

# The Fake News Detective: A Game to Learn Busting Fake News as Fact Checkers using Pedagogy for Critical Thinking

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*Abstract*—Fake news travels faster than real news; in one specific event, fake news even got more engagement than real news. As fake news' threat to the truth and democracy becomes more imminent, it is increasingly important to educate people on how to spot fake news. The project aims to teach how to differentiate fake news by developing a web-based game available to play in the public internet. Users play as a professional fact checker, learning three most important questions used by fact checkers. The game is designed by using three most effective pedagogy to teach critical thinking. Evaluation is not part of the project due to time constraint.

## 1 INTRODUCTION

### 1.1 The Threat Fake News Possesses

In 2017, two-thirds or 67% of U.S. adults read news from social media, says a study conducted by Sheared and Godfried (2017). Being one of the main sources of news, social media is where people can create and share content easily without much moderation. Stories shared in social media might be true, and might be not. A study done by Vosoughi et al. (2018) found that fake news in social media “diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information”. Social media users see fake news as something new and interesting to be shared, hence fake news spread faster than real news (Vosoughi et al., 2018). Knowing both facts that most people read news from social media and fake news spread faster and broader, we can see already the threat fake news possesses.

In one occasion, during the U.S. presidential election in 2016, fake news even got more engagement (likes, shares, and comments) compared to 19 major news companies combined (Silverman, 2016). The study did not examine closer what

causes this, but the number is still shocking, that truth is defeated by fake stories. Fake news not only engages users more, a study in 2016 shows that fake news are believable as truth, as long as people repeatedly come across the news. In the study's own words that "75% of American adults who were familiar with a fake news headline viewed the story as accurate" (Silverman & Singer-Vine, 2016).

The question would be, why people are prone to be deceived; one hypothesis possible would be educational background. However, a study found that even students "struggled to effectively evaluate online claims, sources, and evidence" (McGrew et al., 2018). The study evaluates students' ability to spot fake news ranging from middle school to college in 12 states. Despite having literacy as part of curriculum, formal education is still struggling to fight fake news.

Fake news can go as far as risking lives. A news article is posted by The Washington Post titled "N.C. man told police he went to D.C. pizzeria with gun to investigate conspiracy theory". The man, in the news article post, went to a pizza restaurant, fired one or more shots, believing a fake story he just read saying that the pizza restaurant in Northwest Washington run a child sex-ring. Taking a step back, this fake news issue even jeopardizes an even bigger and wider issue: democracy. Gaughan (2016) explains that fake news is the first of "three toxic developments that if left unchecked threaten the future of voting rights in America" (Gaughan, 2016).

## **1.2 Fake News Definition**

There are gray areas on defining what fake news and what not. Tandoc Jr., et al. (2017) did a study to define fake news and come up with a definition that a fake news is a content that "takes on some form of credibility by trying to appear like real news" (Tandoc Jr. et al., 2017). Spotting fake news often comes as part of the news literacy domain. News literacy itself is defined as "the ability to critically analyze and evaluate news content" (Bonnet & Rosenbaum, 2019). News literacy has one of the objectives to teach news evaluation, such as verifying evidence and news sources (Fleming, 2014). While having fake news as part of the domain, news literacy is wider than talking about fake news alone; it also teaches how journalism works, for example.

### **1.3 Fake News and Critical Thinking**

Critical thinking can be defined as “the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action” (Scriven & Paul, 1987). Recognizing fake news requires similar skills, it requires information analysis and evaluation, which in the end leads to belief or action.

From a philosophical perspective, critical thinking is seen as tendention to engage with reflective skepticism (Fahim & Masouleh, 2012), a spirit we need when exposed to fake news as well. Similarities in both definitions of critical thinking is seen as a potential hypothesis to check, whether applying pedagogy being used for teaching critical thinking would be an effective means for teaching how to spot fake news.

### **1.4 The Fake News Detective Game**

Aiming to be part of efforts to fight fake news, The Fake News Detective Game is a mobile-friendly web-based game developed using three most effective pedagogy used in critical thinking, which will be elaborated more in Section 3.2. The Fake News Detective Game also tries to approach the problem from a different perspective compared to existing games or solutions out there. The game places players as professional fact checkers, with three most important questions fact checkers as learning objectives. The detail would be elaborated more in Section 2.5 and 3.1.

