Lab 1 – ReasonED.io Product Description

Team Crystal – Dakota Dawe

Old Dominion University

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Professor Thomas Kennedy

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Table of Contents

Listing of Figures

Listing of Tables

1. Introduction

In a world with an increasing reliance on the internet, knowing how to tell if something you see is a fallacy is becoming increasingly important. There is an abundance of misinformation, both intentional and unintentional, that make critical thinking a necessary skill to have.

Figure 1 shows the causation fallacy in a social media post about the quality of work by an American Airlines employee. A causation fallacy is a relational one such as "this happened so that is the result". The person states that American Airlines reamed them out for playing words with friends while sitting at the gate. There is no way to validate this claim, and more so no way to determine if this is the reason for American Airlines filing for bankruptcy. Part of the danger from misinformation is due to how fast they can spread. In this example we can see that the tweet has been retweeted just shy of 2,200 times.

Figure 1: Causation Fallacy

Figure 2 shows some statistics from a report called "Teaching Critical Thinking in K-12" which noted that among 4th-grade teachers, 86% emphasized teaching deductive reasoning, but this figure sharply declines to a mere 39% among 8th-grade teachers when expressing the same sentiment. Moreover, in a 2019 global survey conducted by Cambridge, 50% of teachers indicated they do not have enough time to effectively teach these skills, and only 21% of teachers agreed that they possess all the necessary resources to cultivate these skills.

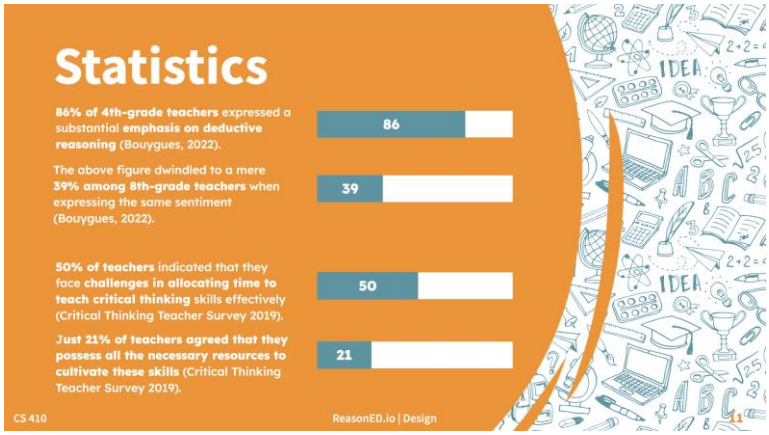

Figure 2: Critical Thinking Teaching Statistics

Because it's difficult to find time to teach these topics, an optimal solution should have resources that are both reusable in a way that still builds on fallacy identification skills in a fun and meaningful way, curated for multiple grade levels ranging from elementary to high school.

2. Product Description

ReasonED.io will be a website that contains game based learning solutions for identifying logical fallacies. These games will be broken into categories. A collection of games for elementary, middle, and high school as well as a collection for adults. The games will share the same goals of introducing and improving logical fallacy identification skills but will be tailored to each age group.

The initial series of games that will be hosted will revolve around a logical fallacy personified character, each with their own quirk. For example:

- **Straw Manny**: Straw Manny is a knight in training that practices fighting on fake straw men because they are easier than real opponents. Because of his lack of real training, he is not a skilled fighter. Players need to help Straw Manny by training him with real opponents rather than fake ones, helping teach players the "straw man" fallacy.
- **Hasty Harry**: Harry is "hasty" to make decisions rather than thinking to allow himself to process the information before deciding. Players need to help harry collect all the puzzle pieces before he hastily completes the puzzle. This game helps teach players the "hasty generalization" fallacy.
- **Slippery Slope Sadie**: Sally will often jump to extreme conclusions. Players need to guide here down a winding path without letting her slip into a pitfall. This game helps teach players the "slippery slope" fallacy.

The goal of each of these characters is to teach various kinds of fallacies that are associated with them, like how people you know have certain behaviors and personalities. This

allows the characters to be memorable and let players associate fallacies they may come across with characters from the games that will hopefully let them go “hey, this might be a fallacy”.

