

# Teaching, Testing, Transforming: A Multi Faculty Experience with AI-Assisted Microteaching

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## Abstract

**KARE–Teaching Learning Centre has operationalized a human-centric, tool-agnostic microteaching assisted by Artificial intelligence (MT–AI) model that breaks core topics into 10–15 minute micro-segments, couples AI-assisted preparation with visual pedagogy, and closes each loop with synchronous formative checks and asynchronous application tasks mapped to CO–PO–PSO and X-components for applied learning. Faculty leverage a common template specifying split topic, justification, activity, AI tools, synchronicity, roles, and assessment hooks, while students engage via quizzes, simulations, coding/ML notebooks, and data-to-insight workflows with transparent AI attribution and LMS evidence trails for auditability. The model scales across Heat Transfer, Bioenergy, Operating Systems, Data Structures, Business Economics, Java Programming, Biomedical Sensors, Physics, Civil Engineering courses, and Statistics, using domain-appropriate stacks such as Perplexity/NotebookLM for retrieval, Napkin/Pictory for visuals, Socrative/Wayground/Kahoot/Forms for analytics, Python/Weka/Excel-ML for ML, and ANSYS/CFD/solvers for engineering simulations. Early evidence indicates higher clarity, improved quiz mastery, and strong sessional outcomes in cohorts taught with MT–AI.**

**Keywords—** AI-assisted microteaching; Applied learning analytics; Microteaching framework; Pedagogical mapping;

**JETLP Category—** Research

## **Implementation**

### ***Scope and goals***

- Target 2–3 microteaching assisted by Artificial intelligence (MT-AI) cycles per week per course topic, each aligning to specific COs and mapped to program outcomes, with explicit evidence capture in sessional, assignment, X-component, and end-semester artifacts.
- Emphasize outcome fluency, practice depth, and tool literacy across LLMs, quiz platforms, modeling/simulation suites, and lightweight ML classification/regression tasks.

### ***Roles and Responsibilities:***

- Faculty: curate micro-topics, prompt AI to produce mini-lectures, MCQs, visuals, rubrics, and exemplars; orchestrate polls/quizzes; and synthesize analytics for feedback and re-teaching.
- Students: engage in live checks for understanding, complete AI-assisted practice tasks, contribute micro-presentations/flowcharts, and maintain brief reflections and artifacts in LMS/portfolios.

### ***Standard MT–AI cycle (10–15 minutes per micro-topic)***

- Pre-class: Use AI-generated primers like text, diagrams, and podcasts. Curated summaries build prior knowledge and prepare students for in-class activities (Table 1).
- In-class: Microteaching segments of 10–15 minutes share key concepts. Visual maps and flowcharts are used to explain them. Then, students take AI-evaluated quizzes for quick feedback and focused reteach
- Post-class: Asynchronous AI-assisted assignments, modeling/simulation, literature synthesis, and data activities extend learning into application and reflection with rubrics tied to COs.

Recent studies say AI microteaching supports active learning. Two or three short practice cycles each week link the cycles to course goals. This helps students interested and challenged (Konakbayeva et al., 2025; Zhumabayeva et al., 2025). AI formative tools help teachers and students learn goals. They also teach how to use tools. Teachers and students plan lessons together. AI gives quick feedback with mini-lectures, quizzes, and rubrics (Mousa, 2025; Lyanda, 2025). A common MT–AI routine is short pre-class AI primers, clear visuals in class, and quizzes checked by AI. These steps aids students move knowledge and reflect. Follow-up online tasks keep learning and save notes for review (Konakbayeva et al., 2025; Mousa, 2025). Table 2 highlights the various courses respective MT-AI activity and tools used in this study.

Table 1: Tool Effectiveness and Learning Outcomes

AI Tool	Primary Function	Effectiveness Indicators	Student Engagement
Wayground	Quiz analytics and assessment	91.7% accuracy on sustainability concepts; pass rate rose to 100%	High - Immediate feedback in real-time
Napkin.ai	Diagrammatic teaching	100% pass rate vs 86% traditional methods	High - Learning through visuals
ChatGPT	Content generation and Q&A	Used by many departments	Medium-High
Socrative	Live polling and quizzes	Learners get quick feedback and stay engaged	High - Interactive
Google Colab/Python	Hands-on data analysis	Practical skill development in AI/ML	High - Applied learning
NotebookLM	Podcast generation	Pre-class prep and curated content	Medium - Self-paced
ANSYS	Engineering simulation	Helps solve real problems	High - Practical application

## Impact and Outcomes

- Pilot micro-sessions were also very successful. Microteaching resulted in more than 90 percent accurate responses to quizzes on sustainability issues with low stakes. This implies high transparency and consistency.
- Cohort performance was better with visual teaching and diagram-first microteaching. The BME Sessional-I increased by 86 percent in previous semesters to >96 percent. This demonstrates improvements of clarity and reduced misconceptions.
- The students were found to perform well in AI-assisted problem solving to explain the concepts through LLMs. They were also able to show simple ML capabilities in classification and regression on domain datasets. Also, they were prepared to ANSYS and Revit simulations, and they connected theory with practice.
- The triangulation of CO is achieved through sessionals, assignments, X-components and End semester Examinations (ESE) and micro artifacts enhance traceability, between activity and outcome mapping and scoring by the rubric.
- Faculties observed faster course materials preparation and were able to diversify their offerings with AI assisted authoring as well as standardized micro templates decreased rework and consistency of quality in sessions.

