

Traditional, Video-based, or AI-assisted learning? A comparative study in engineering education

MM Kasaei (INEGI, Portugal) | A Akhavan-Safar | EAS Marques | M.C.B.V. Soares | VCMB Rodrigues | RJC Carbas | LFM da Silva

INTRODUCTION

Engineering education now combines lectures with AI tools and digital preparation. These approaches differ in how students access content and interact with teachers. Understanding their effects can help educators choose suitable methods for engineering courses. This poster brings together two comparisons: a three-condition study of traditional and AI learning, and a published quasi-experiment of traditional and video-supported teaching [1].

METHODOLOGY

AI comparison

- **Participants and topic:** First-year Industrial Engineering and Management students studied adhesive bonding.
- **Learning activities:** **Group A** attended a 60-minute lecture (n = 35). **Group B** used AI for 60 minutes, followed by 30 minutes of teacher Q&A (n = 34). **Group C** used AI for 60 minutes without teacher Q&A (n = 32).
- **Assessment:** Students took a multiple-choice exam.

Video comparison

- **Participants and topic:** Twenty-three Informatics and Computing Engineering students with no prior Materials Science study joined Group 1 (traditional, n = 13) or Group 2 (video-supported, n = 10). Allocation was balanced by prior academic average without randomization.
- **Learning activities:** **Group 1** attended a one-hour slide lecture. **Group 2** received five video modules two days before a one-hour class with physical models, live demonstrations, and discussion guided by students' questions.
- **Assessment:** Both groups completed the same 20-mark exam

RESULTS AND DISCUSSION

Method	Main advantage over a traditional lecture
AI with teacher Q&A	Students can study at their own pace and ask AI for explanations, then use the teacher session to resolve questions. Its exam average matched the traditional group (89% in both groups), though it included an extra 30 minutes of Q&A.
AI alone	Offers flexible, on-demand study without a scheduled lecture. It did not show a performance advantage: its exam average was 81%, versus 89% for traditional teaching.
Video-supported teaching	Students can revisit the videos, while class time focuses on demonstrations and discussion. In its separate study, the video group scored 18.60/20, versus 16.19/20 for the traditional group.

