

# Hoaxes in Social Media: Can Game-Based Learning Beat Them?

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**Abstract:** In the digital era, people, especially younger generations, are increasingly turning to social media as their primary news source. Reports show a significant increase in the use of online social media networks and an increasing amount of false information spreading on these platforms. False information can have severe consequences, as seen in the recent US presidential elections, the Brexit vote, and the COVID-19 pandemic response. False news can lead to radicalization, fear, and anti-social behavior both online and in real life. Addressing false information involves more than just labeling or filtering it on social media platforms. Cognitive biases like confirmation bias or the echo chamber effect can lead to distrust of such labels. The most effective solution is prevention through education, emphasizing critical thinking skills. It is therefore important to encourage students to think critically to be as resistant as possible to the influence of hoaxes. Given that frontal education does not appear to be an effective approach to developing critical thinking, other alternatives need to be sought. Game-based learning is gaining prominence as an effective educational approach. It offers advantages like increased student motivation, a secure environment for experimentation, and the development of crucial skills, including critical thinking. Several meta-analyses showed that games can improve critical thinking, but the effect depends on factors like game genre, mechanics, instructional approaches, learner demographics, and cultural nuances. Our work is dedicated to the qualitative analysis of games enhancing critical thinking, especially in the context of building immunity towards online false information. Our primary aim is to thoroughly examine these games and their game mechanics and comprehensively assess their advantages and disadvantages within the formal educational context. We systematically playtested selected games based on criteria related to usability in classrooms. We found, that most of these games are strongly story based, typically putting the player in the role of a hoax-monger or alternatively in the role of a fact-checker. The games offer easily understandable game mechanics to support fast onboarding, and therefore offer an effective educational tool to discuss and learn more about the risks of increasing amounts of false information in online space.

**Keywords:** Education, False information, Game-based learning, Gaming, Hoaxes in social media, Teaching

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## 1. Introduction

In the online era, there is a shift in news consumption, with younger generations favoring social media over traditional outlets (Flintham et al., 2018). The Media Use in the European Union – Report (Commission and for Communication, 2023) highlights a significant increase in online social media usage, rising from 33% in 2010 to 67% in 2023. Daily usage among those aged 15 to 24 is at 79%, with 93% using social media at least once a week. The same report notes that 69% of respondents frequently encounter news they believe distorts reality or is false.

False news can be defined as information that is created to resemble conventional news but contains false or misleading information (Lazer et al., 2018). The spread of false information can harm both society and individuals in various ways. Prominent instances of this impact include the notable cases of the latest US presidential elections (Gunther, Beck and Nisbet, 2018), the Brexit vote (Höller, 2021), affecting the political scene in other countries (Reichel et al., 2020; Cantarella, Fraccaroli and Volpe, 2023), reducing interest in COVID-19 vaccination (Carrion-Alvarez and Tijerina-Salina, 2020; Montagni et al., 2021). In addition, increased radicalization and spread of fear result in aggressive and anti-social behavior both online and offline (Roberts-Ingleson and McCann, 2023).

Addressing false information goes beyond labelling or filtering on social media platforms, as cognitive biases and distrust complicate this approach (Clayton et al., 2020). Labelling content as true or false is time-consuming and sensitive, with potential errors undermining trust (Kemp, Loaiza and Wahlheim, 2022). Social media developers may resist implementation due to cost and misalignment with their business model. The most effective solution involves prevention through education, emphasizing the development of critical thinking skills (Levy and Ross, 2021).

Conventional educational methods, such as traditional frontal education in classrooms, often fall short of equipping students with the essential skills demanded by the 21st century, including critical thinking skills (Lavi, Tal and Dori, 2021). Consequently, alternative pedagogical approaches are gaining prominence, with game-based learning emerging as an effective solution (Plass, Homer and Kinzer, 2015).

