Media & Learning 2025: Educational media that works

Health Professional Virtual Reality Simulation: Replacement of Manikin for the Digital Eva Education

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Background

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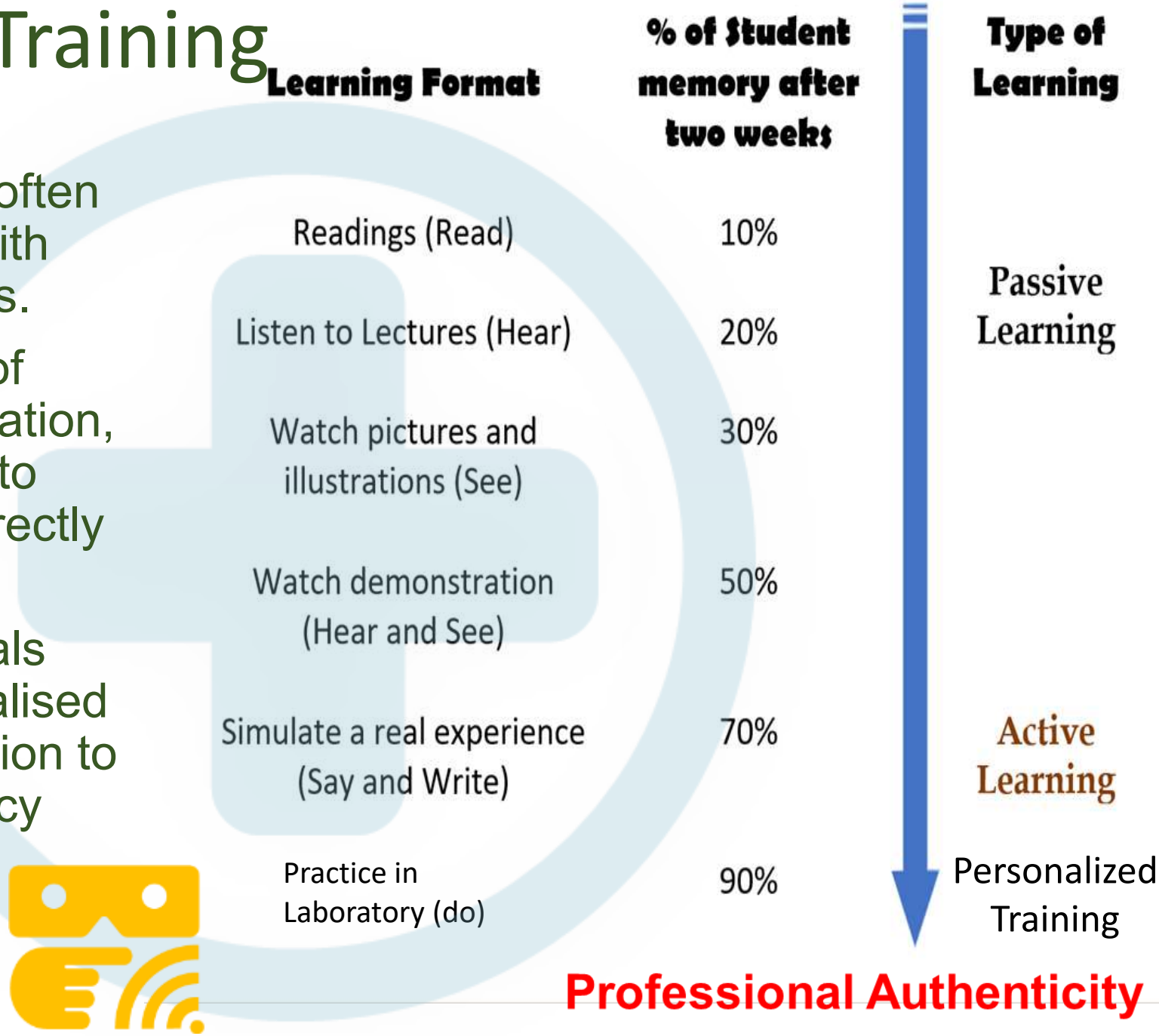
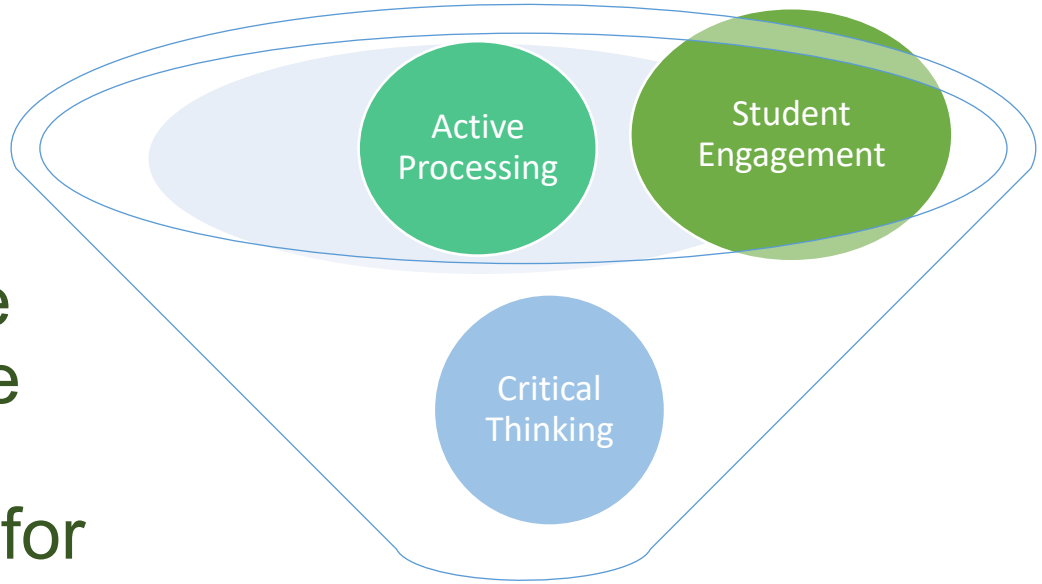
Health Professional Training

