Enhancing Active Learning through Generative AI: A Case Study

Imane Bayane

KTH Royal Institute of Technology, ABE/Structural Engineering and Bridges

🔍 Keywords

Active Learning · Generative AI · Engineering Education · Structural Dynamics · Student Engagement

Background

- Traditional engineering lectures often rely on teacher-centered methods that limit student engagement. In the Structural Dynamics course at KTH, we redesigned four 3-hour lectures to shift toward active, student-centered learning.

Purpose

- Our purpose was to enhance learning through a mix of pedagogical redesign and the integration of generative AI tools to support instructors in creating engaging, reflective, and adaptive educational experiences.
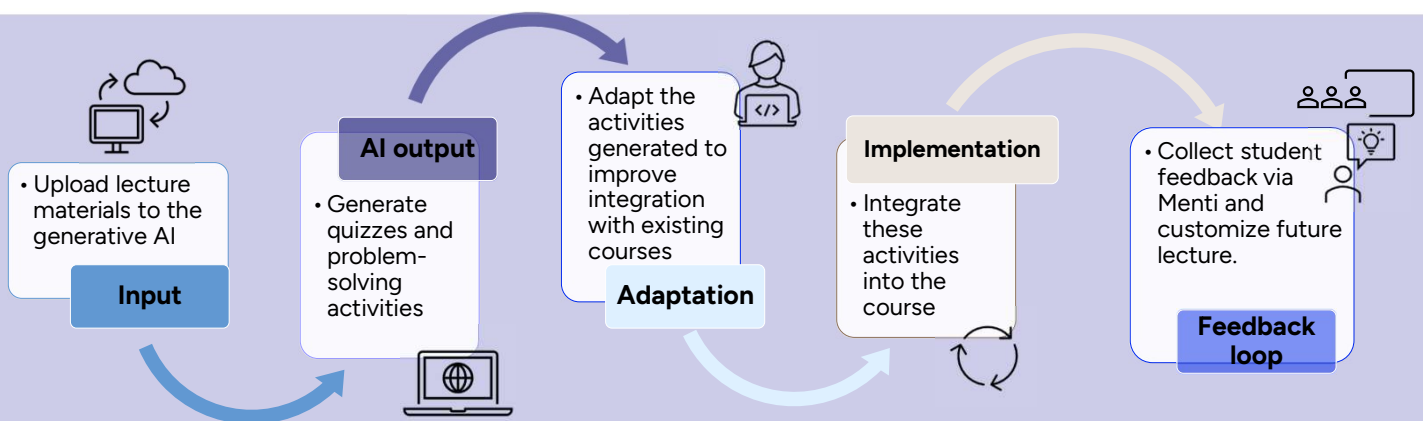
Work Done

Replaced passive lecture segments with:
- Menti quizzes after each 45-minute segment.
- Problem-solving sessions in groups with peer comparison and reflection.
- Mini exercises to reinforce new concepts.
- Open feedback quizzes at the end of each session.

Used generative AI (ChatGPT) to:
- Generate and refine problem-solving tasks.
- Create formative quiz questions.
- Suggest active-learning strategies and feedback prompts.

Input
- Upload lecture materials to the generative AI

AI output
- Generate quizzes and problem-solving activities

Adaptation
- Adapt the activities generated to improve integration with existing courses

Implementation
- Integrate these activities into the course

Feedback loop
- Collect student feedback via Menti and customize future lecture.

📈 Results / Feedback

- Students appreciated the **balance** between guidance and participation.
- "COVID students" especially valued the shift from passive online learning.
- Feedback via Menti and email revealed:
  - Higher engagement
  - Better understanding of complex concepts
  - Recognition of the instructor's effort to innovate

🧠 Role of Generative AI

Used as a **pedagogical co-pilot**, generative AI streamlined lecture design by:
- Reducing preparation time for quizzes and activities
- Suggesting varied ways to promote student engagement
- Supporting reflective teaching through feedback analysis

=> Generative AI can empower teachers to adopt active learning without increasing workload, especially in time-constrained research environments.

Contact & QR Code

Email: bayane@kth.se
https://www.kth.se/profile/bayane