Game-based learning (GBL) uses various games to fulfill educational objectives. This approach offers several key advantages, notably heightened student motivation and engagement in assigned tasks (Anastasiadis, Lampropoulos and Siakas, 2018). Moreover, it provides a secure environment within games where

experimentation is encouraged, failure is not punitive but rather an opportunity for learning and improvement (Anastasiadis, Lampropoulos and Siakas, 2018). Additionally, game-based learning empowers educators to shift a portion of the educational process from teacher-led instruction to student interaction with the game itself (Hanghøj, 2013).

Game-based learning can effectively impart knowledge across a spectrum of subjects, spanning traditional disciplines like mathematics (Ramli, Maat and Khalid, 2023), programming (Papadakis and Kalogiannakis, 2019), and history (Scholz, Komornicka and Moore, 2021), while also developing crucial skills such as teamwork and communication (Martín-Hernández et al., 2021), and critical thinking (Mao et al., 2022).

One approach actively used in GBL aimed at developing critical thinking skills includes the inoculation theory (Roozenbeek and van der Linden, 2018). This theory is based on the biological metaphor of inoculation: an organism is exposed to bacteria or viruses in safe amounts so that later when encountering a real disease, it knows how to respond effectively. This works similarly in games where players can be exposed to the threat of false information in a safe environment so that they can later recognize it in real life. Experiments conducted with existing games suggest that games can be a powerful tool for developing critical thinking skills and thus building immunity towards false information (Roozenbeek and van der Linden, 2019; Basol, Roozenbeek and Linden, 2020).

The increasing prevalence of false information on social media platforms and its potential impact on individuals' critical thinking skills prompted this study. Recognizing the challenges in addressing misinformation through traditional means, the researchers explored the potential of game-based learning as an innovative approach to enhance critical thinking skills and build resilience against false information.

## **2. Methods**

Our work is dedicated to the qualitative analysis of games enhancing critical thinking, with a strong focus on the ability to recognize false information. Our primary aim is to thoroughly examine these games and their game mechanics and conduct a comprehensive assessment of their potential within the formal educational context. Therefore, we can formulate the following research questions:

- RQ1: How can these games be used in a formal education context?
- RQ2: What game mechanics do these games use to teach about false information?

### **2.1 Game Selection**

Initially, we searched for games centered on the theme of false information or misinformation. Given that such games are typically free-to-play web-based games, we opted not to explore conventional platforms like Steam or the Google Play Store. Instead, we conducted a targeted web search using the key phrases "fake news game" and "misinformation game," examining the search results to handpick the relevant digital and tabletop games.

In the screening process, we identified 19 game projects. We excluded those that: a) did not directly tackle false information, such as the Interland game aimed at lower primary school children, focusing on general Internet safety; b) addressed false information only through gamified quizzes lacking a deeper game context, like Fakey, a news labeling simulation. After these exclusions, we identified 11 digital and 2 tabletop game projects (see Table 1).

### **2.2 Examined Criteria**

We played the selected games and analyzed them based on the following criteria:

- Platform – on which platform is the game available, this can affect the accessibility of the game in the classroom.
- Pricing – whether the game is free to play, or requires financial investment, which can greatly reduce its accessibility in formal education.
- Number of players – how many players can play the game simultaneously. Determines also, whether the game is single- or multi-player.
- Recommended age – for which age category is the game suitable.
- Average playtime – approximately how long it takes to finish a round or a full game.
- Key features – this broader criterion describes the most important game mechanics of the game. Gives a general explanation of the game's core loop and describes how the game teaches about false information.

- Preparation and equipment needed – what is needed to use the game in the classroom., including technical equipment and preparation needed before the game can be played, such as explaining the rules.

These criteria should help us to identify the key advantages and disadvantages of these games in the formal educational context and determine their usability. The main constraints in general are the pricing, the relatively short duration of classes (typically 45 to 60 minutes), the number of players, and the accessible equipment. Besides these, the teacher needs to understand the game and actively participate in directing the students during playtime, which requires further preparation based on the type and complexity of the game (Hanghøj, 2013).

