

AI vs conventional learning of clinical skills in O&G- A comparison

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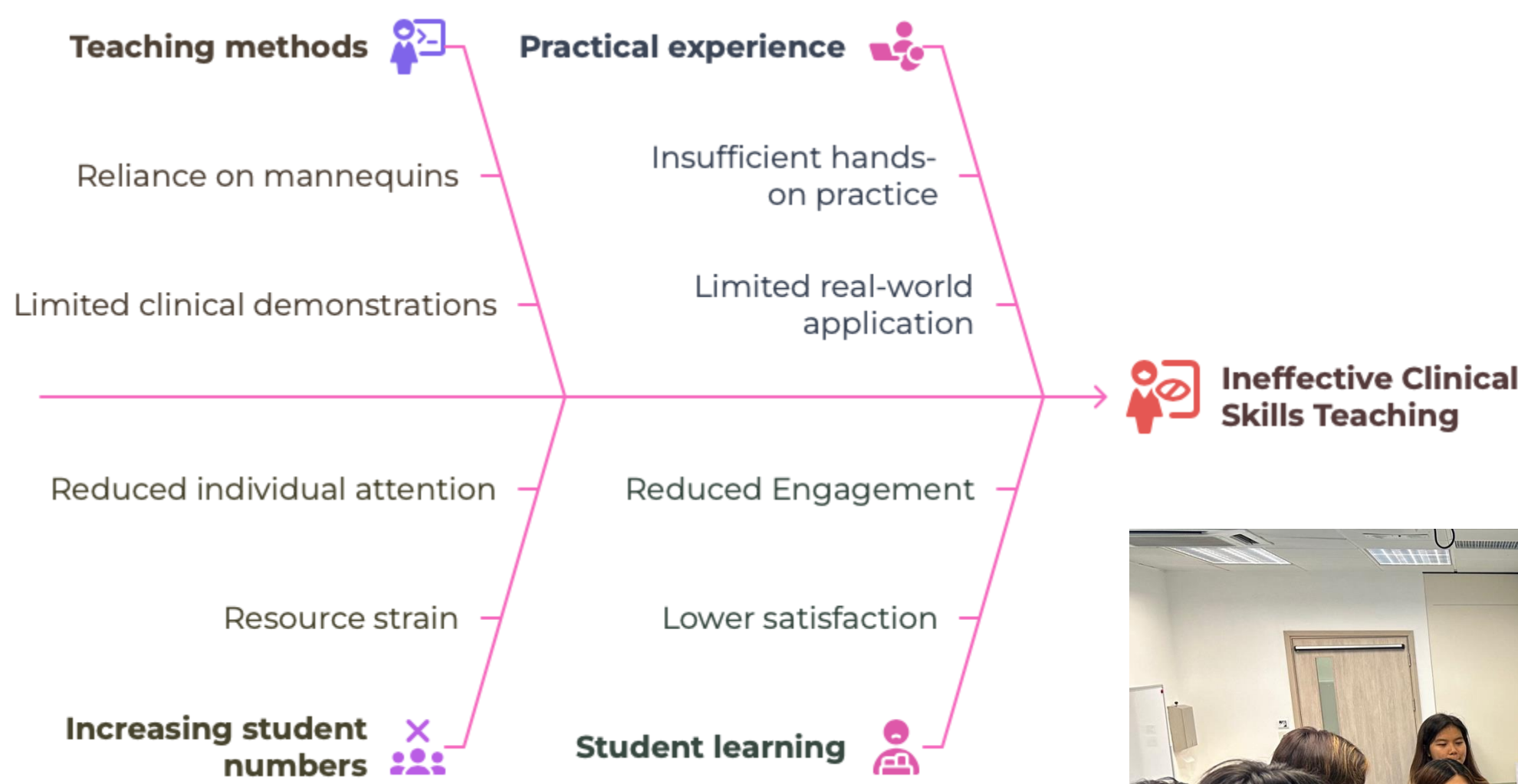
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Background

Traditional clinical skills teaching methods for the examination of the gravid abdomen, a fundamental skill in obstetrics, uses mannequins and clinical demonstration. Increasing numbers of students impacts the quality of clinical skills teaching and hands-on learning, which reduces students' satisfaction. This study describes the development of an artificial-intelligence (AI) avatar enhanced module to teach medical students how to perform an examination of a gravid uterus.

