Lab 1 - Logic Path

Product Specifications

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1 Introduction

In our modern society the ability to think critically, judge evidence, and logically reason, has been an increasingly difficult challenge. The rapid growth of digital media, algorithm driven content, and the increasing normalization of misinformation have created an environment in which people are frequently required to assess claims, sources, and arguments without the analytical tools required to do so. Educational researchers have identified this gap as a pressing societal issue, especially since traditional educational models struggle to adapt to the pace and format of modern information consumption. A 2019 study found that 96 percent of students were unable to reliably evaluate the credibility of online sources, which highlights a significant systemic weakness in digital and informational literacy (Breakstone et al. 2019) More recently, the Organization for Economic Cooperation and Development (OECD) reported a decade long stagnation in adult problem-solving and reasoning skills, despite increasing educational attainment and access to information (OECD, 2024). Together, these findings suggest that exposure to information alone is insufficient. And that structured reasoning skills must be deliberately cultivated.

The core problem is not a lack of intelligence or motivation, by rather a lack of accessible and engaging systems that teach logical reasoning as a transferable and practiced skill rather than a purely academic abstraction. Logic instruction is often isolated within philosophy or mathematics courses, framed in highly formal language, and disconnected from everyday decision making. As a result, many learners fail to recognize its relevance, leading to disengagement and shallow retention. An effective solution must satisfy a few key characteristics. It must lower barriers to entry, connect formal reasoning to practical real-world context, adapt to individual learner ability, and sustain engagement over time.

LogicPath is designed to meet these needs by providing a modern, interactive, and accessible platform for developing strong reasoning skills. Rather than treating logic as an abstract academic subject, LogicPath reframes reasoning as a practical tool for everyday use that can be strengthened through guided practice. The platform integrates informal and formal logic instruction through interactive modules, adaptive learning algorithms, and gamified progression systems that encourage consistent engagement. Users receive immediate feedback on their reasoning, allowing them to identify common fallacies, evaluate evidence, and build confidence in constructing sound arguments.

By incorporating real-world scenarios drawn from news, debates, and everyday decision-making, LogicPath bridges the gap between theoretical concepts and practical application. Adaptive difficulty ensures that learners are continually challenged at an appropriate level, while gamified elements such as streaks, achievements, and progression paths help sustain long-term motivation. Through this approach, LogicPath aims to cultivate durable reasoning habits that extend beyond the platform and into academic, professional, and personal environments.

Ultimately, LogicPath addresses the shortcomings of traditional logic education by offering a scalable, technology-driven solution that is both relevant and engaging. In an era defined by information overload and widespread misinformation, LogicPath provides learners with the tools they need to navigate complex information environments with clarity, confidence, and intellectual rigor.

2 Product Description

LogicPath is a web-based educational tool that teaches logic through interactive modules, gamified challenges, and real-world reasoning exercises. Its goal is to make logic learning engaging, structured, and applicable to everyday decision-making. The platform targets high school and college students, lifelong learners, and educators seeking to improve critical thinking outcomes**.**

2.1 Key Product Features and Capabilities

2.2 **Interactive Module:** Lessons will progress from informal reasoning to formal logic.

2.3 **Gamified Learning:** Quests, streaks, and achievements motivate sustained engagement.

2.4 **Real-Worlds Application**: Exercises tied to news, debates, and personal decisions

2.5 **Adaptive Learning**: Difficulty adjust based on user performance

2.6 **Visual Aids**: Diagrams and simulations simplify abstract concepts

2.7 Major Components (Hardware/Software)

2.8 Hardware:

2.9 Software Architecture:

2.10 Presentation layer: React-based UI for learners and educators

2.11 Application Layer: Engines for learning modules, gamification, adaptive logic, and feedback.

2.12 Data Layer: PostgreSQL database storing user profiles, performance metrics, and learning history.

Tech Stack: HTML, CSS, JavaScript, React (frontend); Node.js (backend); PostgreSQL (database).

- Provide an overview of the hardware needed to support the solution.
- Describe how it is structured based on CS 410 MFCD.
- Define and describe the software to be developed.

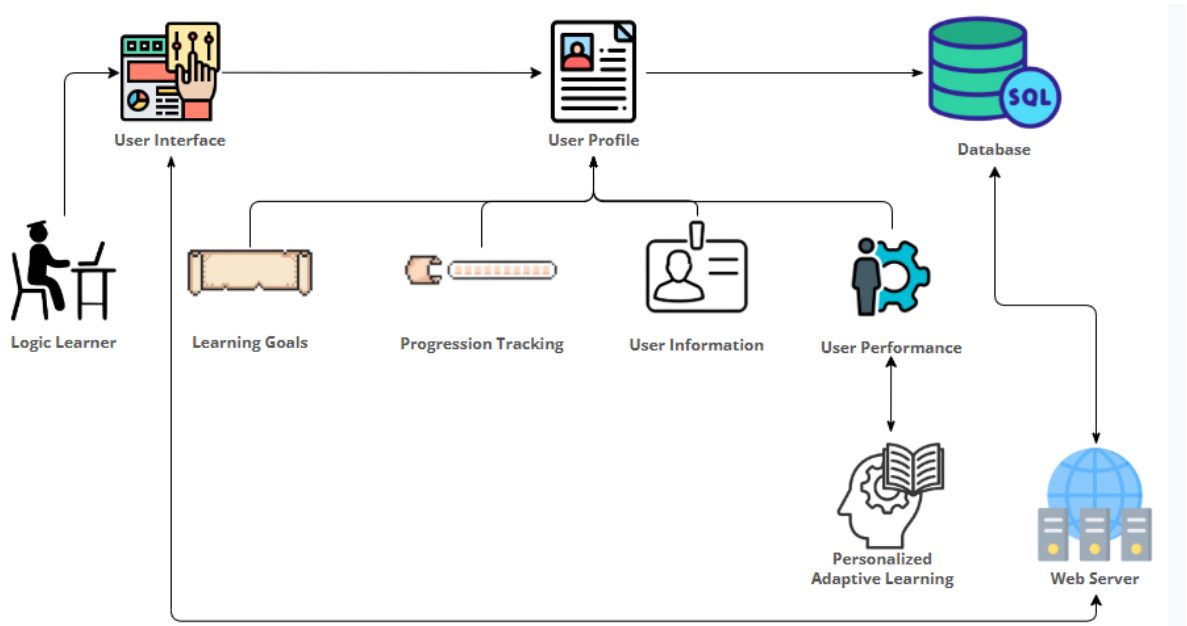

Figure 1

3 Identification of Case Study

LogicPath is being developed for high school juniors/seniors preparing for standardized tests, college students in logic-heavy disciplines, and adult learners seeking career advancement.

The case study group includes college students at Old Dominion University who will test the prototype and provide feedback. Future users may include educators, institutions, and lifelong learners across various domains.

4 Glossary

- **Logic:** the systematic use of symbolic and mathematical techniques to determine the forms of valid deductive argument.
- **Formal/Informal Logic:** Formal logic is based off deductively valid reasoning. Informal logic is based off natural languages.
- **IDE**: Integrated Development Environment
- **CI**: Continuous Integration
- **CD**: Continuous Deployment

5 References

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