### **3. Results**

The results obtained from the observed games are shown in Appendix A – Table 1. The table was filled out based on our playtesting of the games (in duration of one or two play sessions per game) and based on available information about the games online (such as the recommended age group).

#### **3.1 Accessibility of the Games**

The results show that digital games are predominantly available as browser-based games, except for Cranky Uncle, which has a mobile app, and Escape the Fake, which uses a mobile app and augmented reality. Browser-based games are a good choice for educational games because they are platform-independent and easily accessible on a variety of devices, including mobile and tablet devices, if the webpage is responsive. A possible drawback is that they require a permanent internet connection, but this is ensured in most schools in Europe.

The accessibility of these games is also supported by the fact that they are free to play, as most of the projects were created on academic campuses or at the initiative of non-profit organizations. A standout of these are the tabletop games Lamboozled! and Follow Me, which need to cover printing costs and are therefore charged (in both cases with a price of around 20€ per copy). The authors of Follow Me offer an alternative solution and the possibility to download the game materials as a print-and-play version.

Another common characteristic of digital games is that they are designed for a single player. The exception is Escape the Fake, which offers an escape room experience using augmented reality for a group of players. The advantages of making a single-player game for designers are more control over the flow of the game and easier technical implementation. On the other hand, the possibility of interaction between players can increase the players' engagement in the game because the game also creates a social experience. Thus, in this respect, tabletop games have a certain advantage until the abstinence of a digital game created for multiplayer in the theme of fake information.

#### **3.2 Usability in Formal Education**

The primary target audience for these games is teenagers around the age of 14-15. This can be explained by the fact that by this age, children are usually mature enough to deal with more serious topics (Shehata and Amnå, 2017), including politics and democratic principles (as depicted in the games Harmony Square or Libertas Veritas), or illegal migration (as in the game Troll Factory), or the complex motivations behind the creation and dissemination of fake information (as in the games Bad News and Fake it to make it). However, it appears that children are getting exposed to social media and, therefore, to fake information at an increasingly young age, which makes it appropriate to target games with this theme at even younger generations, as the game Fake News Detective does.

It turns out that these games were created with a consideration for use in formal education. They are designed to be short enough to be used effectively within a typical lesson, lasting around 10 to 25 minutes. They also contain simple game mechanics, where the player mostly just reads the text and selects an action from the available choices, which makes the onboarding process easier, and players can start to play without a long explanation or a difficult tutorial. An exception is Fake It to Make It, which has a relatively long game time and a complex simulation of the spread of fake news and the economics of web portals, for this reason, it requires a longer play time, and there is a greater risk that students will stop enjoying the game before they reach the desired level of understanding of the spread of false information. Another limitation for more complex games is the restricted class duration in schools, which does not provide opportunities for longer play sessions. A special case are tabletop games that require an explanation of the rules before playing. In this respect, the Follow Me game has a slight disadvantage due to the higher complexity of the rules, but both tabletop games studied try

to simplify the process of learning the rules by using freely available video tutorials that can be watched before playing.

Most of the games do not require much preparation and a lot of tools, just an internet connection and a computer or mobile phone. In the case of tabletop games, it is, of course, necessary to have a sufficient number of copies of these games. Only Escape Fake requires more precise room preparation, printing and hanging the posters according to the freely available instructions. More preparation may be required for the post-play debriefing about the topic of false information and prevention, which has the potential to increase the educational effect of the gameplay; for this purpose, several of the games (for example, Harmony Square, Follow Me, Lamboozled!) offer a freely available methodological guide and sample lessons to assist in the preparation and implementation of the debriefing.

Based on these findings, we can state that the answer to RQ1 is that most of these games are well prepared for implementation in formal education, especially in lessons such as media education or civic education. They are of adequate length and offer enough methodological materials to ensure that their use does not pose an excessive workload for the teacher.