2.1. Key Product Features and Capabilities

ReasonED.io will be playable via a browser so it is easily accessible from anywhere. Registration will be free for everyone, and educators will have special tools to cultivate their students critical reasoning skills. Accessibility is a large focus so text to speech options, in game tutorials, and a simple UI to help people navigate will be important. The home page will be descriptive in what the website is for, and it’s intended use. We want those who came to the website outside of school to know exactly what it’s for and feel inclined to interact with it.

2.2. Major Components (Hardware/Software)

Since ReasonED.io is web based that means users can access it from a Desktop and a phone. Because of this, ReasonED needs to accommodate the UI so that everything scales and plays as expected across these very different types of devices.

- Front End: For the front end, React will be used to allow for a fast and responsive user interface on top of HTML and CSS.
- Database: For the database, PostgreSQL will be used.
- Back End: For the backend, ReasonED will be utilizing a Node.js web server to allow for good scalibility. The games will be built using Godot which is a light, small, and performant game engine that will allow us to develop games quickly and package them out for the web server to host.
- Development Tools: For the development tools, Git will be used for version control, Trello for project and task management, Visual Studio Code as an IDE for the website development, Visual Studio for the C# development with Godot, and Discord and Zoom for the primary means of communication.

3. Identification of Case Study

3.1. Intended Users:

ReasonED.io is built to cater to a wide variety of users. These users are broken into two groups, Customers and End Users. The customers would be educational facilities such as schools and educational publishers. The end users would be the students and the public utilizing ReasonED to learn.

3.2. Intended Use:

The intended use of ReasonED.io is to offer a different approach to traditional classroom learning. ReasonED will offer an interactive and gamified approach to critical thinking skills.

3.3. Case Study Group:

To further improve ReasonED, ReasonED aims to collaborate with local schools to get feedback on what can be done to improve ReasonED.

3.4. Future Use:

As ReasonED.io grows, it is likely it will have a large user base that extends to a broad audience beyond traditional educational stakeholders. The goal for ReasonED is to create a widely accessible tool for logical fallacy education.

4. Product Prototype Description

The prototype is meant to display the vision of the ReasonED platform to show the stakeholders what they can expect with a comprehensive display of the key features. Running within a controlled environment, the prototype will offer a preview of the planned features and games. See Table 1: Real World vs. Prototype for a breakdown:

RWP vs. Prototype

Features & Functionality	RWP Features	Planned Prototype	Actual Prototype
PC & Tablet compatibility	✓	✓	
Characters+ Animations	✓	✓	
Accessibility Features	✓	Text-to-Speech	
Educator Tools	✓	Printable Graphics, Progress Tracking	
Paid Features	✓		
Games for k-12+	✓	1 Game Elementary, 1 Middle, 1 High School	

Table 1: Real World vs. Prototype

4.1. Prototype Architecture (Hardware/Software)

These are the tools chosen to power ReasonED to drive the front end, the back end, and the games.

- Front-End
  - Framework: React
  - Languages: JavaScript, HTML5, CSS
- Back-End
  - Languages: JavaScript, C#, GDScript
  - Web Server: Node.js
  - Game Engine: Godot
  - Database: PostgresSQL
  - Hosting: HostGator

The multi-functional component diagram below gives a good view of how each tool interacts with one another to form the ReasonED product. See Figure 3: Multi-Functional Component Diagram.