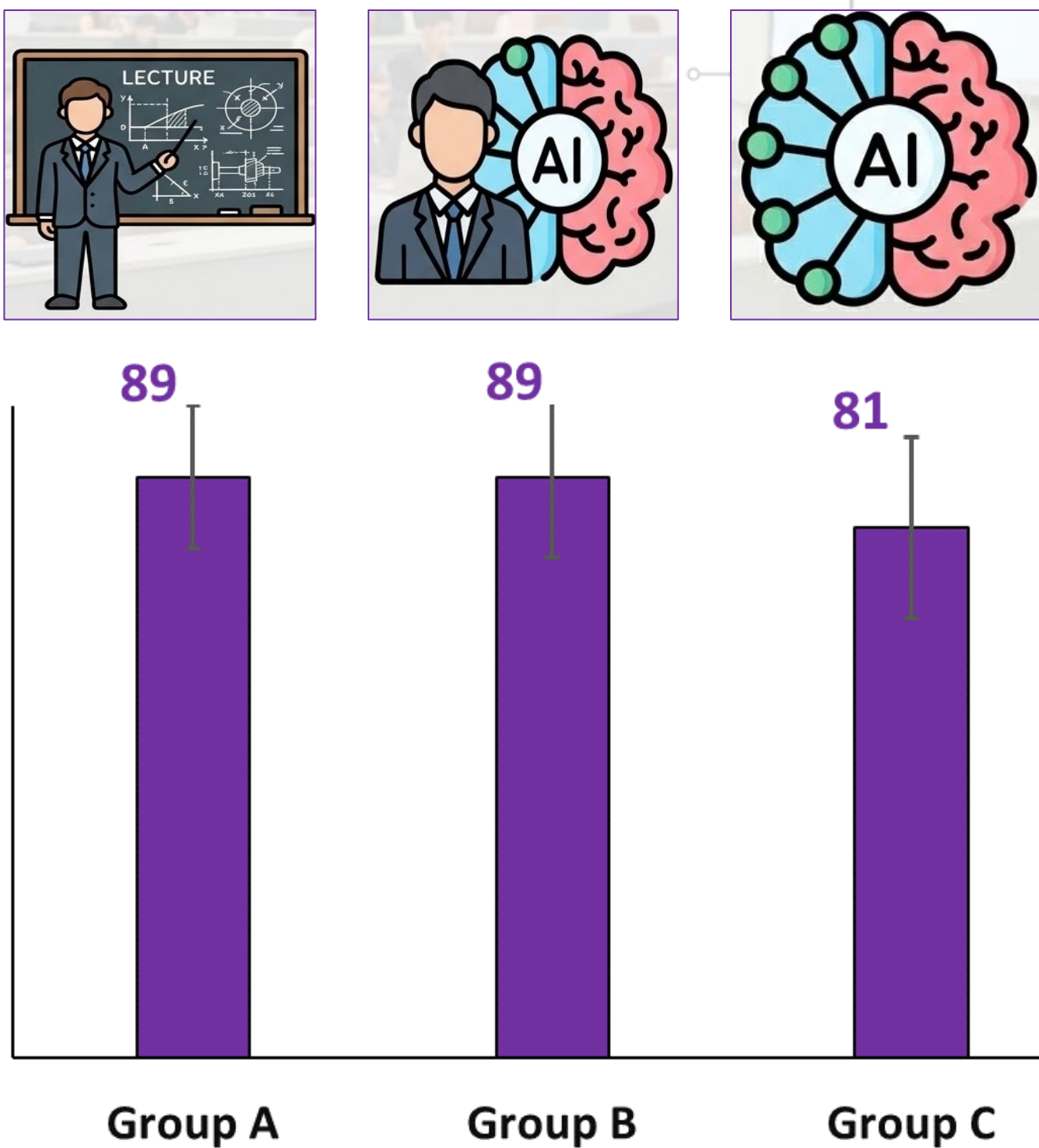


Figure 1. AI study: percentage of correct answers

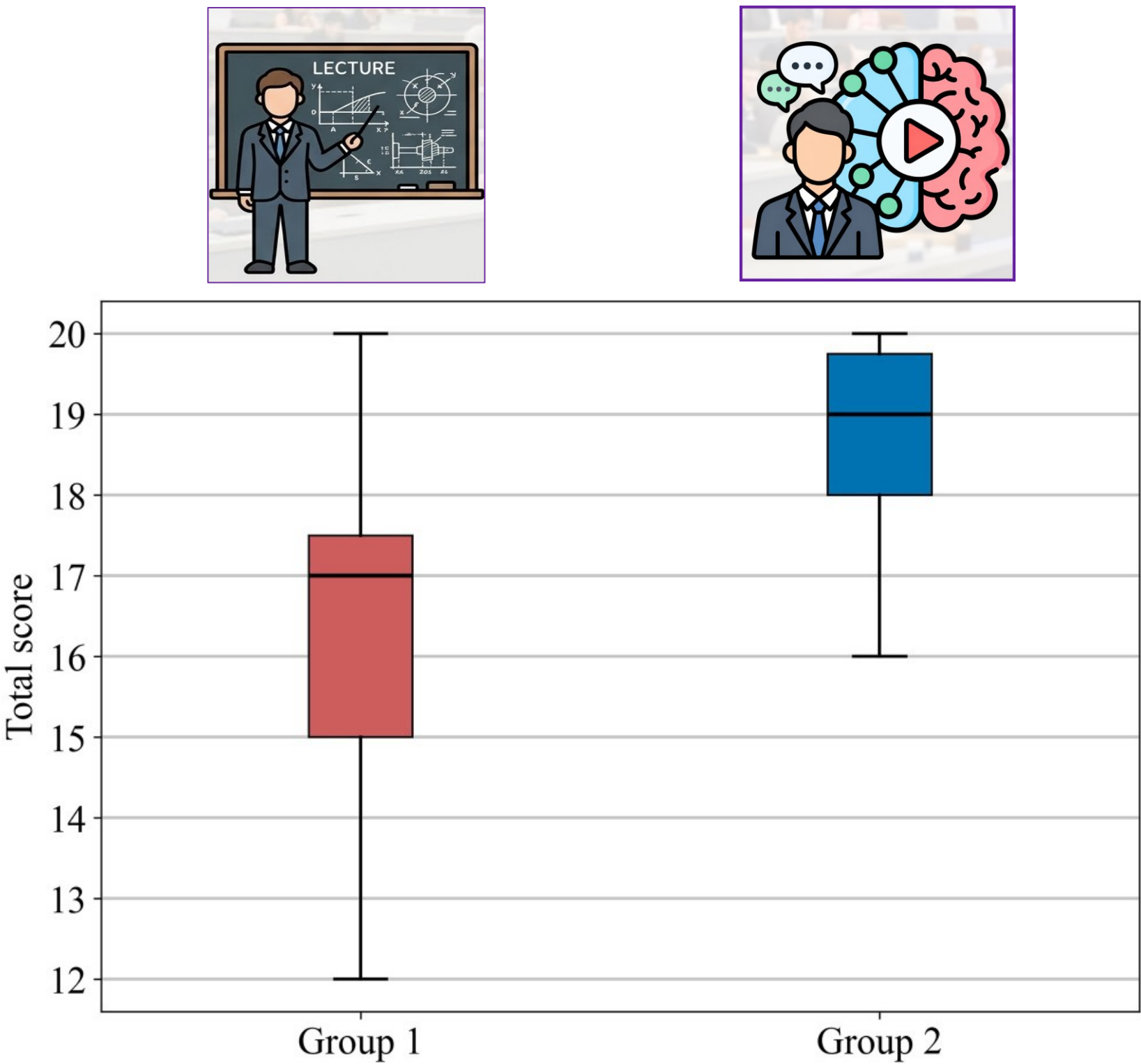


Figure 2. Video study: score distribution [1]

CONCLUSION

Teacher interaction remains valuable in both comparisons. AI with Q&A matched the traditional group mean in the first study, while the video-supported class outperformed the traditional class in the second. A direct ranking of all three approaches would require a common cohort, topic, test, and protocol.

REFERENCES

- [1] M.C.B.V. Soares et al., Int. J. Mech. Eng. Educ. (2026). DOI: 10.1177/03064190261428218.