### **3.3 Key Game Mechanics**

In terms of game mechanics, we also find commonalities between the games studied. Most of them are story-based and focus on decision-making between 2-3 offered actions that affect player statistics (for example, credibility or popularity), with the player's main goal being to have these statistics as good as possible at the end of the game; 6 of the 13 games studied work in this way. The Choose Your Own Fake News game is even simpler, it uses only a story with several decisions for the player without any stats, and the player's goal is only to achieve a "good" ending to the story. Other games use game mechanics representing the process of debunking fake news, such as collecting evidence and verifying the article's author (in the case of Lamboozled!, Post Facto, and partially in the game Follow Me!).

Another interesting game in terms of choice of mechanics is Fake News Detective, which is an explorative adventure game where the player discovers a large headquarters of a disinformation portal to find the main director. The player progresses by solving simple puzzles and playing mini-games where they guess the truthfulness of the depicted articles, the educational component is less pronounced in this game, but due to the appealing graphics and elements of adventure, it is suitable for the younger generations. Unique in this respect is the game Escape Fake, which functions as an escape room in augmented reality where players solve various puzzles related to media, fake news, and social networks to meet the game's goal and save the world.

### **3.4 Story**

Most of these games rely heavily on stories. A recurring motive is to put the player in the role of a disinformation spreader with different goals: From arguing within the family (Cranky Uncle) to gaining wealth and popularity (Bad News, Fake It to Make It, Troll Factory), staying in power (Libertas Veritas) to destroying an existing democratic regime (Harmony Square). This makes it easier for the player to understand the motives behind the spread of false information and teaches the most common techniques of creating and spreading hoaxes, building resilience to false information in real life as well, as applying the inoculation theory.

Another group of games puts the player in the role of a fact-checker (Fake News Detective, Post Facto, Lamboozled!, Escape Fake), who tries to uncover hoaxes by using established techniques such as verifying the author of the article, searching for other sources, examining the stylistics of the text and the way the facts are presented and the emotions evoked. These games playfully teach players these important techniques and increase the expectation of using fact-checking in real life as well.

The third group of games puts the player in the position of a person who is not a professional fact-checker, but who can be greatly influenced by the impact of these reports. In the case of the Follow Me game, the player is an influencer on a social network trying to gain popularity, and in the case of the Troubled Times scenario on NewsGamer, the player is put in the role of the chief director of a TV channel trying to maintain popularity, support from the state, and a professional reputation at the same time. In the case of these games, players can experience the negative impact of false information in the safe environment of the game, which again can reinforce their alertness subsequently in real-life situations.

Based on these findings, we can state that the answer to RQ2 is that the key mechanics of these games are predominantly story-based decision-making, embedding the player in the roles of various stakeholders in the

creation and dissemination or debunking of false information, and simulating the process of fact-checking through in-game actions.

### 3.5 Discussion

Existing studies that address game-based learning in the context of fake news predominantly work with quantitative data and look at the impact on the ability to recognize fake information. In this way, the effectiveness of games *Bad News* (Basol, Roozenbeek and Linden, 2020), *Harmony Square* (Roozenbeek and van der Linden, 2020) or *Cranky Uncle* (Cook et al., 2023) has been demonstrated.

In the other hand, a qualitative analysis of *Bad News* and similar games suggests, that these games by themselves are not as effective and has questionable long term effect (Barabas, 2023), the article however states, that even if the games themselves cannot offer the ultimate solution, they definitely can play a role in the fight against hoaxes. Another qualitative research of games *Bad News*, *Harmony Square* and *Fake It To Make It* made similar finding to our results: their players enjoyed the storylines of games and disliked the complexity of the game *Fake It To Make It* (Berg, Loewen-Colón and Saridaki, 2021).

## 4. Conclusion

The current era is marked by an increasing amount of false information being spread, especially online on social networks. This news can seriously threaten both the individual (e.g. bad advice on healthy lifestyles) and society (e.g. influencing public opinion and elections). Young people are extremely exposed to hoaxes as their primary source of information is often social media. Solutions such as news labeling or fact-checking are costly but limited in their effectiveness, so the best solution is prevention and the associated development of critical thinking. Traditional frontal education in schools often fails to develop the skills needed to build resilience to false information effectively enough, so alternative ways of teaching are becoming more popular, including game-based learning, which allows students to learn playfully in a safe environment.

