Effectiveness of an Artificial Intelligence-Powered Training Platform in Undergraduate Dental Education: A Comparative Study

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In collaboration with med2lab

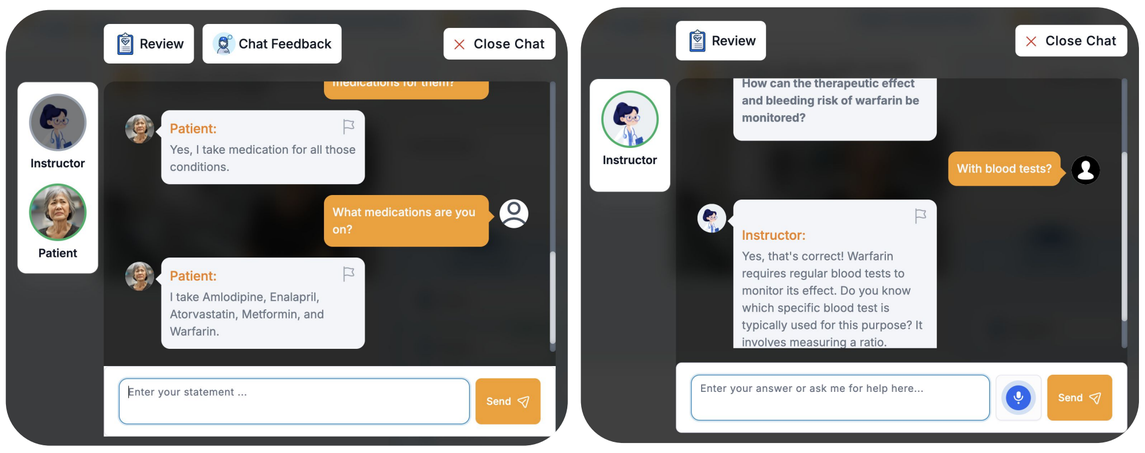
1 Introduction & Aims

- AI technologies, especially large language models (LLMs), have become increasingly integrated into healthcare education
- However, student acceptance and the effectiveness of their implementation into dental education are not well studied
- This project thus aimed to evaluate the effectiveness of LLMs in case-based tutorials in the undergraduate dental curriculum

2 Methods

Part 1: Case Development

- Employment of GPT-4-based interactive platform (**Med2Lab**)
- Prompt development with input on the following:
  - Case information (e.g. patient history, examination findings, photographs, radiographs)
  - Learning objectives
  - Preceptor questions and model answers
- Ethics approval obtained (NUS IRB: IRB-2024-1093)
- Test runs prior to launch of pilot study to refine cases



Screenshots of GPT-4-powered chatbot platform for virtual patient and instructor interactions

Part 2: Study Execution

Pilot / Qualitative

- 2 hours for students to complete 1 pilot case study on Med2Lab
- Post-tutorial survey disseminated to collate student feedback
- Cases modified prior to employment into tutorials

Launch / Quantitative

- Split by coin toss
- ***Intervention:*** 2 hours to complete 2 case studies
- ***Control:*** Conventional 2-hour tutorial by faculty member
- Pre- and post-intervention assessments for all students before and after session

Pedagogical Basis

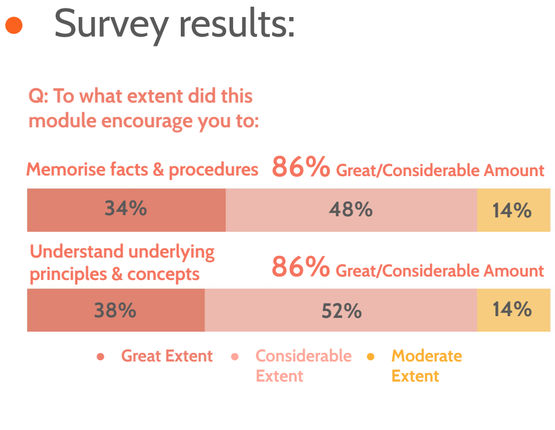
- ***Situated Learning:***
  - Context rich virtual cases mirrored authentic clinical scenarios, promoting real-world knowledge transfer supported by just-in-time feedback from a virtual 'preceptor"
- ***Kolb's Cycle:***

