Project Proposal: Enhancing AI-Driven Lesson Planning through Emotion-Aware Adaptive Systems

Student Name: Mario Pauldon
UNI: mip2124
Proposed Team Name (if applicable): EdTechNOVA

Project Topic and Motivation

For my final project, I propose to build upon my midterm paper topic, *"AI in Curriculum and Lesson Planning: Enhancing Education,"* by developing an emotion-aware adaptive lesson planning system prototype that addresses the current limitations of AI in education—namely, the lack of emotional intelligence and contextual adaptability.

While AI-powered platforms like Knewton Alta, Google Classroom AI, and Squirrel AI excel in personalized content delivery based on performance data, they often neglect students' real-time emotional states—an essential element of learning engagement and comprehension. I aim to investigate whether integrating emotion recognition can improve the quality and adaptability of AI-generated lesson plans.

Project Goals and Innovation

This project introduces an extension to existing AI lesson planning systems by incorporating emotion detection from facial expressions, voice tone, and text sentiment to adjust content dynamically. The system will integrate open-source emotion recognition APIs (e.g., Affectiva, Microsoft Azure Emotion API) with a custom lesson planning engine.

Key innovations:

- **Emotion-aware personalization**: Beyond grades and assessments, lesson difficulty, pacing, and content type will be adapted based on students' emotional feedback.
- **Hybrid AI-human intervention**: Teachers will receive insights into student emotional patterns, enabling targeted human follow-up.
- **Bias-aware AI calibration**: Emotion data will be anonymized and analyzed to reduce bias and improve inclusivity.

Implementation Plan

The system will be prototyped using Python and integrated with the OpenAI GPT API for lesson generation. Emotion recognition will be tested via webcam (facial expressions), microphone (tone analysis), and chat inputs (sentiment analysis).

Features:

- Student interface for completing micro-lessons
- Real-time emotion tracking
- Dynamic lesson adjustments based on emotional response
- Teacher dashboard for insights and manual overrides

Evaluation Plan

To evaluate the effectiveness of the system, an experiment will be conducted using two groups:

- **Group A (Control)**: Uses standard AI-generated lesson plans
- **Group B (Experimental)**: Uses emotion-aware AI-generated lesson plans

Metrics for evaluation:

- **Engagement levels** (measured via survey + participation data)
- **Learning outcomes** (pre/post assessment scores)
- **Student satisfaction** (survey results)
- **Teacher feedback** (qualitative interviews)

Conclusion

This project extends my midterm research by exploring a forward-looking enhancement to AI in education: emotion-aware learning systems. It aims to balance the efficiency of automation with the empathy of human educators. By focusing on emotional context, this system could significantly improve the adaptability and inclusivity of digital learning environments.