This work aimed to map the available games aimed at educating about false information, to compare their key mechanics and other parameters that influence their usability within the learning process. We identified and analyzed 11 digital and 2 tabletop games.

We found most of these games to be well implementable in the learning process due to their shorter playing time and easy-to-understand mechanics, which primarily involves story-based decision-making and roleplay (most often in the role of a "bad" hoax-maker or "good" fact-checker) and game mechanics simulating the fact-checking process. At the same time, some of the games offer sample lessons and a methodology guide for teachers to facilitate the use of games in the classroom.

A potential limitation of this study lies in the influence of researcher bias, as the effectiveness of games in developing critical thinking skills may be influenced by the researcher/s perspectives and preferences in selecting or designing the gaming scenarios

In future work, we intend to test these games with students and teachers from schools to validate our assumptions and gain a more accurate, data-supported picture of the usefulness of these games in formal education and their effectiveness in building resilience to false information.

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Appendix A – Results Table

Table 1: Summary of the parameters of the studied games

Game title	Key features	Other information	
<b>Bad News</b> <sup>1</sup>	A narrative game centered on player-character dialogue, driven by decisions impacting stats like credibility and followers. Players take on the role of a 'disinformation and fake news tycoon,' striving to build a social media following inspired by X (formerly Twitter) through the spread of hoaxes	Platform	Web, (mobile friendly)
		No. of players	1
		Playtime (min)	10-15
		Pricing	Free
		Age group	14+
Preparation & Equipment	computer/mobile, internet access		
<b>Choose Your Own Fake News</b> <sup>2</sup>	A nonlinear storytelling game driven by simple player decisions. Choose from three characters and make decisions related to online false information.	Platform	web
		No. of players	1
		Playtime (min)	5-10
		Pricing	Free
		Age group	10+
Preparation & Equipment	computer, internet access		
<b>Cranky Uncle</b> <sup>3</sup>	A linear dialogue-driven game immerses the player in discussions with a 'cranky uncle,' teaching denial techniques like cherry-picking or conspiracy theories. The game features short lessons followed by multiple-choice questions. Players can retry incorrect answers or proceed upon finding the right one, providing a more engaging context than traditional quiz games like Factitious.	Platform	Web, mobile
		No. of players	1
		Playtime (min)	15-20
		Pricing	Free
		Age group	14+
Preparation & Equipment	computer/mobile app, internet access		
<b>Escape Fake</b> <sup>4</sup>	An augmented reality escape room game, where the players need to solve different puzzles related to false information to save the world. The content of the game is accessible through the camera of the mobile phone in combination with printed-out posters.	Platform	Mobile (AR)
		No. of players	1-6
		Playtime (min)	45-60
		Pricing	Free
		Age group	12-16
Preparation & Equipment	mobile app, internet access, printed posters, an empty room with enough space		
<b>Fake It to Make It</b> <sup>5</sup>	A complex game where players assume the role of a hoax spreader, aiming to earn money. The game offers significant freedom with various article options on different topics. Players manage their news portal's	Platform	Web (mobile friendly)
		No. of players	1

