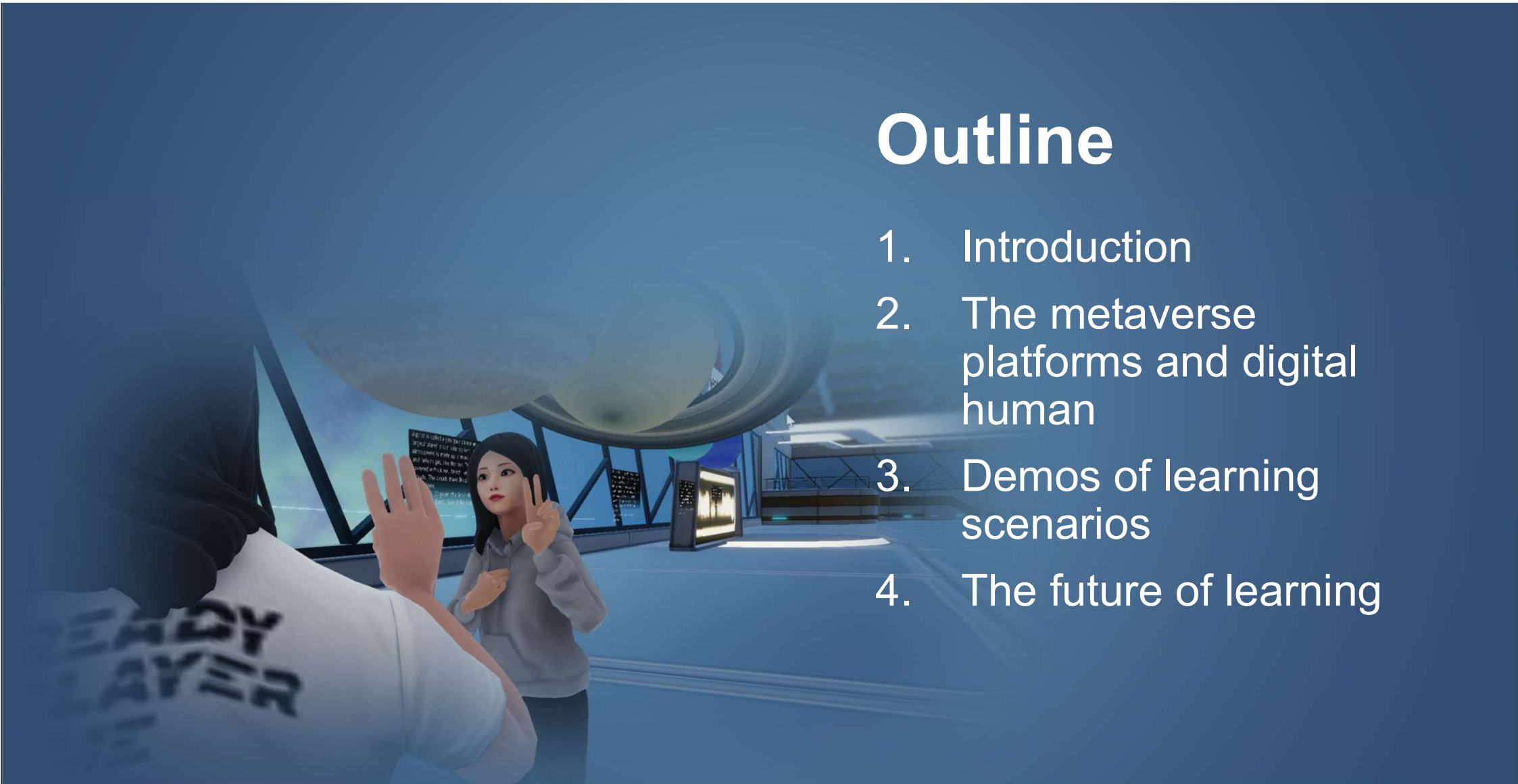


The Future of Learning: AI-Powered Interactive and Immersive Experiences

02 July 2025, Hong Kong

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*Department of Mathematics and Information Technology
The Education University of Hong Kong*





