

Lab 1—ReasonED

June Troyer

CS 411

Instructor: Thomas J. Kennedy

29 March 2024

Version 1

Table of Contents

1	Introduction.....	2
2	ReasonED Description.....	4
3	Identification of Case Study.....	5
4	ReasonED Prototype Description	6
4.1	Prototype Architecture (Hardware/Software)	7
4.2	Prototype Features and Capabilities.....	7
4.3	Prototype Development Challenges.....	8
5	Glossary	9
6	References.....	10

List of Figures

Figure 1: Causation Fallacy	2
Figure 2: Absence of Evidence Fallacy	3

List of Tables

No table of figures entries found.

1 Introduction

As communication becomes increasingly easy to access and fast-paced in the online world, the skills to evaluate claims for accuracy and validity is more important than ever. Identifying misinformation is essential to participating responsibly in the online ideas marketplace.

Logical fallacies are common in posts on social media. The short form of communication encourages attention-getting claims with little space for explanation.

In figure 1, @ABFalecbaldwin makes the claim that poor customer service exemplified by flight attendants making a request the poster found rude is the reason American Airlines was failing. In this claim, the poster is committing the causation fallacy, *pos hoc, ergo proctor hoc*, implying that because the rude behavior occurred first, it must be the cause of the subsequent failure.

However, one event occurring after another does not prove that the first event caused the second.



Figure 1: Causation Fallacy

Twitter user @bobatl's claim in figure 2 provides an example of the absence of evidence fallacy. They claim that because they are not able to see the curvature of the earth in the photo they took, the earth must not be curved. However, a single source of evidence not supporting a claim does not prove the claim is not true.



Figure 2: Absence of Evidence Fallacy

In this environment of widespread logical fallacies, students are not being provided with adequate education in evaluating claims and identifying logical fallacies. In Reboot Foundation’s 2022 report “Teaching Critical Thinking in K-12”, they noted that while 86% of 4th grade teachers expressed an emphasis on teaching deductive reasoning, this figure sharply declines over a student’s education, with only 39% of 8th grade teachers sharing the same emphasis. Cambridge University also identified cracks in critical thinking skills education in their 2019 Critical thinking Teacher Survey. They found that while 93% of teachers agree that developing student’s critical thinking skills is important, only 20% agree that most English courses adequately support student’s development of these skills. Additionally, only 21% of teachers agreed that they have all the materials necessary to help students develop critical thinking skills, and half struggle to find time to develop these resources.

ReasonED aims to support teachers and students in developing critical thinking skills through educating students in logical fallacy identification. By providing age-level differentiated instruction and practice identifying logical fallacies through video games, ReasonED will

support educating students in these critical skills for participating fully and responsibly in the fast-paced global communities found online.

2 ReasonED Description

ReasonED is a web-based collection of games that teach the identification of specific logical fallacies accessible on both desktop and tablet devices. Many of these games, including all of those included in the prototype, will feature characters personifying the types of logical fallacies. Friendly characters such as Straw Manny, Hasty Harry, and Slippery Slope Sadie will help make the content more engaging and memorable as the characters guide students to a greater understanding of each logical fallacy.

To make ReasonED simple to implement in the classroom, teachers will be provided with printable graphics and readings that introduce the logical fallacies tailored to different age groups to support instruction, as well as links to external resources. Each game will feature a tutorial to help students grasp gameplay independently. Text-to-speech options will be available to increase accessibility and support weak readers in accessing the content. Easy access to ReasonED will be ensured by making the games playable without any required downloads or logins, reducing friction to beginning learning.

The games featured in ReasonED will have difficulty levels for elementary, middle, and high-school students to provide age-appropriate practice in detecting each type of logical fallacy. By making the games revisitable at all age levels, teachers will be able to provide students with consistent practice in these skills, supporting students in reinforcing prior knowledge and then building further understanding as they grow. While logins are not required, free accounts will be available for students to be able to track their progress.

Approaches will vary based on the age level targeted. Simplified concepts and scenarios will make the topics accessible to younger learners just taking their first steps in developing their critical thinking skills, allowing them to succeed early on in their journey and making the experience of identifying flawed reasoning rewarding. As students get older and their skills grow, the scenarios will grow in complexity with more subtle expressions of the logical fallacies, allowing students to continue to stretch their abilities.

