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Problem: I am a faculty member in the Chemical Engineering Department of a State University with 27 years of teaching experience. In my classes, which typically have around 60 students, I have observed that only about 25% regularly attend lectures, while the majority show little interest in attending despite the quality of teaching. A key reason for this low attendance is that students are allowed to appear for exams even if they have 0% attendance throughout the semester.

Objective: How can AI be leveraged to address this attendance issue effectively? Provide a concise write-up of approximately 200 words explaining potential AI-driven solutions. Include at least two measurable benefits such as improved attendance rates and enhanced student engagement or academic performance. Additionally, describe how students would interact with an AI agent designed to encourage consistent class participation—e.g., through personalized reminders, interactive learning modules, or real-time feedback. The response should focus on practical, scalable AI applications that motivate students and support faculty in monitoring and improving attendance patterns.

Solution with ChatGPT

Leveraging AI to Improve Student Attendance and Engagement in Chemical Engineering Classes

Artificial Intelligence can offer practical, scalable solutions to address chronic absenteeism. An AI-powered student engagement system can analyze attendance patterns, academic performance, and behavioral trends to identify disengaged students early. The system can send **personalized reminders and motivational messages** via WhatsApp, SMS, or email, nudging students to attend classes regularly. Moreover, it can offer **interactive micro-learning modules** that summarize missed lectures, making it easier for students to stay updated and reintegrate into class discussions.

To support faculty, an AI dashboard can provide **real-time analytics on attendance trends**, flagging students who need intervention. Faculty can then tailor outreach strategies or trigger automated interventions. Gamification techniques such as badges for consistent attendance or quiz-based incentives can also be deployed by the AI agent to sustain interest.

Measurable Benefits:

1. **Expected 30–50% increase in class attendance** through targeted nudges and academic support.
2. **Improved academic engagement/performance by 10–15%**, especially among previously disengaged students.

Student Interaction with the AI Agent:

Students would engage through a chatbot or mobile app that delivers attendance alerts, brief lecture recaps, self-assessment quizzes, and feedback loops—encouraging accountability, reducing learning gaps, and reinforcing classroom participation as a habit.

Solution with Google Gemini

While AI cannot directly enforce attendance policies, it can significantly enhance engagement and provide valuable insights into student learning, even with low physical attendance.

One approach is to leverage AI for personalized, adaptive learning platforms. Imagine an AI agent that delivers course content through interactive modules, quizzes, and simulations accessible anytime, anywhere. Students can engage with this material at their own pace. The AI would track their progress, identify areas where they struggle, and provide targeted remediation or advanced topics. This system caters to individual learning styles and schedules, potentially rekindling interest in those who skip traditional lectures.

Measurable Benefits:

1. **Increased Engagement with Course Material:** AI can track the time spent by students on the platform, the number of modules completed, quiz scores, and participation in online discussions. A significant increase in these metrics, even with low physical attendance, indicates improved engagement.
2. **Improved Academic Performance:** By identifying and addressing individual learning gaps, AI can contribute to higher average scores on assignments and examinations. This can be measured by comparing pre- and post-AI intervention academic outcomes.

Students would interact with the AI agent primarily through a web or mobile application. They would access course materials, submit assignments, receive personalized feedback, and participate in AI-moderated discussion forums. The AI could also act as a virtual teaching assistant, answering common questions and guiding students through complex concepts, fostering a more self-directed and engaging learning environment.