Outline

1. Introduction
2. The metaverse platforms and digital human
3. Demos of learning scenarios
4. The future of learning

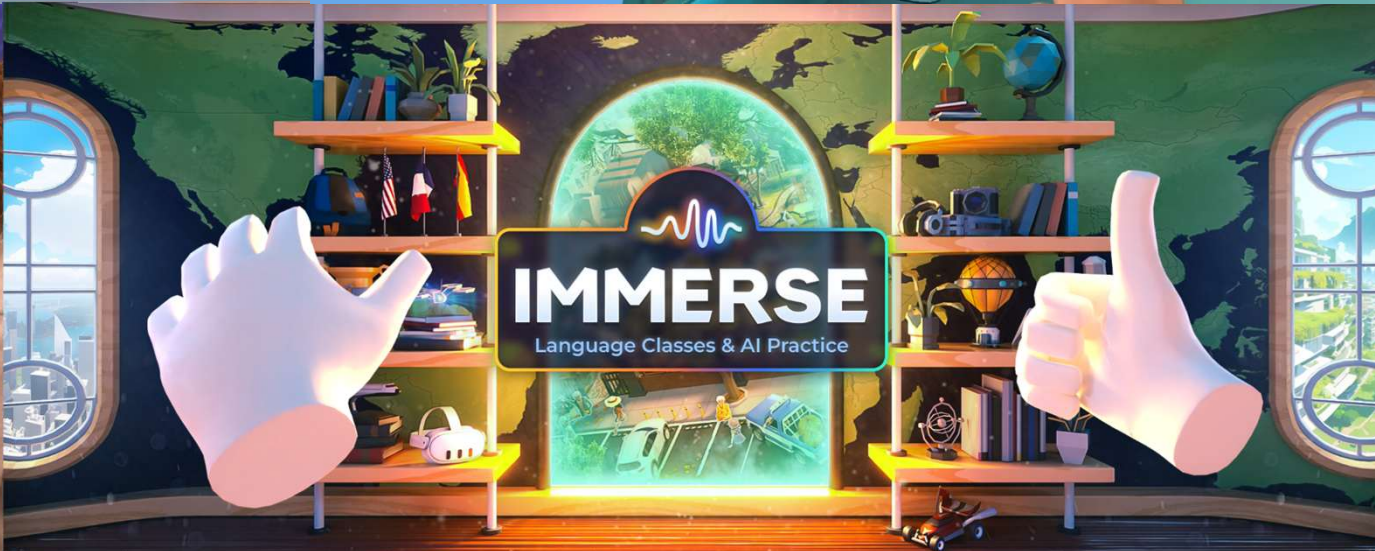
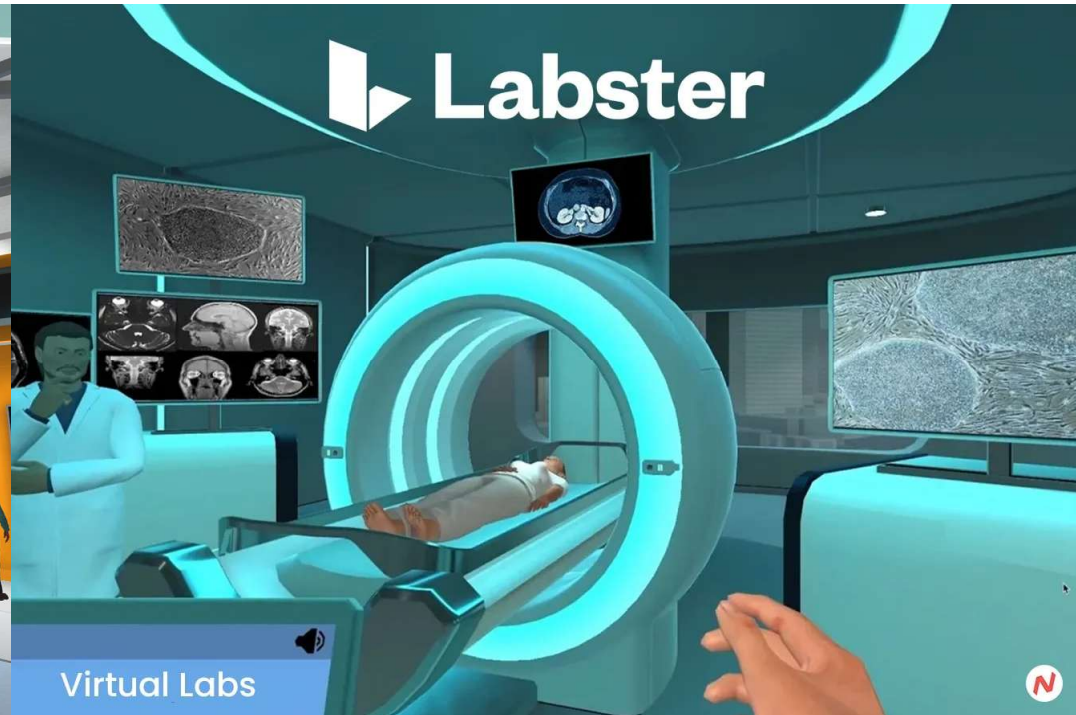