ReasonED will require a web server to host its web interface, which will allow access via both desktop and tablet to both the supporting readings and printables as well as the core games. This server will also host a PostgreSQL database to support both the games and user accounts. Games will be developed using 2D graphics via Godot engine in C# and GDScript.

3 Identification of Case Study

ReasonED is an educational platform whose primary customers are K-12 schools and teachers looking to expand or rework their logical fallacy instruction. These educators are looking for a simple to implement solution that supports complete education in logical fallacies that does not stress limited educational budgets. ReasonED will meet these goals by providing readings and tutorials to support initial instruction as well as games that engage students in active practice in logical fallacy detection. Its cost-free access web-based platform only requires schools to ensure that it is whitelisted to begin using the platform.

While ReasonED's primary focus is K-12 schools, the tools provided will also support home-schooled students by allowing all students to freely access the website and resources without any paywall. College students and members of the general public may also find the games useful to reinforce their understanding of logical fallacies.

ReasonED is primarily designed to be used by K-12 students. Their first encounter with the platform will likely be facilitated by their teacher using one or more of the provided introductory readings and printable materials, followed by practice in the relevant games. Once introduced to ReasonED, students can practice their skills by playing ReasonED's games during school free time, helping them reinforce their learning throughout the year. Because ReasonED allows account creation to save progress, students can be rewarded for returning to practice by seeing their scores improve over time.

4 ReasonED Prototype Description

The ReasonED prototype will consist of a website hosting three games personifying specific logical fallacies curated for three age groups: second and third graders, middle schoolers, and high schoolers. Games will be tailored to these groups by adjusting the complexity of the examples, reading levels of the explanations and examples, and gameplay feedback and penalties for wrong answers.

The games will include Hasty Harry, which teaches about hasty generalization, Straw Manny, which teaches about the straw man fallacy, and Slippery Slope Sadie, which teaches about the slippery slope fallacy. Hasty Harry is an astronaut who visits various planets and needs assistance waiting to collect evidence about the new creatures on the planet he visits instead of jumping to conclusions. Straw Manny is a knight in training who has only practiced combat on straw men and needs assistance learning to target real opponents rather than fake ones. Slippery Slope Sadie is a snowboarder who tends to jump to extreme conclusions and needs help getting safely down a snowy path without slipping into pitfalls.

Games will feature 2D graphics in a number of game styles. Straw Manny will use side view graphics, Hasty Harry will use a top-down view as he explores the planet, and Slope Sadie will be a platformer game. Each game will begin by providing an age-appropriate explanation of the logical fallacy that the game teaches about. Games will also provide age-appropriate feedback after each answer to help students understand how their reasoning is correct or incorrect. Educator resources will also be available for each game.

4.1 Prototype Features and Capabilities

The prototype will feature at least one game for each of the three identified age-levels with in-game tutorials. The games will be compatible with PC and Tablet devices. Text-to-Speech will be available to support developing reading skills. The website will also implement user logins and progress tracking and have printable graphics available as educator resources.

4.2 Prototype Architecture (Hardware/Software)

ReasonED's games will be implemented using the Godot engine in C# and GDScript. The website will be implemented using Next.js and Tailwind. The games, website, and login features will be supported by a PostgreSQL database.

4.3 Prototype Development Challenges

ReasonED will likely face a number of challenges in a number of domains as the prototype is developed:

1. **Compatibility:** Ensuring that ReasonED provides a consistent interface across the wide variety of screen sizes, operating systems and hardware specifications in common PCs and tablets provides a significant challenge to testing and development.
2. **Diversification:** Fully customizing content for a wide range of ages while maintaining a consistent experience in each game will require careful planning.
3. **Accessibility:** Balancing ease of use with customization in text-to-speech options will provide a design and development challenge.
4. **Animations:** Developing and maintaining animations to support all games with a consistent style is a significant challenge. Care will have to be taken to ensure that the artistic elements do not exceed capabilities of more limited devices.

Addressing these challenges will require careful design, testing, and collaboration between all parties engaged in prototype development.

5 Glossary

Confirmation Bias - A cognitive bias that involves seeking, interpreting, and remembering information that confirms one's preconceptions (American Psychological Association n.d.).

Critical Thinking - The ability to think clearly and rationally, understanding the logical connection between ideas and the ability to make reasoned judgements (American Psychological Association n.d.).

Fact-Checking - The process of verifying the accuracy of claims made in public discourse and journalism (Cambridge English Dictionary n.d.).