<sup>1</sup>Available at: <https://www.getbadnews.com/>

<sup>2</sup>Available at: <https://chooseyourownfakenews.com/>

<sup>3</sup>Available at: <https://crankyuncle.com/>

<sup>4</sup>Available at: <https://escapefake.org/>

<sup>5</sup>Available at: <https://www.fakeittomakeitgame.com/>

Game title	Key features	Other information	
	economy, including domain costs, hosting, and monetization. To maximize visibility, players select and share articles among groups on social media. The game delves into a detailed model of spreading misinformation, requiring a longer playtime and may not be ideal for casual players.	Playtime (min)	45-60
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer/mobile, internet access
<b>Fake News Detective<sup>6</sup></b>	A charming top-down adventure game emphasizes exploration as players take on the role of a detective searching for the head of a misinformation portal. The game includes mini-games where players label real-life inspired articles as true or false.	Platform	Web
		No. of players	1
		Playtime (min)	15-20
		Pricing	Free
		Age group	10-14
		Preparation & Equipment	computer, internet access
<b>Follow me<sup>7</sup></b>	A card game, that puts the player in the role of an influencer on a fictitious social media platform. Players are trying to gain followers by sharing articles and increasing the credibility of their page. Besides that, they are trying to slow down other players by fact-checking their articles and searching for hoaxes.	Platform	Tabletop
		No. of players	2-4
		Playtime (min)	25-45
		Pricing	26.99€ or print&play
		Age group	10+
		Preparation & Equipment	hard copies of the game, explaining the rules, creating groups
<b>Harmony Square<sup>8</sup></b>	Non-linear storytelling game based on a dialogue between the player and a fictitious character, driven by the player's decisions, decisions affecting stats such as credibility or following. The player takes the role of the 'Chief Disinformation Officer,' attempting to disrupt peace in the fictional Harmony Square by spreading hoaxes.	Platform	Web (mobile friendly)
		No. of players	1
		Playtime (min)	15-20
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer/mobile, internet access
<b>Lamboozled!<sup>9</sup></b>	A card game where players aim to build evidence for a randomly selected article using cards for actions like checking sources, authors, and related facts. The game, set in a politically neutral fictional world ruled by lambs, simulates real-life fact-checking processes.	Platform	Tabletop
		No. of players	2-6
		Playtime (min)	20-25
		Pricing	19.95\$
		Age group	11+
		Preparation & Equipment	hard copies of the game, explaining the rules, creating groups
	A non-linear storytelling game in which players assume the role of the 'Minister of Integrity' in a dictatorial regime. The player makes decisions to control public opinion,	Platform	Web (mobile friendly)
		No. of players	1

<sup>6</sup>Available at: <https://fakenewsdetective.com/>

<sup>7</sup>Available at: <https://www.gamifactory.eu/en/follow-me>

<sup>8</sup>Available at: <https://harmonysquare.game/en>

<sup>9</sup>Available at: <https://www.tcpress.com/lamboozled>

Game title	Key features	Other information	
<b>Libertas Veritas</b> <sup>10</sup>	appease the 'Glorious Leader,' and manage limited time for actions.	Playtime (min)	10-20
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer/mobile, internet access
<b>Newsgamer.com – Troubled Times</b> <sup>11</sup>	A non-linear storytelling game where player decisions impact three stats: revenue, government support, and professional reputation. Players take on the role of a chief editor of a news channel, making content decisions to maintain all three stats above a defined level by the end of the game.	Platform	Web (mobile friendly)
		No. of players	1
		Playtime (min)	10-15
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer/mobile, internet access
<b>Post Facto</b> <sup>12</sup>	In this game, players identify and report suspicious flags in real-world articles to a bot, using a simple interface. The game provides various red flags for different parts of the article, like 'typos' or 'missing sources,' along with additional information such as maps or database records, guiding players through the fact-checking process	Platform	web
		No. of players	1
		Playtime (min)	10-15
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer, internet access
<b>Troll Factory</b> <sup>13</sup>	A non-linear storytelling game centers on player-character dialogue with a fictitious character, the 'boss.' Players, in the role of a troll seeking online visibility, make choices from several answers in dialogue. The game addresses real-life issues and example articles, including topics like illegal migration.	Platform	Web (mobile friendly)
		No. of players	1
		Playtime (min)	10-15
		Pricing	Free
		Age group	15+
		Preparation & Equipment	computer/mobile, internet access

<sup>10</sup>Available at: <https://apps.deakin.edu.au/library/dlm/twine/MisinformationGame.html>

<sup>11</sup>Available at: <https://news-gamer.com/stories>

<sup>12</sup>Available at: <https://www.postfactogame.com/>

<sup>13</sup>Available at: <https://trollfactory.vle.fi/>