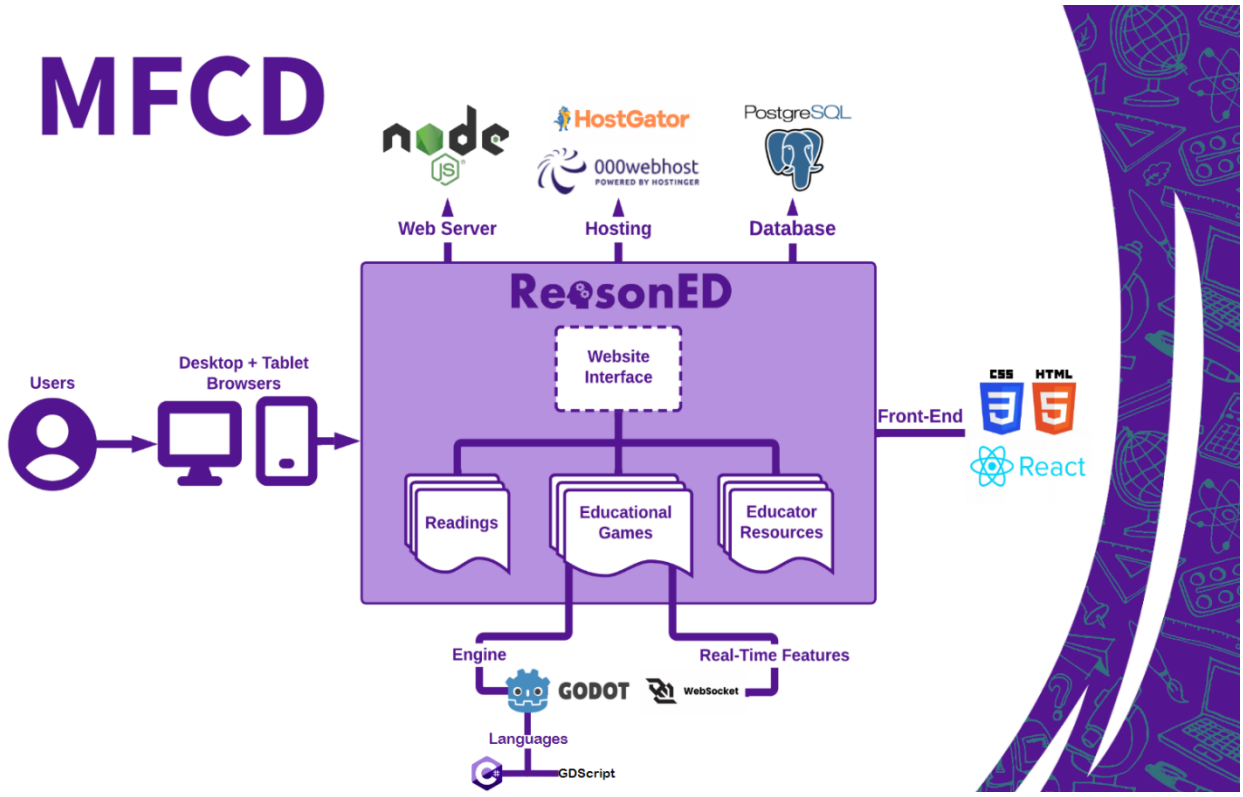

Figure 3: Multi-Functional Component Diagram

4.2. Prototype Features and Capabilities

ReasonED will have a focused set of features and abilities. One of the big goals for ReasonED is to allow the platform to be utilized from all age groups ranging from elementary school to college and beyond.

- One complete game for elementary, middle, and high school
- In-Game Tutorials
- PC and Tablet Compatibility
- Text to Speech
- Printable Graphics
- Progress Tracking

4.3. Prototype Development Challenges

There are some challenges ReasonED might face, however; these challenges are nothing extraordinary and something the team behind ReasonED can handle.

1. **Technical Compatibility**:
   The challenge here lies in the fragmentation of devices and operating systems. Supporting multiple devices across various operating system to offer a smooth user experience will require much testing.
2. **Characters and Animations**:
   Making the characters diverse and memorable with interactive animations is something that is expected to be quite difficult. Keeping the animations simple and smooth is a big focus in engagement with the characters.
3. **Accessibility Integration**:
   Making a powerful text to speech system that is tunable by the end user requires finding a balance between customization and a seamless, simple experience.
4. **Educator Tools and Progress Tracking**:
   Designing a robust set of tools for educators that offer a comprehensive tracking progress system that is user friendly is a challenge that will need fine tuned with real educators using ReasonED giving feedback.
5. **Diversified Educational Games**:
   Developing games for kindergarten through high school levels present a challenge in maintaining both diversity and consistency. Each game needs to be tailored to each educational level it strives to reach while ensuring it suites the targeted audience with a smooth experience.

Addressing these challenges will involve discussions between developers, designers, educators, and potential users.

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.).

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