Lab 1

Emerald Group – EduSense

Old Dominion University

CS 411W Professional Workforce Development II

Professor Kennedy

August 29, 2025

Table of Contents

Listing of Figures

1. Introduction

1.1. Concerns Around AI in Education

Artificial Intelligence tools like ChatGPT and Grammarly are becoming integral to students' everyday academic routines. While these tools can be helpful, there are growing concerns that relying too much on them will have a negative impact on important skills like creativity, critical thinking, and problem-solving. One study found that students who depend heavily on AI for assignments score up to 20% lower on writing tasks compared to those who use it more thoughtfully. A systematic review from 2024 reported that students who lean too heavily on AI dialogue systems struggle with analytical reasoning and independent thinking. Many users also trust AI-generated responses without verifying them, which is often due to cognitive biases that affect their judgement.

1.2. Solution Requirements and Challenges

There has been a substantial decline among students in the development of necessary skills to include critical thinking, independence, and the ability to learn effectively. A requirement of our solution is to address the safeguards needed to teach students how to use LLMs as an educational tool. Educators are receiving poorer quality work, often created in part by an LLM. A requirement of our solution will be to prevent students from utilizing LLM technology to obtain the answer directly, subverting the need to think critically about the assignment.Educators are struggling to identify rampant plagiarism. A requirement of our solution will be to provide educators with the ability to review student LLM use.

1.3. Introduction to EduSense

EduSense is currently in development as a web-based application designed to help students and educators use AI tools more intentionally. Instead of giving direct answers, the app will encourage students to think first by using guided questions, reflective prompts, and challenge modes to limit or delay AI input. Educators will also be able to upload assignments, monitor interactions with AI, and identify problem areas in comprehension. Key features include copy/paste restrictions, usage tracking, and admin level controls for oversight. EduSense is meant to support learning, not replace it, by helping students and other learners build stronger problem solving and critical thinking skills.

2. Product Description

EduSense is an innovative web application designed to help students and educators use artificial intelligence tools more resourcefully and effectively. This solution addresses the growing concern that overreliance on AI can weaken essential skills like critical thinking, creativity, and problem solving. EduSense encourages users to engage with their assignments independently, utilizing an LLM to aid them in their problem-solving process. The app allows instructors to upload assignments, monitor student interactions with AI, and identify areas where students might need additional help. By promoting intentional AI use, EduSense aims to empower students to develop lifelong learning skills while still benefiting from the advantages of modern technology.

2.1. Key Product Features and Capabilities

EduSense is designed to foster independent thinking and responsible use of AI in educational settings. The platform allows instructors to upload assignments, giving them control over the learning material and enabling seamless integration with classroom activities. Students can access a large language model (LLM) for support while working on their assignments. Instead of providing direct answers, it uses guided prompts and leading questions to help students think through problems and develop their own solutions. By combining these features, it offers a unique and innovative approach that encourages critical thinking, supports educators, and helps students build essential problem-solving skills without becoming overly dependent on AI.

[This space was intentionally left blank.]

2.2. Major Components (Hardware/Software)

2.2.1 Hardware Components

- User Device: Any modern laptop, desktop, or tablet capable of running a web browser.
- Network Access: 802.11ac Network Adapter

2.2.2 Software Components

2.2.2.1 Frontend:

- HTML, CSS, JavaScript.
- Node JS, React, Vite

2.2.2.2 Backend:

- Python, Django & Django REST Framework
- Caddy & Cloudflare

2.2.2.3 Database:

- Sqlite3 will be used for storing assignments, interaction logs, and user data with the intent of migrating to a Postgresql database after the prototyping phase.

2.2.2.4 LLM:

- Models: LlaMA 3

2.2.2.5 Integration:

- Canvas LMS API: Integrate with Canvas Rust API to sync assignments and track student-AI interactions.