Recent studies show AI microlearning makes ideas clear and raises quiz scores. Monib et al. 2025 found an AI microteaching method gave students more though provoking challenges. It also boosted their understanding over regular teaching. Stavrinou et al. 2025 reported short LLM-made “reels” raised quiz scores. They made students more interested than lectures did. Durgungoz and Durgungoz (2025) found that AI gamified quizzes helped students identify misconceptions. These quizzes also eased teachers' workload. Baillifard et al. (2025) discovered that AI tutors boosted learners' scores by up to 15 points in neuroscience tests. These gains match the MT–AI results for quiz mastery and concept understanding. Willenborg and Withorn (2025) found that modular AI microcourses allow faculty to update content easily. They also save time for faculty for other productive tasks. Figure 1 highlights the various tools used in the courses of this study. It could be

seen that ChatGPT was most used AI tool followed by Notebook LLM and Napkin.ai. These advantages offered by these reflect the AI support seen in our study.

Table 2: Cross-department MT–AI coverage (illustrative)

Department/Course	MT–AI Activity	AI Tools
Aeronautical: Heat Transfer (213AER3101)	Heat moves in three ways: conduction, convection, and radiation. We will teach using short micro-segments. We'll use ANSYS X-components and co-teaching. Also, there will be weekly quizzes and assignments.	Perplexity, Socrative, ANSYS/CFD Post
Biotechnology: Bioenergy (213BIT2112)	Test feedstock quality with regression and classification. Perform LCA clustering. Give brief presentations.	Python/Colab, Weka/Excel-ML, OpenLCA
CSE: Data Structures (212CSE2301)	Visual explainer and algorithm visualization for search	Pictory.ai, Algorithm Visualizer
BCA: Operating Systems (212BCA2301)	Topic-wise quizzes for IPC, memory, paging, segmentation	Google Forms, Kahoot
EEE: Power Electronics/EV Tech	Visual maps and AI quiz data for semiconductors and IGBT	Napkin.ai, Wayground
BME: Sensors & Data Acquisition (212BME2320)	Diagram-led concept teaching and quiz analysis	Napkin.ai
Commerce: Business Economics (212COM3101)	Pre-class NotebookLM podcast + in-class MS Forms quiz	NotebookLM, ChatGPT, MS Forms
CSE: Java Programming (212CSE2403)	Case-based OOP/Exceptions microteaching with quiz	NotebookLM, ChatGPT, Wayground
Food Tech: Fruits & Vegetables (212FTE2306)	Conduct the experiment. Collect the data. Upload the data. Check the results. Publish your findings.	Datawrapper + AI scaffolds
Civil: Concrete/Estimation (212CIV2111/3116)	IS-code design choice tests; BIM tools split into small groups	ChatGPT/Quizlet/Quizizz/Padlet
Physics: Engineering Physics (PHY100)	Concept maps and flowcharts. Quizzes and short video explainers	Kahoot/Quizizz/Canva/Tutor AI

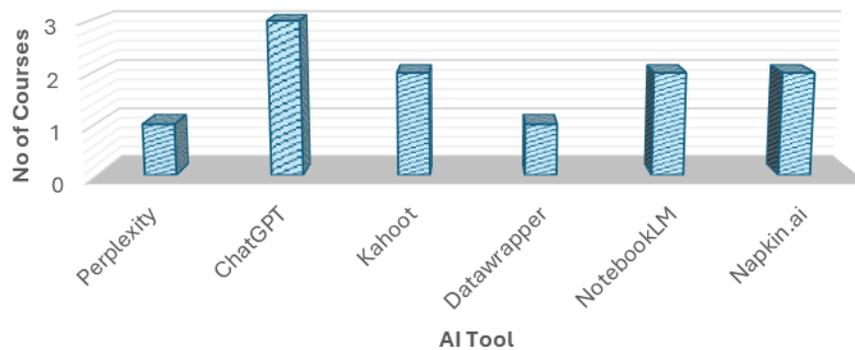


Figure 1: AI Tools Used in Courses

## Lessons Learned

- Visuals come first, and then the formal details. Diagrams, flowcharts, and brief explanations help you grasp concepts quickly. This method boosts understanding and improves performance in sessions.
- Analytics-guided reteach: Item-level quiz analytics enable targeted micro-reteach and spaced retrieval, improving mastery with minimal schedule overhead in large sections and mixed-ability cohorts
- Integrity and Attribution: Clear AI attribution and records—such as prompts, drafts, and dashboards—help support academic honesty. They also make audits easier for all programmes.

Zimmermann et al. (2024) found that flowcharts enable ideas to be clearer and easy to remember. They observed that flowcharts enabled the students to understand and retain difficult subjects which could be enhanced with AI tools shown in this study. Learning also increases through multi-sensory teaching as pointed out by Bharath et al. (2025), the use of sound notes in background improved students learning which could be enhanced by AI tools. They incorporated audio visuals in engineering classes. Students' retention and curiosity was found to be increased. This indicates that good visuals created by AI support are not only helpful to students rather enhance the creativity amongst teachers for content preparation.

Reteaching and spacing Quiz data can inform small-scale retries. Pei et al. (2024) demonstrated that learning dashboards indicate areas where the students have weaknesses. These weak areas can be corrected with minimum effort on the part of teachers. Regular low-stake quizzes in the long run enhance the memory and grades of STEM students.

Finally, teachers need to remain transparent on AI so that honesty is maintained. It is indicated that students have to refer to AI content as any other source. Their prompts, outputs, and reasoning of AI need to be documented.

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