False Dilemma - A fallacy that presents a limited set of options as the only possible choices when there may be other alternatives (Excelsior OWL n.d.).

Logical Fallacy - An error in reasoning or a flawed argument that can make an argument appear valid when it is not (Nikolopoulou, 2023).

Misinformation - False or inaccurate information shared, often unintentionally, without the intent to deceive (Dictionary.com n.d.).

Disinformation - False information deliberately spread to deceive or mislead others (Dictionary.com n.d.).

Slippery Slope - A fallacy that suggests one small step will inevitably lead to a chain of related events, often with exaggerated consequences (Excelsior OWL n.d.).

Straw Man Argument - A fallacy that involves misrepresenting an opponent's argument to make it easier to attack and refute (Excelsior OWL n.d.).

6 References

American Psychological Association. (n.d.). *Apa Dictionary of Psychology*.

<https://dictionary.apa.org/critical-thinking>

American Psychological Association. (n.d.). *Apa Dictionary of Psychology*. American

Psychological Association. <https://dictionary.apa.org/confirmation-bias>

Bouygues, H. L. (2022, June). *Teaching Critical Thinking in K-12: When There's A Will But Not*

Always A Way. <https://reboot-foundation.org/>. [https://reboot-foundation.org/wp-](https://reboot-foundation.org/wp-content/uploads/2022/07/Reboot-White-Paper_NAEP-5.pdf)

[content/uploads/2022/07/Reboot-White-Paper_NAEP-5.pdf](https://reboot-foundation.org/wp-content/uploads/2022/07/Reboot-White-Paper_NAEP-5.pdf)

Cambridge University. (2019). *Critical Thinking Teacher Survey*. Cambridge University Press &

Assessment. [https://www.cambridge.org/us/cambridgeenglish/catalog/skills/unlock-2nd-](https://www.cambridge.org/us/cambridgeenglish/catalog/skills/unlock-2nd-edition/product-details/teaching-critical-thinking?utm_source=wobl&utm_medium=blog)

[edition/product-details/teaching-critical-thinking?utm_source=wobl&utm_medium=blog](https://www.cambridge.org/us/cambridgeenglish/catalog/skills/unlock-2nd-edition/product-details/teaching-critical-thinking?utm_source=wobl&utm_medium=blog)

[&utm_content=woblcontent&utm_campaign=unlock](https://www.cambridge.org/us/cambridgeenglish/catalog/skills/unlock-2nd-edition/product-details/teaching-critical-thinking?utm_source=wobl&utm_medium=blog)

Dictionary.com. (n.d.). *Disinformation definition & meaning*. Dictionary.com.

<https://www.dictionary.com/browse/disinformation>

Dictionary.com. (n.d.). *Misinformation definition & meaning*. Dictionary.com.

<https://www.dictionary.com/browse/misinformation>

Echales, M. Hope. (2017, December 14). Identifying Flaws in Your Twitter Feed: A New

Frontier in LSAT Preparation. Blueprint Prep Blog.

[https://blog.blueprintprep.com/lsat/identifying-flaws-in-your-twitter-feed-a-new-frontier-](https://blog.blueprintprep.com/lsat/identifying-flaws-in-your-twitter-feed-a-new-frontier-in-lsat-preparation/)
[in-lsat-preparation/](https://blog.blueprintprep.com/lsat/identifying-flaws-in-your-twitter-feed-a-new-frontier-in-lsat-preparation/)

Fact-checking. FACT-CHECKING definition | Cambridge English Dictionary. (n.d.).

<https://dictionary.cambridge.org/us/dictionary/english/fact-checking>

Fallacy (n.). Etymology. (n.d.). <https://www.etymonline.com/word/fallacy>

False dilemma fallacy. Excelsior OWL. (2022, May 19). <https://owl.excelsior.edu/argument-and-critical-thinking/logical-fallacies/logical-fallacies-false-dilemma/#:~:text=Sometimes%20called%20the%20%E2%80%9Ceither%2Dor,actually%20many%20shades%20of%20gray.>

Khartite, B., & Hellalet, N. (2021). The Impact of Teaching Reasoning Fallacies on the Critical Thinking Ability of Moroccan Engineering Students: The Case of ENSAM Meknes. *International Journal of Linguistics, Literature and Translation*, 4, 222-232.
<https://doi.org/10.32996/ijllt.2021.4.9.23>