## **2 RELATED WORKS**

### **2.1 Factitious: Large Scale Computer Game to Fight Fake News and Improve News Literacy**

In the Factitious game, users are given news with image and text. Then, users have to judge whether it is fake news or not. Grace and Hone (2019) mention in the study they publish that the game has been played by 45,000 players more than 500,000 times. The author tries to achieve two points: 1) educating users on thinking critically pertinent to fake news, 2) gathering data about users' perception. The game has multiple game levels, starting from easy (for middle schoolers), medium (for highschoolers), and hard (for college students)..

## **2.2 The fake news game: actively inoculating against the risk of misinformation**

In the game developed by Roozenbeek and Linden (2019), players play as the maker of bad news. The game is called The Bad News Game. The game in the study is a card-based role play game. The same game is also developed as a web-based game. The gameplay flows as if it is a story, where the player is asked to play as one of six personas of bad news makers. The player will get a bigger score when they get more social media followers and get more of their fake news shared across. The web-based game seems to simulate the role play with more limited options, yet still having some benefits of dialog-like decision making.

## **2.3 BBC iReporter**

In BBC iReporter, users “become a social media journalist faced with a major breaking story” (Cellan-Jones, 2018). The game is quite realistic and immersive as it involves chatting, having video calls with other journalists. The players need to make decisions with trade offs, for example speed and accuracy, whether to publish a story as quickly as possible or to confirm first with a reliable source. The game educates the players more on the side of how good journalism is and what to consider before sharing a story.

## **2.4 NewsFeed Defender**

The users play as social media manager in the NewsFeed Defender game. The content is coming continuously and the player has to choose which content to post in their social media page. Before posting the content, the player has to check the content first based on some aspects: accuracy, transparency, trustworthiness, impartiality, and focus. The game is developed by ICivics, an education nonprofit, and the Annenberg Public Policy Center (Bouygues, 2018).

## **2.5 Summary and Comparison**

Each of the games mentioned above takes different roles for players to play as, starting from 1) news users (Factitious), 2) bad news makers (The Bad News Game), 3) journalists (BBC iReporter), and 4) social media manager (NewsFeed Defender). One study conducted shows that educating “strategies for evaluating digital content that were based on the practices of professional fact checkers” significantly improve students ability to “investigate the source of a website, critique evidence, and locate reliable sources” (McGrew, 2020). Yet there is no

game, as of the time of writing, for players to play as professional fact checkers. The related works mentioned also do not highlight that much on the pedagogy being used, how effective the learning method would be for teaching how to spot fake news.

In the Fake News Detective Game developed for this project, players play as professional fact-checkers. Players will learn three most important questions asked by professional fact-checkers when they face a new content to be analyzed (Wineburg & McGrew, 2018). The game also developed based on the hypothesis that pedagogy used for critical thinking would be effective for teaching how to spot fake news. The novel approach to address the problem hoped to be one of possible effective solutions on fighting fake news.

*Table 1*—Related works comparison table.

<b>Game</b>	<b>Player’s Role</b>	<b>Learning Objectives and Structure</b>	<b>Pedagogy</b>
Factitious	News consumer	Not-known	Not-known
The Bad News Game	Fake news maker	Six fake news maker personas	Active inoculation induced by game
BBC iReporter	Journalist	Not-known	Not-known
NewsFeed Defender	Social Media Manager	Not-known	Not-known
The Fake News Detective Game	Professional fact-checker	Three main questions for professional fact-checkers (see Section 3.1)	Pedagogies effective for critical thinking (see Section 3.2)

### **3 LEARNING OBJECTIVES AND PEDAGOGY**

#### **3.1 Learning Objectives**

The Fake News Detective Game uses three most important questions used by professional fact-checkers (Wineburg & McGrew, 2018) as learning objectives. This is based on a study done by McGrew (2020) that teaches students to spot fake news by positioning them as professional fact checkers has proven significantly to improve the students ability to spot fake news. Each of the learning objectives act as game levels, game levels then broken down into game cases (case as in a case for the detective to solve).