Challenges in Traditional Clinical Skills Teaching



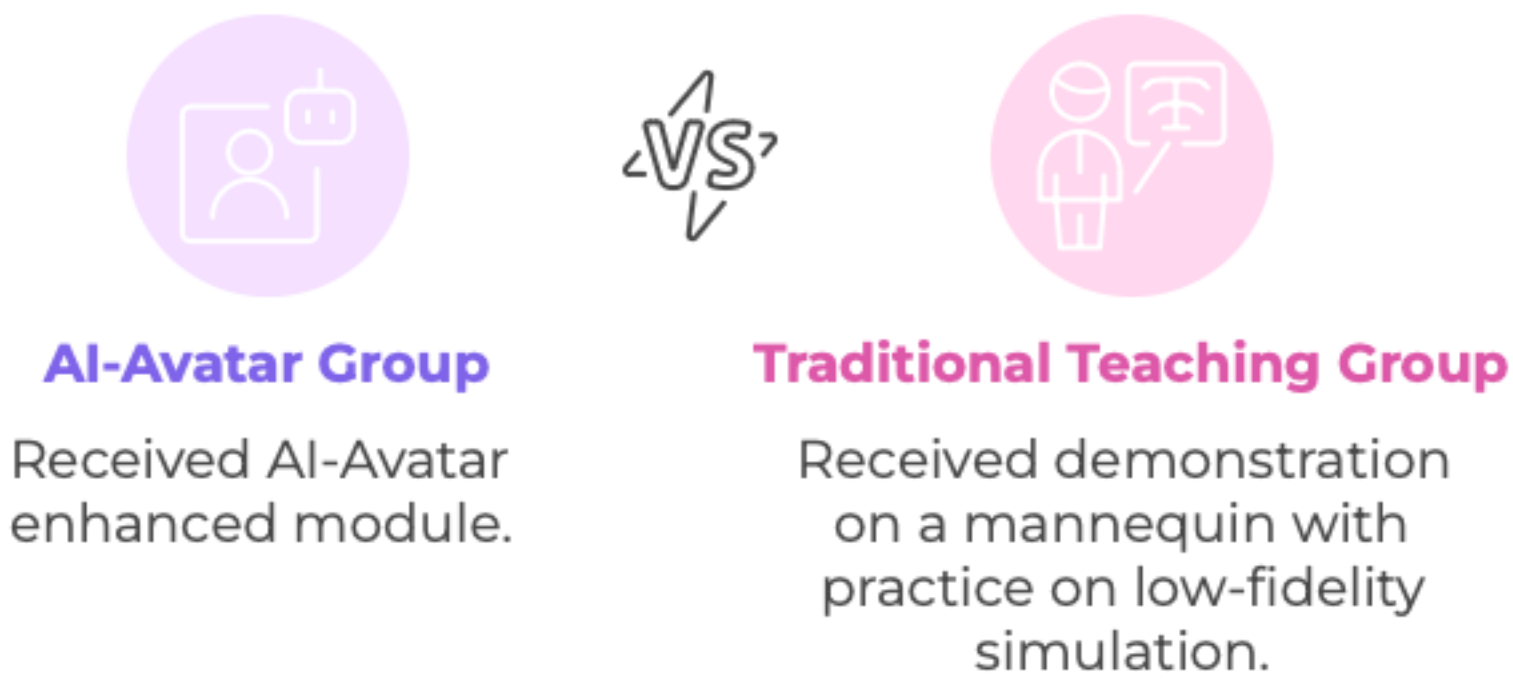
Objective

The goal was to demonstrate that an AI-Avatar enhanced module is effective in improving students' knowledge, self-efficacy, and confidence, and improves students' satisfaction.



