Lab 1 – Outline

Emerald Group – EduSense

Lab 1

Old Dominion University

CS 411W Professional Workforce Development II

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1. Introduction

1.1. Concerns Around AI in Education

Artificial intelligence tools like ChatGPT and Grammarly have become part of everyday student life. These tools can be helpful for writing and studying, but they also make it easy for students to depend on them too much. When that happens, it can take away from learning and creativity. A 2024 study found that students who rely heavily on AI tools score up to 20 percent lower on writing and reasoning tasks compared to those who use them more thoughtfully. Over time, this can hurt important skills such as problem-solving, critical thinking, and independent learning. These concerns show why there needs to be a better balance between using AI for help and still thinking for yourself.

1.2. Solution Requirements and Challenges

To help students use AI responsibly, there needs to be a way to guide them through the learning process while still letting them think on their own. Students should be encouraged to try assignments first before turning to AI for help. Teachers also need tools that show how students are using AI, so they can step in if it starts replacing real learning. The main challenge is to create something that supports students' independence while still making sure AI is used in an honest and productive way.

1.3. Introduction to EduSense

EduSense is a web and mobile app designed to help students and teachers use AI responsibly in class. Instead of just giving answers, it provides guided prompts, reflection questions, and challenge modes that help students work through assignments step by step. Teachers can upload assignments, see how students interact with AI, and figure out where they might need extra help. In CS 411W, the EduSense prototype will show how these features encourage critical thinking and independence. The goal is to help students build strong academic skills while using AI in a smart and ethical way.

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 encourages independent learning and responsible AI use. Instructors can upload assignments and view student progress. Students can use guided prompts and reflection tools to think through their work before accessing AI feedback. The platform also includes challenge modes that limit direct answers, helping students strengthen their problem-solving abilities. By combining these features, EduSense supports balanced learning where AI acts as a tool instead of a replacement for human thought.

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.
- Django framework for interactivity and styling

2.2.2.2 Backend:

- Python
- Handles user requests, LLM interaction, and assignment uploads.

2.2.2.3 Database:

- PostgreSQL or Firebase will be used for storing assignments, interaction logs, and user data.

2.2.2.4 LLM:

- Models: OpenAI, Claude, or LLaMA.

2.2.2.5 Integration:

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

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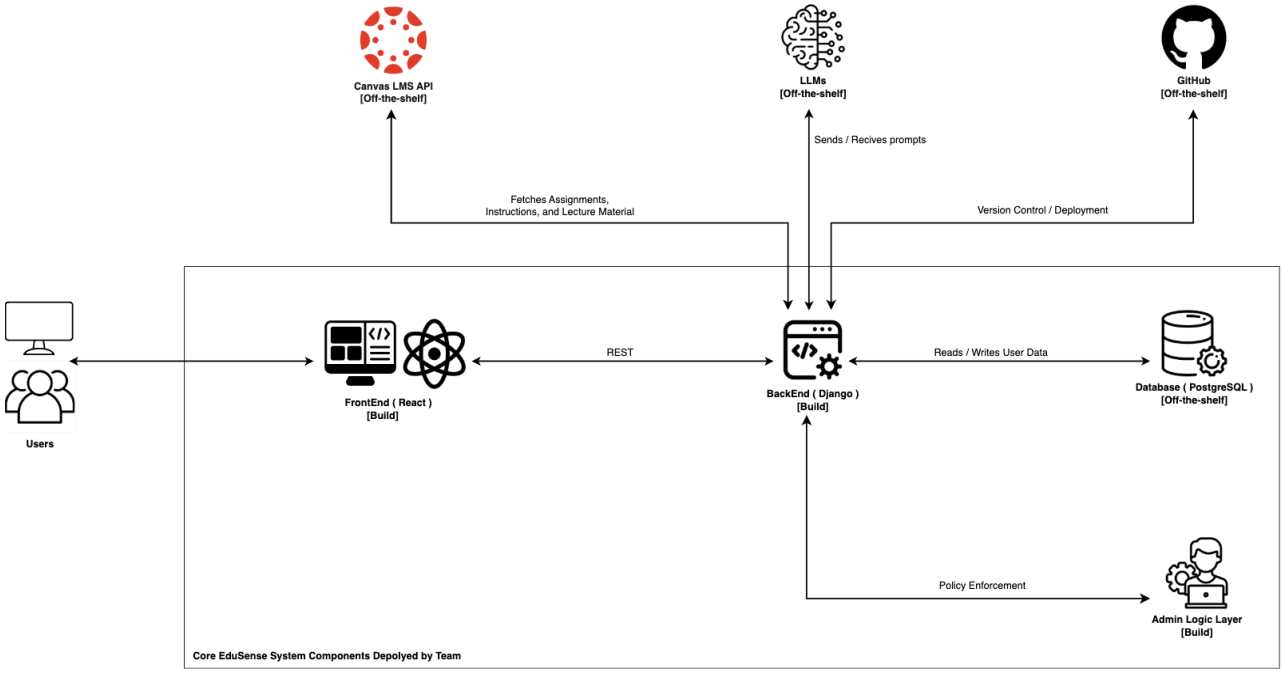

Figure 1: Major Functional Component Diagram

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.

Students are the main focus because they are going to be using AI the most for classwork. Many students are already using AI as a tool to write essays, answer questions, and check grammar. Realistically, most of the applications we use every day have these features built in. While this might save time, it also causes students to rely on AI to do the work for them. This can create a snowball effect where the more you don't practice something, the worse you get at it. That is the fear with AI, that students will begin to lose important skills over time. EduSense is meant to stop that from happening by making sure AI is just a tool for students to use and not something that replaces the human brain.

In the future, our goal is for EduSense to be used at all levels of education, from elementary school to high school and college. It can give teachers a way to introduce kids to responsible AI use at a young age. Just like we were taught how to use the internet as a tool, the hope is that EduSense will also be taught as something to utilize in learning environments. EduSense could also be used in workplace training programs to help employees practice solving problems on their own. Even adults who want to keep learning outside of academia could use EduSense as a way to stay sharp and continue building new skills.

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.

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_AIPowered_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 AIAssisted 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/s40561024-00316-7, https://doi.org/10.1186/s40561-024-00316-7.