### ***3.2.1 Learning Objective 1 - Who is behind this information?***

Professional fact checker would think first, who writes the content, and what are possible intentions of the writer, does the author relate to authority or sponsorship, does the author have a certain background that might bias the content inclination towards a certain side of the story (McGrew, 2020). By checking the author background and possible intention first, users are expected to see another side of the story and judge accordingly. One simple example would be, if a story is written by someone who frequently lies in public, we then should not believe the story coming to the person right away. Another example would be, if an article is written by a company, a possible intention would be for readers to buy or use the company's product. At the end of this level, users are expected to be comfortable to say whether a source is a reliable source of information or not, and whether the author has certain intentions possible. See Appendix 7.2 for breakdown of this learning objective.

### ***3.2.2 Learning Objective 2 - What is the evidence?***

In social media, it is not hard to find claims without sufficient evidence. Fact checkers will examine evidence first (McGrew, 2020), for example if a photo is posted in social media with an emotional caption, we need to ask first who takes the photo, who is in the photo, and what is the story behind the photo. If there's no strong evidence that the photo supports the claim, then there is a probability that it might not be a true story, or it is miscaptioned. At the end of this level, we expect the user to always check the evidence of the news and not believing the story right away without checking the evidence. Check Appendix 7.2 for breakdown of this learning objective.

### ***3.2.3 Learning Objective 3 - What do other sources say?***

Professional fact checkers do a lot of cross-checking. It is recommended to do click restrain, which means taking a look at the end of the search result page to consider sources available (McGraw, 2020). Do reverse search on a content before believing that it is true, helps a lot. Check the post or the news back into the search engine and see what other sources say is one of three most important questions professional fact checkers do when checking whether a content is fake or not. Break down of this learning objective can be found at Appendix 7.2.

### **3.2 Pedagogy for Critical Thinking**

Abrami et al. (2015) conducted a meta-analysis study on strategies for teaching students to think critically. The purpose of the study is “to estimate the average effects in the population of learners who are exposed or not exposed to various instructional interventions, and to explore the variability that exceeds sampling error through moderator analysis of categories of study features.” (Abrami et al., 2015). The study shows that 1) dialogue, 2) authentic problems, and 3) mentoring are the most effective pedagogy to teach critical thinking.

Dialogue is learning through discussion, be it oral or written. Teachers started by prompting a question then students start to answer or give arguments (Abrami et al., 2015). The discussion then developed from there with a learning objective to ensure the discussion still has a direction towards a certain objective. The Fake News Detective Game put some effort to simulate dialog in certain ways.

The authentic problem “is characterized by an effort to present students with genuine problems or problems that make sense to them, engage them, and stimulate them to inquire” (Abrami et al., 2015). Having real fake news shared to the users for them to solve would be more engaging compared to have fabricated fake news to be judged. Hence in the Fake News Detective Game, all cases and levels are based on fake news or real news from the real world.

Last, the mentoring is about “one-on-one modeling and error correction based on critical analysis” (Abrami et al., 2015). Mentoring can be simulated by giving feedback based on answers given by the users, which is the approach the Fake News Detective Game will take.

## **4 THE FAKE NEWS DETECTIVE GAME**

### **4.1 Game Design**

A web-based game is developed with the hope to engage users while learning (Papastergiou, 2009). The players take a role as professional fact-checkers in a hoax busting organization. The organization has a social media page where the followers usually ask whether a story is true or not (see Figure 1). The game score would be determined based on the answer of the users to their followers. If the answer is accurate, then they get four points. If the answer is incorrect, then

they get minus one point. The score here is not the primary focus of the project and has not yet been well-designed as part of gamification strategy.

