in the game, everyone used the hidden information and the details disseminated in the scenario, even when not so immediate. In terms of adaptability, players made an effort to react, change behaviors (4 is the main score), and they used their time to improve the final score, despite the school setting and the time limit (4 is the main score for 5 students).

6. Conclusion

Board games and digital games developed in this project result from a collaborative effort between game developers – focused on technical choices and narrative development – and a pedagogical viewpoint, informed by the working group and the feedback gathered from stakeholders during the initial phase of the project.

These game proposals share at least four key elements: attention to the educational context, connection with literature and strategies for preventing misinformation, emphasis on group dynamics, and language that resonates with young people.

Regarding the first key element, the games (both analogue and digital) are specifically designed for educational settings. However, they also incorporate a crucial insight shared during discussions with teachers, educators, and journalists (Carenzio, 2024a). In particular, educators emphasized that when addressing social messages, game mechanics and learning objectives should be seamlessly integrated, making it difficult to separate the social content from the gameplay. Otherwise, there is a risk of creating a "foreign body effect," where the social message feels disconnected from the game. In other words, the playfulness of the game must be effective in engaging players.

On the second level, literature analysis and study of existing games have highlighted relevant aspects, such as adopting "prebunking" strategies. In prebunking, the audience is engaged preemptively to recognize the nature of information by understanding the techniques determining whether it is true or false, thereby building a kind of "preventive resistance" to misinformation. In contrast, debunking involves identifying and refuting false information after it has already spread, following the logic of what is termed "meticulous exposure". As social psychologist Sander van der Linden suggests, prebunking could help achieve a form of herd immunity against misinformation, limiting its impact (van der Linden, 2023).

In addition, literature on video games highlights how they allow players to simulate real-world problems and explore solutions, reducing the risks and negative consequences of incorrect choices. This enhances players' sense of agency in protected environments. Simulating and practicing within games support skill development, where "making mistakes" becomes a valuable part of learning. Based on Erickson's concept of a psychosocial moratorium in adolescence, Gee argues that video games create safe spaces for experimentation, reducing the pressures of real-life consequences (Gee, 2003). In a video game, exploration is not just about moving through levels, but about making decisions, testing ideas, and solving problems in an ever-changing and dynamic context. This mirrors the process of learning, where understanding grows through active exploration, critical thinking, and application. Through this lens, video games become powerful tools for learning, fostering autonomy, motivation, and personal growth. Players take on different roles, make difficult decisions, tackle problems, and test various strategies – all without the negative outcomes they might face in real life.

The third key element centers on group dynamics. The ability for players to form teams, collaborate, and develop shared strategies is particularly significant. An example can be found in the game Social Media Fake News, where players collaboratively create fake news. In education, fostering collaboration is crucial as it emphasizes knowledge as a social construct, emerging from dialogue rather than being owned by a single individual. This aligns with teachers' feedback, where peer tutoring strategies have proven effective. In particular, proficient students can support peers struggling with certain concepts, including technology-related topics.

Lastly, the fourth element involves connecting with young people through game design. The characters, such as influencers, are relatable to the world of social media and everyday life. Similarly, the

news to be analyzed in Data Defenders and the prompt cards used to create fake news in Social Media Fake News resonate with younger audiences. The settings, game mechanics, atmospheres, and graphic elements are designed to feel authentic and credible. Also, the elements we collected indicate the need to support young people, providing more guidance, and helping players to understand cause-and-effect relationships in the game world. Game designers have already worked on feedback to improve this part of the game, in particular in data Defenders, providing answers to make players understand mistakes or support better choices in the game.

Educators, teachers, and trainers can choose these games to implement diverse pedagogical strategies and explore various themes, using both analog and digital approaches depending on the context, complexity, and available time. Game sessions can range from 20 minutes to more extended activities of up to 60 minutes, fitting into both school schedules and extracurricular settings. It is also possible to revisit game sessions by selecting specific news items, products, or outcomes to facilitate further discussion and deeper exploration of relevant topics, aligned with the principles of digital education. In this way, games act as a bridge, mediator, and catalyst for new activities. For instance, incorporating current events, social media trends, or recent news into gameplay can engage participants and provide a relevant, real-world context. Students provided valuable feedback and expressed strong support for the game's role in developing media literacy skills. Their suggestions for future levels contributed significantly to the development plans (for example, including a new island on Artificial Intelligence in Data Defenders). The experience also offered students hands-on exposure to digital education tools and research methodologies.

In conclusion, the games are designed to immerse players in complex scenarios that challenge them to engage in strategic planning, evaluate consequences, and navigate moral dilemmas. Ultimately, this interactive and immersive approach can foster intergenerational dialogue and engagement across diverse audiences, emphasizing the importance of building a dynamic community attuned to contemporary digital cultures and practices.

7. Author contributions

This article is the result of collaborative efforts among the authors and the Yo-Media project working group. Alessandra Carenzio wrote Section 4.2, 5.2 and 6, Stefano Pasta wrote Section 1, Maria João Atunes and Oksana Tymoshchuk authored Section 2, Ruth S. Contreras-Espinosa and Jose Luis Eguia-Gomez wrote Section 3.1, 4.1 and 5.1, Oksana Tymoshchuk, Frederico Proença, Ana Passos contributed to Section 3.2. We appreciate the valuable contributions and insights provided by each member of the team.

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