Use of Augmented Reality to Optimize the Effectiveness of Biomedical Education

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Introduction

Augmented Reality (AR)   Live view of physical environment with elements enhanced by computer-generated sensory inputs

- In education, AR is used to enhance lecture notes, 3D models, or other objects with multimedia to (i) provide supplementary information & (ii) facilitate interactions, manipulations, and active participations by students.
- AR has been paradigmatically shifting the mode of E-learning toward virtual experiences embedded in real-world contexts.
- What are the impacts of AR applications in medical education?

Aim of Study   To investigate the effectiveness of AR software on improving the quality of biomedical science education

Method

Participants

HKU undergraduate students enrolled in Degree Programmes of Nursing, Chinese Medicine, & Pharmacy
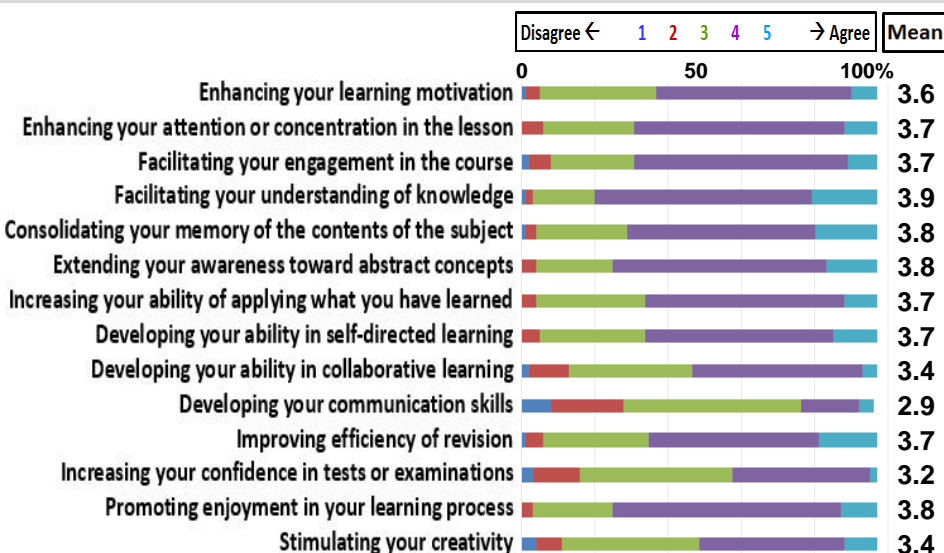
Procedures

- Free educational AR-software *"Brain AR App"* (Harmony Studio Ltd., UK) was used to assist teaching & learning in lectures or tutorials of biomedical science courses.
- Teacher provided guidance on installation & use of AR-software to ensure that students were able to use the software appropriately on their own to learn at any time.
- After learning experience with AR, students were invited to complete a questionnaire to evaluate (i) effectiveness of the software in their learning & (ii) their expectations on how to enrich the functions of educational AR-software.

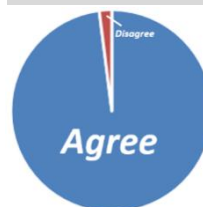Use of AR in a Lecture of a Biomedical Science Course
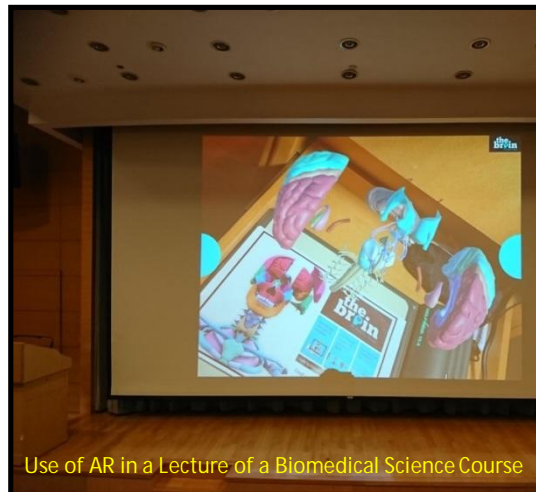
Major Findings

- Students demonstrated excitement when the AR-software was presented, suggesting that AR enhances students' interest in learning.
- Most students agreed that teacher's guidance is important for effective learning with AR.

What are the effects of AR software on your learning?

Disagree ← 1 2 3 4 5 → Agree | Mean

	Mean
Enhancing your learning motivation	3.6
Enhancing your attention or concentration in the lesson	3.7
Facilitating your engagement in the course	3.7
Facilitating your understanding of knowledge	3.9
Consolidating your memory of the contents of the subject	3.8
Extending your awareness toward abstract concepts	3.8
Increasing your ability of applying what you have learned	3.7
Developing your ability in self-directed learning	3.7
Developing your ability in collaborative learning	3.4
Developing your communication skills	2.9
Improving efficiency of revision	3.7
Increasing your confidence in tests or examinations	3.2
Promoting enjoyment in your learning process	3.8
Stimulating your creativity	3.4

- Majority of students agreed that AR facilitated their understanding of knowledge & awareness toward abstract concepts.

Above findings are based on response from 101 Nursing students, and are comparable with findings from Pharmacy & Chinese Medicine students.
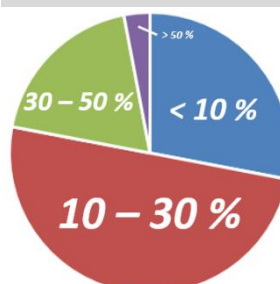
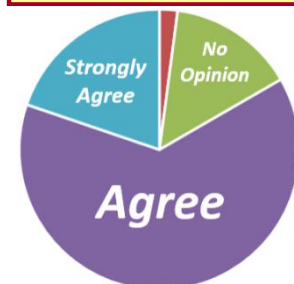*"New AR software with extended functions will be useful in my learning of biomedical science."*

High quality of figures, good integration of contents with curriculum & careful selection of materials are important factors in developing AR-software.

What proportion of a lecture should be spent on AR?

"Teaching with AR-software is better than without."

Conclusion

Introduction of AR as a mainstream technology into biomedical education is a potentially effective approach to improve the quality of biomedical science courses, leading to productive, fulfilling, and rewarding learning.