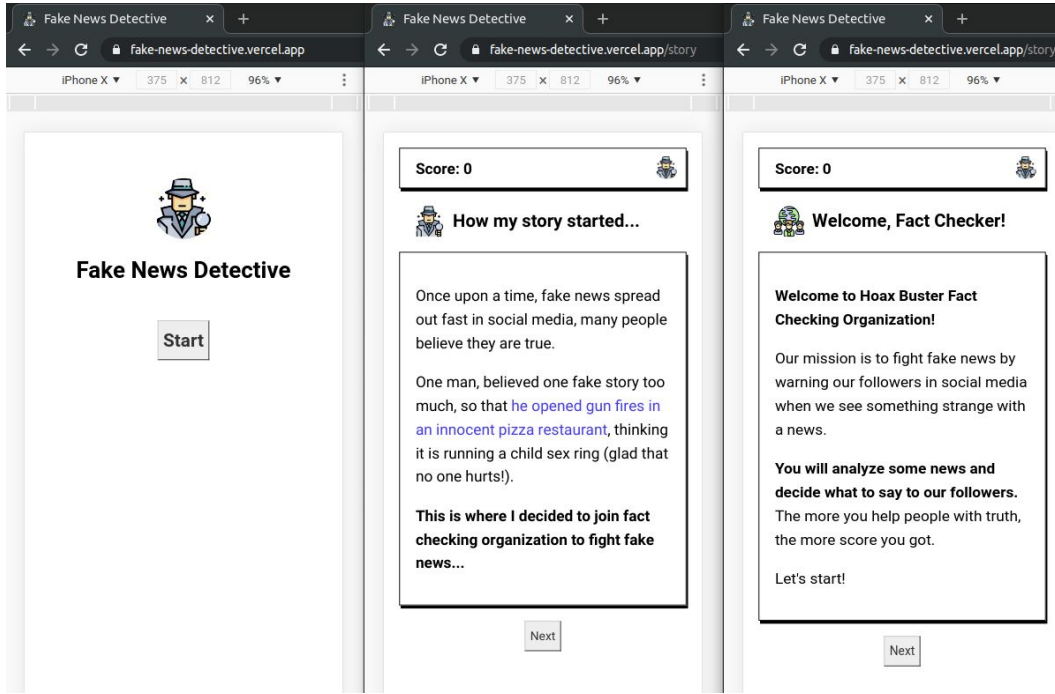


Figure 1—Screenshot of welcome page and story pages.

The Fake News Detective game adopted the approach taken by The Bad News Game (Rozenbeek & Linden, 2019) to simulate dialogue. In the Bad News Game, dialogue is simulated through story with multiple choice questions. Each of the questions lead to a certain flow of story or canned response. In each of the gameplay, there will be prompt and options to be chosen, each choice would lead to different dialog. See Figure 2 for each component of the game screen to simulate dialog. See Figure 3 which shows a screenshot of the developed game to simulate dialog. Mentoring is simulated by giving specific feedback based on the answer chosen by users. The social media followers will give personal feedback to make the game more immersive (see Figure 3).



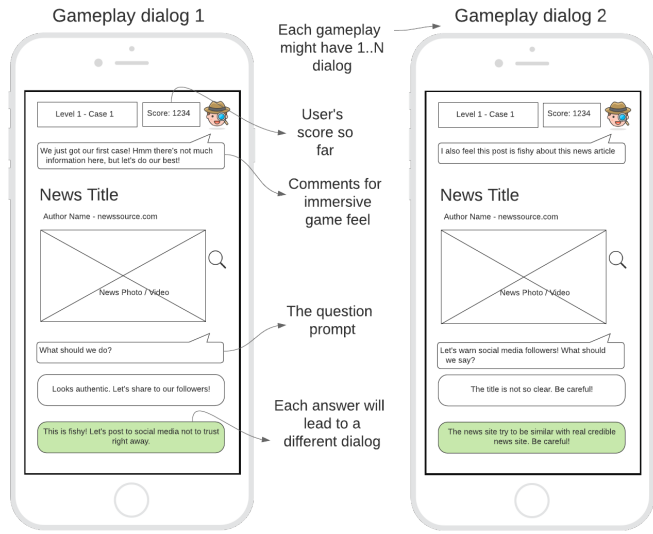


Figure 2—Mock up of simulated dialog based on the answer the player chose.