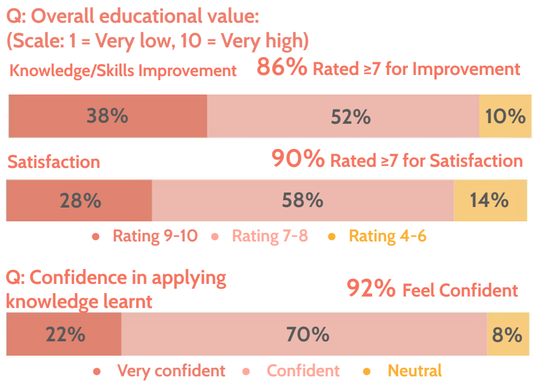
Concrete Experience	Reflective Observation	Abstract Conceptualisation	Active Experimentation
Interaction with simulated patient encounters	Guided feedback & reflection	Linking cases to clinical principles	Applying concepts in new scenarios

3 Results

Pilot Study

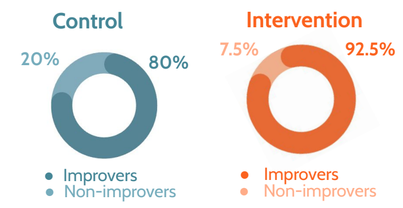
- No. of participants: 50
- Metrics on user engagement, usability, & satisfaction were collected via surveys & platform analytics
- Survey results:

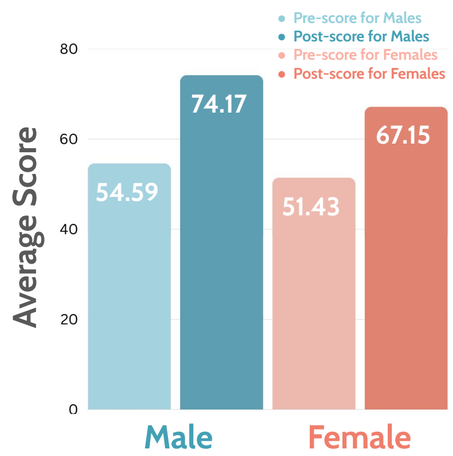


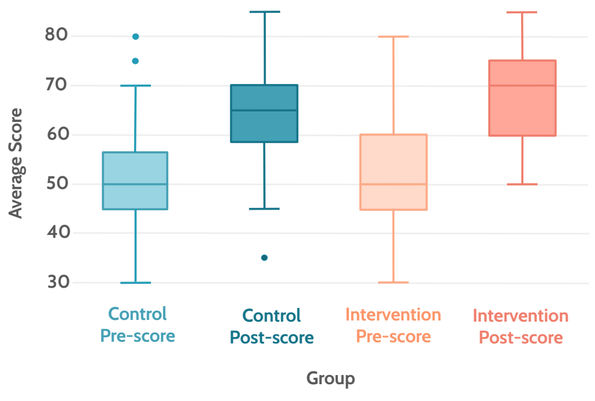


Comparative Study

- No. of participants: 80
  - ***Intervention:*** 40 students
  - ***Control:*** 40 students
- Summary of data collected from study:







4 Conclusions

- The use of AI technologies in teaching ***improved*** dental students' academic performance and satisfaction, compared to traditional teaching methods
- Findings support ***broader adoption*** of AI-driven educational platforms in dental curricula
- Future research should:
  - Assess the feasibility of ***full integration*** of AI platforms into regular dental curricula
  - Review the ***long-term impact*** of learning via AI platforms on clinical skills
  - Evaluate the ***adaptability and effectiveness*** of AI platforms in other medical and dental specialties