- Traditional educational methods often face-2-face in passive learning with geographical and time constraints.
- Active learning is a cornerstone of modern health professional education, moving beyond passive lectures to engage and facilitate students directly in the learning process.
- The training of health professionals increasingly emphasises personalised learning after knowledge acquisition to foster both career and competency development.



Efficiency Pedagogy



Concerning a efficiency pedagogy with active learning and student engagement, healthcare training should stimulate student's critical thinking in problem-solving, decision making for skill acquisition by

- Thinking to revise the theory
- Acting to implement the theory
- Experiencing to consolidate the theory
- Reflecting to apply the theory cognitively

VR Simulation: Innovation Skill Training

- The traditional simulation using a manikin-based training can mimic human anatomy and physiology, simulate vital signs, and even replicate complex scenarios such as trauma, cardiac arrest, or surgical procedures. This realism helps bridge the gap between theory and practice.

https://medvisionsim.com/blog/manikin-simulation-in-medical-training

Oxford Medical Simulation (January 3 2025)

- Virtual Reality (VR) Simulation is an innovative digitized element in healthcare training, providing a safe and immersive metaverse environment for learners to apply, test, and refine their clinical skills.

Objectives, Methods and Results

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Objectives

By adoption of electrocardiogram (ECG) skills training, the goal is to investigate if

- the application of VR simulator support health professional education and facilitate learners for their skill proficiency.
- there are any strengths and limitations in the application of VR simulation compare with the manikin-based simulator,

Methodology

Our team has developed the VR-ECG Simulator, implementing Unity development software and Meta Crest 3 with gamified elements for VR-ECG simulation training, encompassing the 3-Lead, 12-Lead and data interpretation components for creating a comprehensive skill training system in a real-immersive metaverse ward environment.