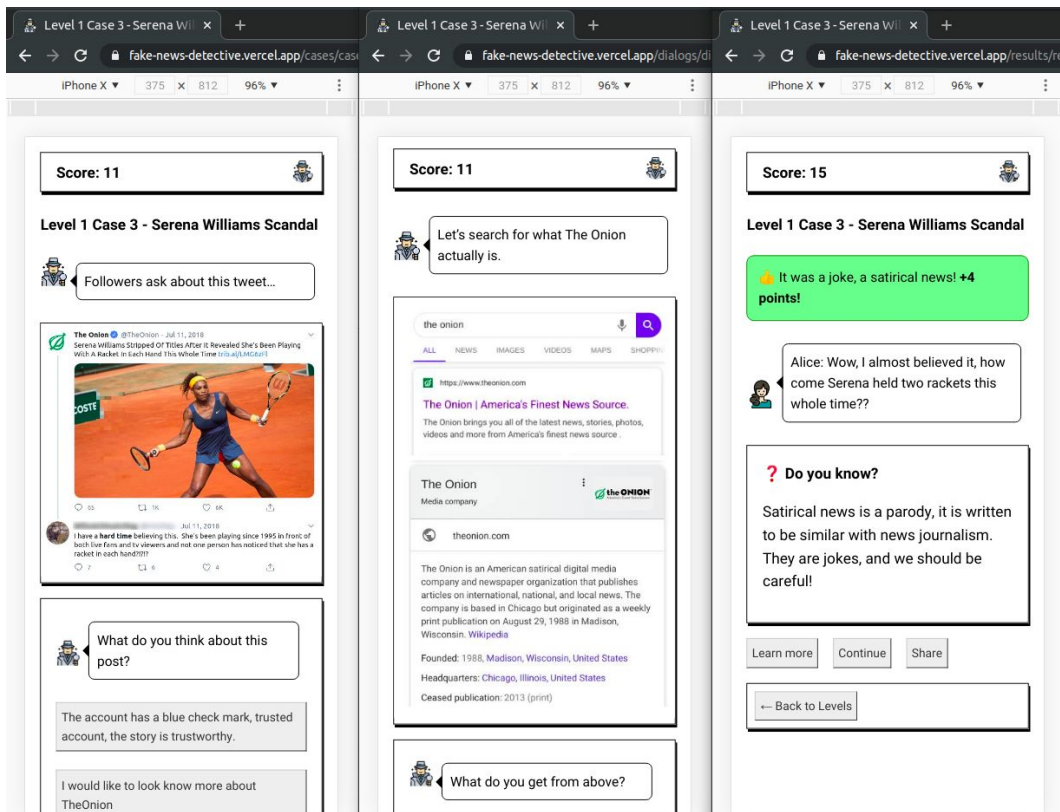


Figure 3—Screenshot of developed game to simulate dialog using multiple choice questions.

## 4.2 User Flow

Screenshots of the game developed are available in Appendix 7.1. The game starts with a welcome and story page. Then users will see a list of games to be played. The list consists of three levels with three cases each. The game is made sequential, so users playing the game for the first time would not be able to play any game except “Level 1 Case 1”. After finishing the “Level 1 Case 1” users will be able to play “Level 1 Case 2” and so on. To play the game, users expected to choose one of the game buttons (see Figure 4 in Appendix 7.1).

In each of the gameplay, users will be shown a content consisting of an image or a video, a prompt, and some options to choose as an answer. After users click one of the options, users will be brought to either another dialog or result page (see Figure 5 in Appendix 7.1). The result page would be based on the option chosen, whether it is correct or incorrect (see Figure 6 in Appendix 7.1). The result page is an attempt to simulate a simple mentoring which gives specific feedback given a certain answer. The users then can continue to the next case by clicking the “Continue” button, learn more about the material by clicking the “Learn More” button which will redirect users to external reference, or clicking the “Try Again” button to retry the case if the answer happens to be incorrect.