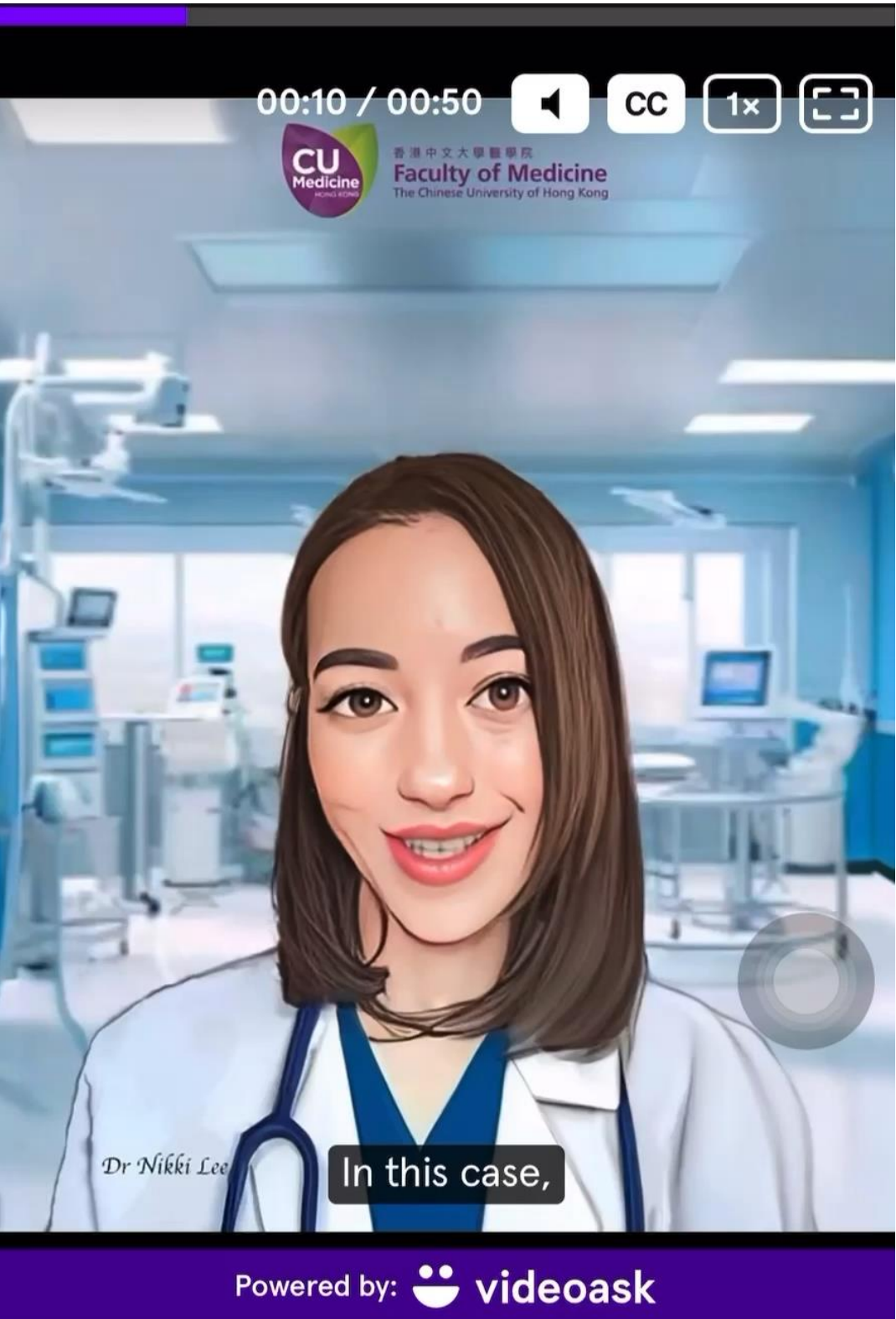
Design

Study Design: Quantitative comparative study
Participants: Year 5 medical students with no prior knowledge of obstetrics and gynaecology.
Group Assignment: Random assignment on the first day of obstetrics and gynaecology attachment.