Unity®

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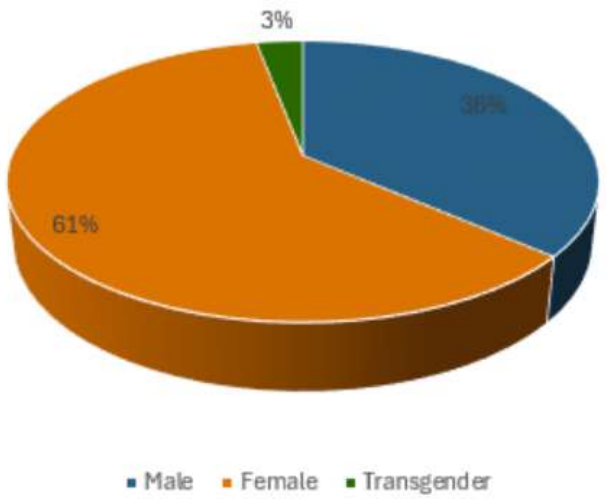
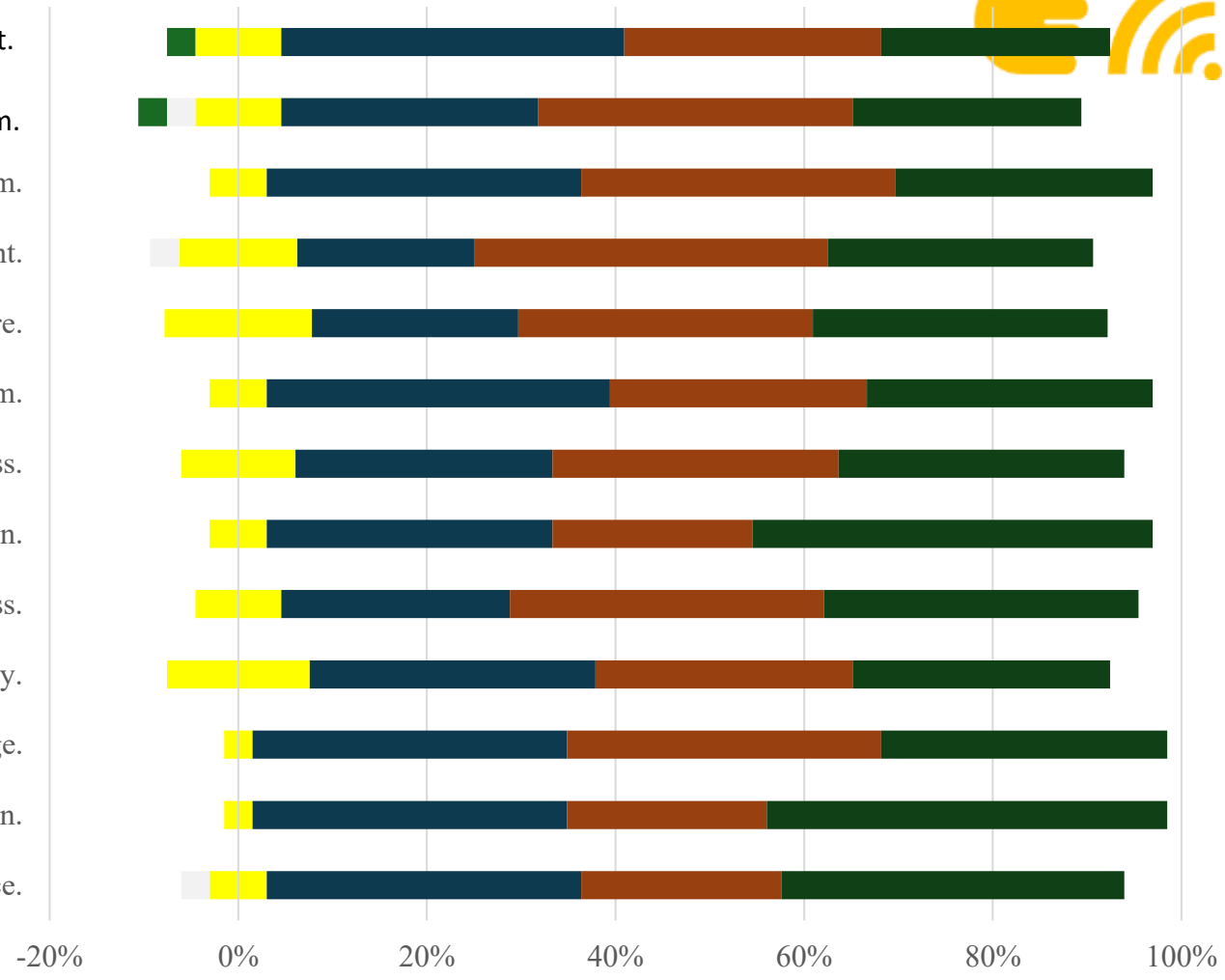
Results: Data Collection

- The 33 biomedical sciences students (studying in Year 2 cohort of the academic year 2024-25 have be given hands-on training to perform the 3-Lead ECG skills being taught in specially arranged practicing sessions to consolidate their confidence.
- The 7-point Likert Scale eSurvey was distributed to the students and teachers for the collection of data in their perceptions of usage.
- From the data analysis, the Cronbach alpha is > 0.966, which reflect the data is reliable and consistency.



Results: Student Perception for 3-Lead Training



Comparison of Manikin-based & VR-based Simulations: : Advantages

Manikin Simulation	VR Simulation
Allows hands-on practice with tactile feedback	Offers highly immersive, virtual environments for different scenarios
Facilitates group learning and teamwork in clinical settings	Is repeatable for all learners to practice with enjoyment, engagement and enhancement for interaction
Practices high-risk procedures without causing patient discomfort	Enables independent learning and repeated practice at any time with performance analysis for the weakness
Have data-driven feedback on vital signs and interventions	Is easy to switch between diverse scenarios without changing physical equipment
	Requires less time and is generally less expensive to run and is much user-friendly
	Can be conducted anywhere with the necessary hardware.