## 5 CONCLUSION AND FUTURE WORKS

As the project does not include evaluation due to time constraint, no evaluation conclusion can be drawn from the project yet. The project however concludes that it simulates the most effective pedagogy of critical thinking in the form of digital game-based learning, to teach the three most important questions of fact checkers: 1) who is behind the information, 2) what is the evidence, and 3) what other sources say. The game used a novel approach compared to other related works, which is taking the player's role as professional fact checkers.

Evaluation would be future work for the project; the evaluation should measure the effectiveness of both pedagogy, learning objectives, and means to deliver the teaching via web-based game. In addition to that, exploring how intelligence agents can simulate a dialog-based learning and also mentoring would be another possible next step of the game. Some feedback from peers also asked for making the game content editable by others so people can contribute to the game

content or be crowdsourced, which would be another promising future work to multiply the game's impact.

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## 7 APPENDICES

### Appendix 7.1 The Screenshots of Game Developed

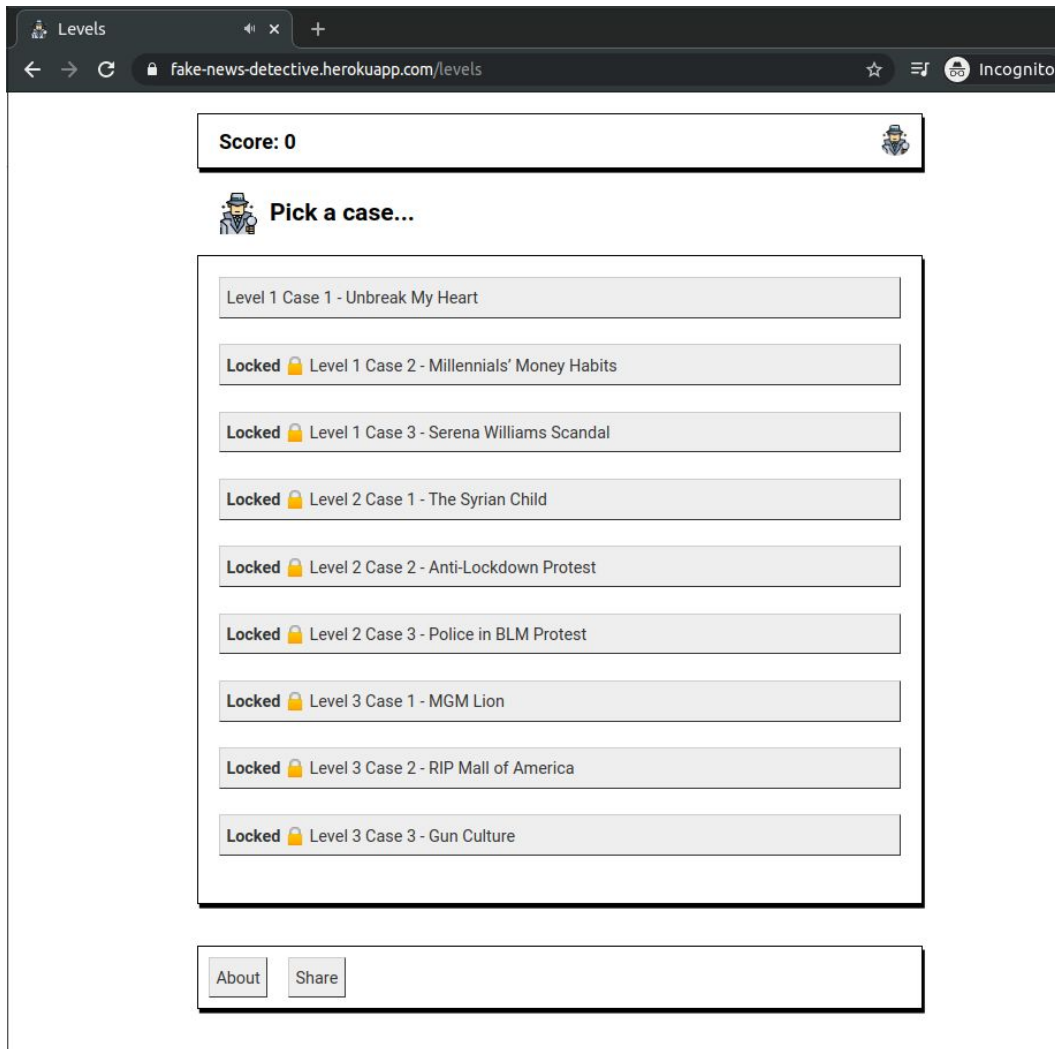


Figure 4—Level screen.