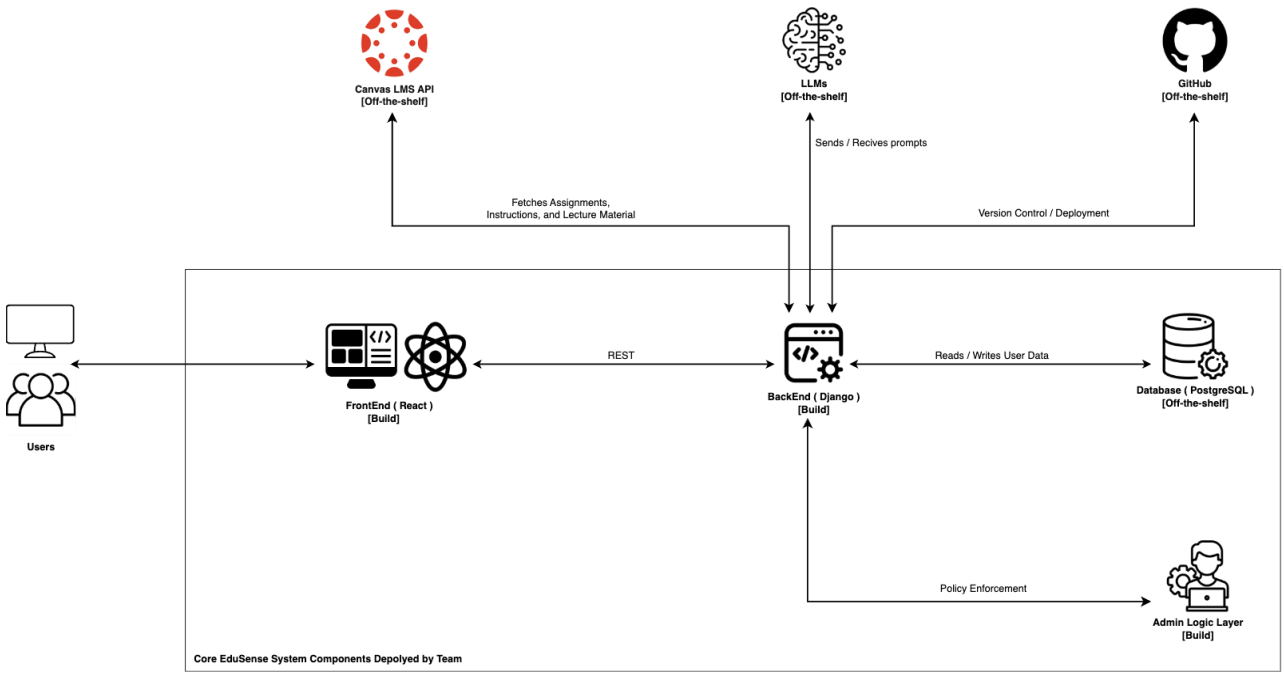

Figure 1: Major Functional Component Diagram

[This space was intentionally left blank.]

3. Identification of Case Study

EduSense is being developed primarily for students and educators in academic environments where AI tools are increasingly used for assignments and learning support. The product addresses the need for intentional and responsible AI use, helping students build independent thinking and problem-solving skills while allowing educators to monitor and guide these interactions. In the future, EduSense could benefit corporate trainers, lifelong learners, and educational institutions seeking to promote critical thinking and ethical AI use across various learning and professional development contexts.

In the Student's case, this technology will fill a gap. At present, there aren't many options for education-centered LLMs. Capitalizing on this tool in a safe manner is paramount for students in the AI era. EduSense will have a heavy focus on teaching students to use LLMs in a responsible manner while helping them with their homework.

In the Educator's case, EduSense's conversation history function will provide insight they can later use to modify their lesson plans, providing students with a better education. Gamification will allow teachers to incentivize their students to manage their use of the LLM, potentially even rewarding them based on their use.

[This space was intentionally left blank.]

4. Glossary

- Artificial Intelligence (AI): A commonly used term encompassing any machine learning algorithm designed to train from a given input to provide an expected output.
- Large Language Model (LLM): An advanced machine learning algorithm trained on massive text datasets to understand and generate human-like language.
- Canvas LMS: A learning management system used by educators to manage course content, assignments, and communication with students.
- Challenge Mode: Setting that encourages learners to try on their own before getting help. It limits access to answers to encourage thinking through the assignment first.
- Guided prompts: Targeted questions or hints created to help students think critically and come up with their own solution.
- MFCD (Modified Functionality Component Diagram): A diagram showing the major hardware and software components of the product and how they interact.
- Usage Tracking: The process of recording how users interact with the system, such as which features they use or how they engage with LLM prompts.

[This space was intentionally left blank.]

5. References

1. Farhan, Hind N. “The Impact of AI-Powered Writing Tools on Students’ Writing Performance: A Content Analysis and Future Prospects.” ResearchGate, 1 Mar. 2025, http://www.researchgate.net/publication/389458566_The_Impact_of_AI-Powered_Writing_Tools_on_Students.
2. Freeman, Josh. “Student Generative AI Survey 2025 - HEPI.” HEPI, 26 Feb. 2025, www.hepi.ac.uk/2025/02/26/student-generative-ai-survey-2025/.
3. Ju, Qirui. “Experimental Evidence on Negative Impact of Generative AI on Scientific Learning Outcomes.” Research Square (Research Square), 21 Sept. 2023, https://doi.org/10.21203/rs.3.rs-3371292/v1.
4. M. Helena Vasconcelos, et al. “Explanations Can Reduce Overreliance on AI Systems during Decision-Making.” ArXiv (Cornell University), 13 Dec. 2022, https://doi.org/10.48550/arxiv.2212.06823.
5. Rastogi, Charvi, et al. “Deciding Fast and Slow: The Role of Cognitive Biases in AI-Assisted Decision-Making.” Proceedings of the ACM on Human-Computer Interaction, vol. 6, no. CSCW1, 30 Mar. 2022, pp. 1–22, krvarshney.github.io/pubs/RastogiZWVDT_cscw2022.pdf, https://doi.org/10.1145/3512930.
6. Zhai, Chunpeng, et al. “The Effects of Over-Reliance on AI Dialogue Systems on Students’ Cognitive Abilities: A Systematic Review.” Smart Learning Environments, vol. 11, no. 28, 18 June 2024, pp. 1–37, slejournal.springeropen.com/articles/10.1186/s40561-024-00316-7, https://doi.org/10.1186/s40561-024-00316-7.