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Comparison of Manikin-based & VR-based Simulations: Disadvantages

Manikin Simulation	VR Simulation
It is limited by the no. of manikins and simulation space	It requires stable hardware, software, and sometimes internet access and time for preparation
It is designed for specific scenarios and patient types for each manikin	It may cause discomfort or motion sickness
It requires planning and coordination for each session	Less effective for practicing real-life communication and teamwork compared to manikins
It requires large space for storage of Manikin(s)	

Discussion and Conclusion

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Practice & Education Impact

- VR simulator training provides active learning environments and encourages more personalized experiential practice, making learning more engaging and reflecting to skill acquisition..
- By engaging both training methods, learners gain hands-on experience in a safe, controlled environment, allowing them to develop practical skills and critical thinking.
- While implementation for either method requires technical trainings and institutional support for the well planning for different curricula, the benefits, i.e. better preparation for clinical challenges, can fulfill the development of competent skills practice, underscore the pivotal role in advancing medical education.

Future of Health Professional Training

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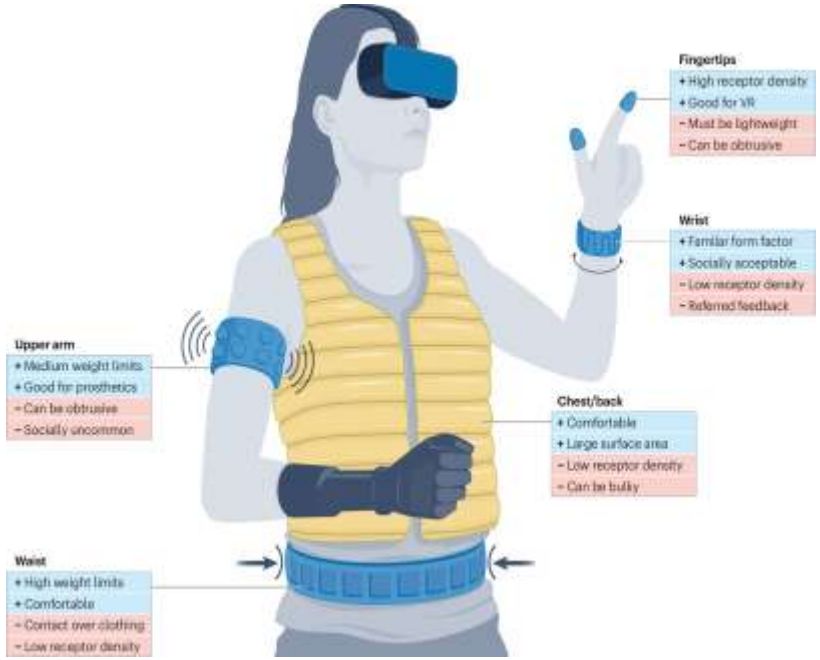
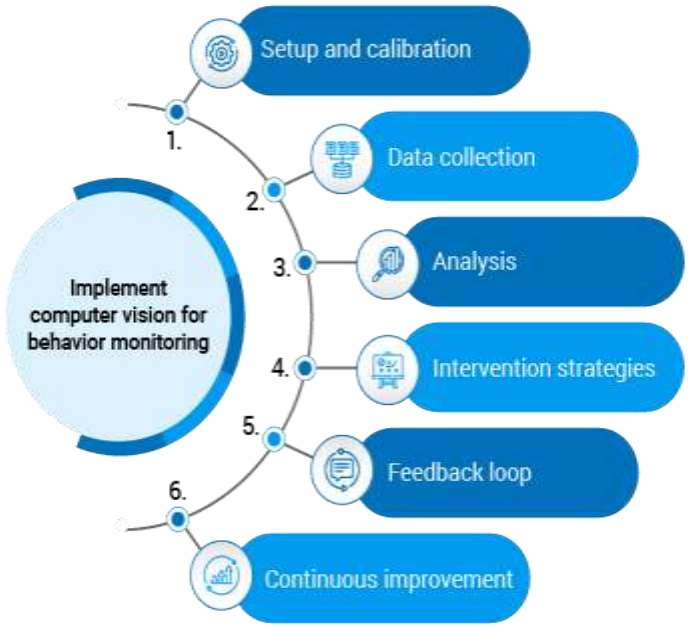
Application of VR-based Simulation



https://techxplore.com/news/2025-03-revolutionizing-explore-future-wearable-multi.html

Enhance haptic feedback for realistic tactile experiences.



https://www.softwebsolutions.com/resources/ai-driven-adaptive-learning.html

Integrate AI technology for adaptive learning to more dynamic virtual patients.

https://www.waterstons.com/insights/articles/meetings-your-own-metaverse-how-scan-room

Adopt the photogrammetry to enable more realistic 3D models for the immersive environment.

Acknowledgements




- The funding was from the Teaching Development and Language Enhancement Grant 2022-25.
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THANK YOU!

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