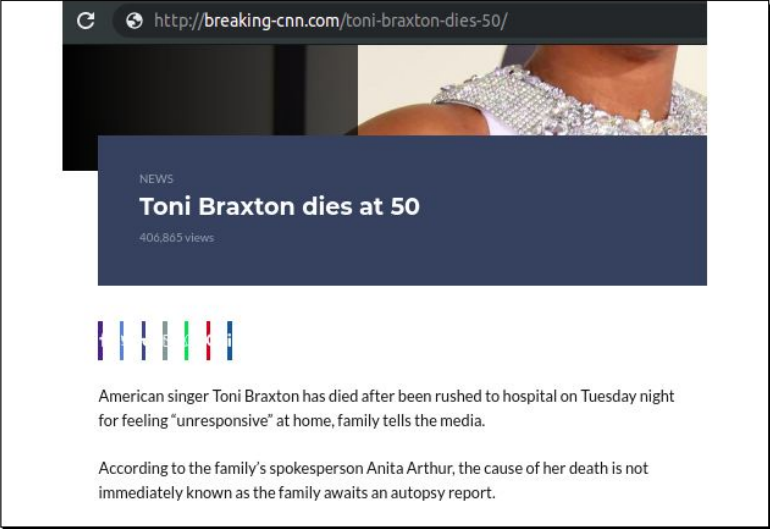
Level 1 Case 1 - Unbreak M x +

fake-news-detective.herokuapp.com/cases/case\_1\_1

Score: 0

### Level 1 Case 1 - Unbreak My Heart

First case! Our followers ask whether this story is true.



What should we say?

Looks authentic. Let’s share to Hoax Buster social media followers that the story looks fine!

Something is fishy here...