Assessment Methods: Pre- and post-learning questionnaires administered to both groups

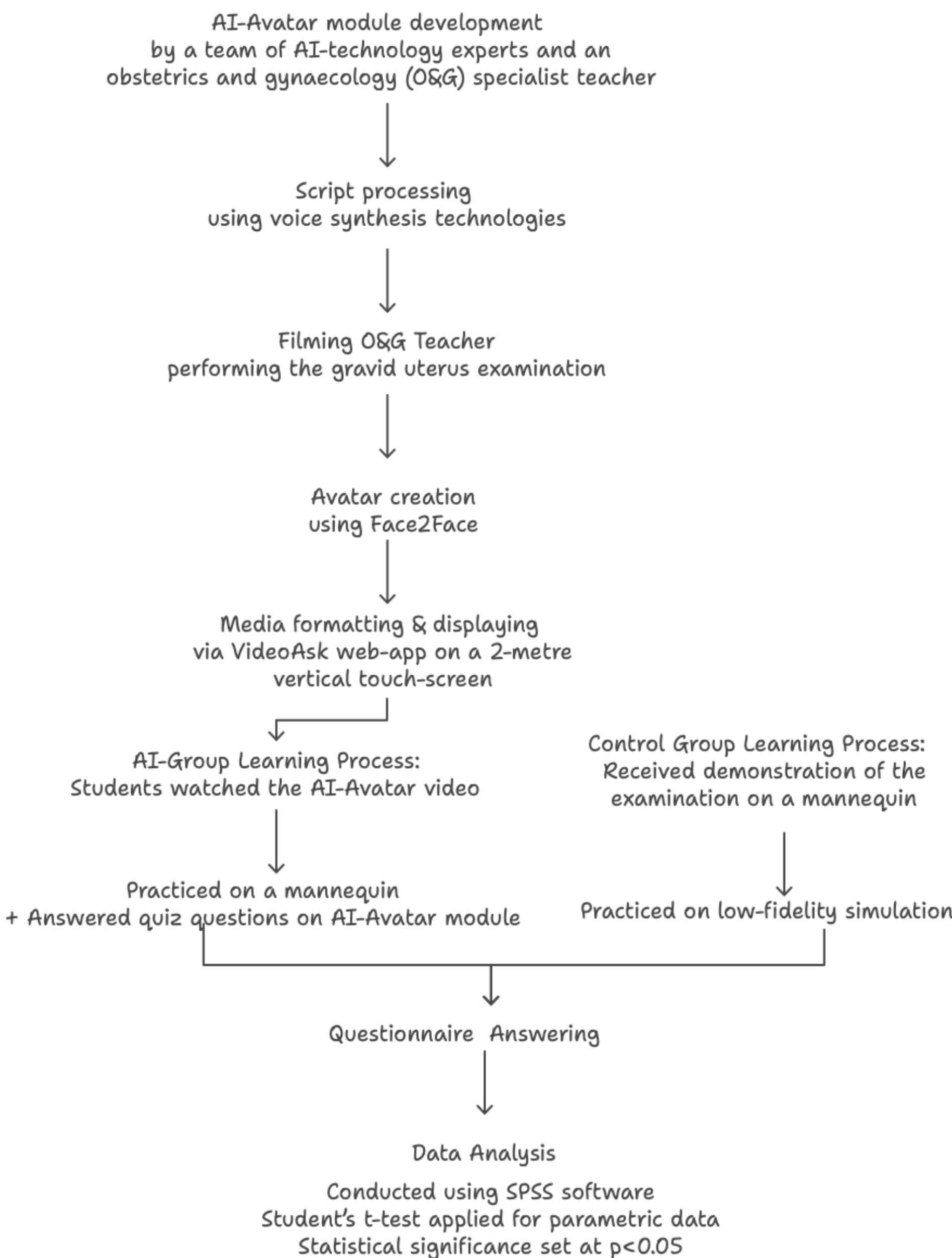
Evaluation Metrics for Learning Outcomes