Figure 5—Gameplay screen

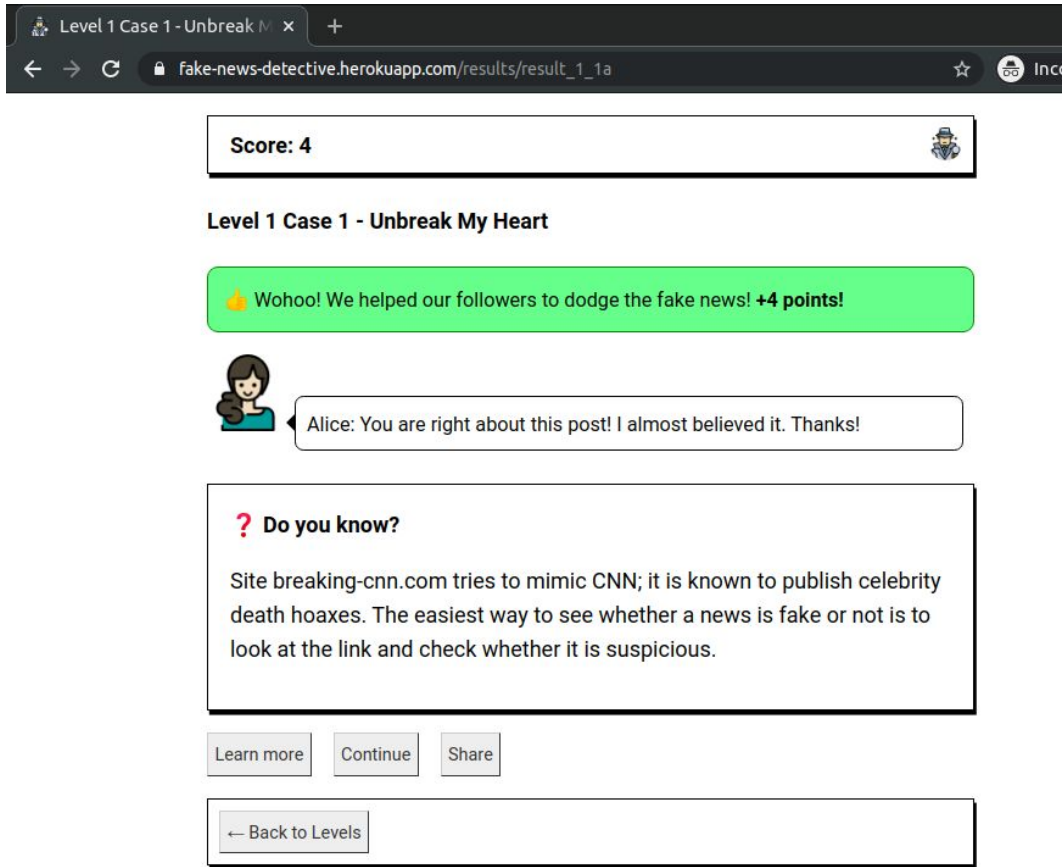


Figure 6—Feedback screen

## Appendix 7.2 Learning Objectives Break Down

Reference: <https://cor.stanford.edu/curriculum/>

Terms of use: <https://cor.stanford.edu/creative-commons/>

### Level 1 - Who's behind the information?

Case	Lesson	Learning Objective	Example
1	Site trustworthiness	Users are able to judge whether a site can be trusted or not. Users understand what is an official domain (edu, gov) and others.	Show a site where it tries to deceive users by similar names to major news sites. <a href="#">An example.</a>
2	Understand	Users consider what might be	Give a user a subtle

	source's motivation	the possible intention of the source posing an argument.	sponsored content, ask the user to guess possible motivations of the content. <a href="#">An example.</a>
3	Intro to Lateral reading	Users have curiosity to search and check what the search results say about the source	Ask the user to look for information on a social media account / news site, turns out it is a parody account. <a href="#">An example.</a>
4	Lateral reading - Wikipedia	Users are able to check the source from Wikipedia.	Example: give a fake site and ask wikipedia about the site
5	Lateral reading - News article	Users are able to check the source from other news articles.	Give user MinimumWage.com and show the news.
6	Lateral reading - Fact checking org	Users are able to use fact checking sites to check the source.	Pick one example from the site and share to user
7	Vertical vs. Horizontal Reading	Users understand the difference of only looking at what the source say vs looking for what others says about the source	Show users and ask who the source really is. <a href="#">An example</a>
8	News vs. Opinion	Users able to differentiate fact vs opinion	Show users an opinion and ask whether it is fact or not. <a href="#">An example.</a>

### Level 2 - What's the evidence?

Case	Lesson	Learning Objective	Example
1	Intro to What's the Evidence	Users start to examine evidence whether they support the claim posed.	Show an image claiming something, and ask the user to choose what they think. <a href="#">An example.</a>
2	Source of the Evidence	Users start to question the source of the evidence and cross check	Show a claim without source, <a href="#">an example.</a>
3	Evaluating photos	Users able to check whether the image is a strong evidence	Show a social media post with photoshopped image



4	Evaluating videos	Users start to question the context of the video in full length as opposed to short footage which can be misleading	Show an example of misleading video, ask the user whether there's other possible explanation then the claim
5	Evaluating Data	Users are able to check data on the claim and see whether the claim actually is correct, how the sampling is being done, etc.	Show a social media post and check whether it aligns with the claim. <a href="#">An example</a>

### Level 3 - What do other sources say?

Case	Lesson	Learning Objective	Example
1	Click Restraint	Check search result first before click one	Show sources and ask user to pick one they think most reliable
3	Reverse search photos	Users able to check whether the image is a strong evidence by doing reverse image search	Show a social media post with an image, ask the user to reverse search, <a href="#">an example</a>
4	Reverse search videos	Users start to question the context of the video in full length as opposed to short footage which can be misleading	Show an example of misleading video, ask user to reverse search
5	Evaluating Data	Users are able to cross check data on the claim	Show a social media post and check whether it aligns with the claim. <a href="#">An example</a>