Methods

The AI-Avatar module was designed by a team of experts in AI-technology and an O&G specialist teacher. A script was processed using voice synthesis technologies. The teacher was filmed performing the examination. An avatar was created using an open-source generative adversarial network (GAN) called Face2Face. The media was formatted into video and displayed via web-app interface VideoAsk on a 2-metre vertical touch-screen. Students watched the video, and then performed tasks in small groups using the mannequin or answering quiz questions. The control group received a demonstration of the examination on a mannequin, and opportunities to practise on low-fidelity simulation. Data was analysed using SPSS. Student's t-test was used for parametric data; $p < 0.05$ was considered statistically significant.

AI-Avatar Module Development and Learning Process



Results

66 students participated in the study with 33 students in each group. There was no difference in mean pre-learning scores in knowledge (8.15, SD=2.46 vs. 8.39, SD=1.95; $p=0.84$), confidence (5.97, SD = 2.85 vs. 6.36, SD=2.64; $p=0.65$) or self-efficacy (5.48, SD=2.11 vs. 5.76, SD=2.11, $p=0.92$) scores between the non-AI and the AI-groups, respectively.

Both non-AI and AI-groups showed improved post-learning scores in knowledge (2.00, SD= 4.50 vs. 3.06, SD =1.82, $p=0.39$), confidence (7.15, SD = 5.67 vs. 7.85, SD = 4.36, $p=0.63$) and self-efficacy (3.33, SD= 3.63 vs. 3.67, SD = 2.35, $p=0.90$), respectively.

The post-learning knowledge, confidence, self-efficacy and satisfaction scores were similar in the AI- and non-AI groups (11.45; SD=0.97 vs. 10.15; SD=3.40, $p=0.035$); (14.21, SD=3.60 vs. 13.12, SD=4.91, $p=0.51$); (9.42, SD=1.42 vs. 8.82, SD=2.90, $p=0.31$); (25.91, SD=3.70 vs. 22.88, SD=8.24, $p=0.22$).

The differences in the scores are shown in Table 1.

Metrics	Non-AI Group	AI Group
Pre-Learning Knowledge	8.15, SD=2.46	8.39, SD=1.95
Pre-Learning Confidence	5.97, SD = 2.85	6.36, SD=2.64
Pre-Learning Self-Efficacy	5.48, SD=2.11	5.76, SD=2.11
Knowledge Improvement	2.00, SD= 4.50	3.06, SD =1.82
Confidence Improvement	7.15, SD = 5.67	7.85, SD = 4.36
Self-Efficacy Improvement	3.33, SD= 3.63	3.67, SD = 2.35
Post-Learning Knowledge	10.15, SD=3.40	11.45, SD=0.97
Post-Learning Confidence	13.12, SD=4.91	14.21, SD=3.60
Post-Learning Self-Efficacy	8.82, SD=2.90	9.42, SD=1.42
Post-Learning Satisfaction	22.88, SD=8.24	25.91, SD=3.70

Table 1. Differences in pre- and post-learning scores between groups

Conclusion

The AI-Avatar enhanced teaching had similar improved learning outcomes in students' knowledge, confidence, self-efficacy and satisfaction when compared with conventional teaching. The results demonstrate that AI -Avatar technology can be an alternative to conventional teaching, saving manpower resources in the face of rising student numbers.