1. Introduction

1. Metaverse



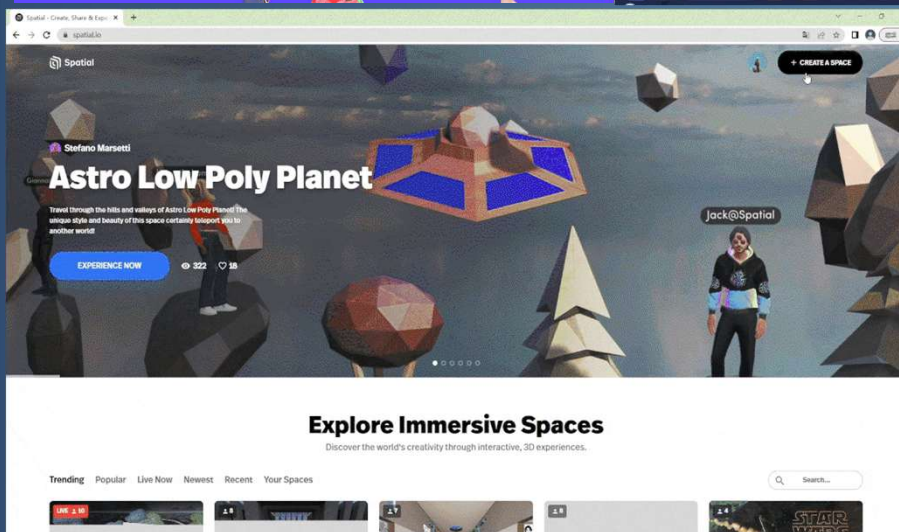
Metaverses





Issue 1: Excessive gamification

These platforms overemphasize on gaming which may distract students, affecting their learning outcomes.



Issue 2: Lack of instructional design

These platforms' lack of instructional design complicates course implementation and management for teachers, and can lead to students losing track of their learning goals; and the AI technology adopted is very basic.



Spatial Pricing

Monthly

Annually

Pro

\$
10

Per Space Per Month

Everything in Free plus

- ✓ Standard content limit (500 MB)
- ✓ 50 participants
- ✓ Premium templates
- ✓ Unlimited screen sharing
- ✓ Standard analytics
- ✓ Access to Discord Channel

Upgrade to Pro

Business

\$
100

Per Space Per Month

Everything in Pro plus

- ✓ Enhanced content limit (1000 MB)
- ✓ 1000 participants
- ✓ Auto full screen w/ no Spatial logo + ads
- ✓ Connect to External APIs
- ✓ Prioritized Support

Upgrade to Business

Issue 3 : Expensive fees

Popular metaverse platforms now charge fees and restrict data collection, hindering student usage data collection for learning analytics.

ENGAGE

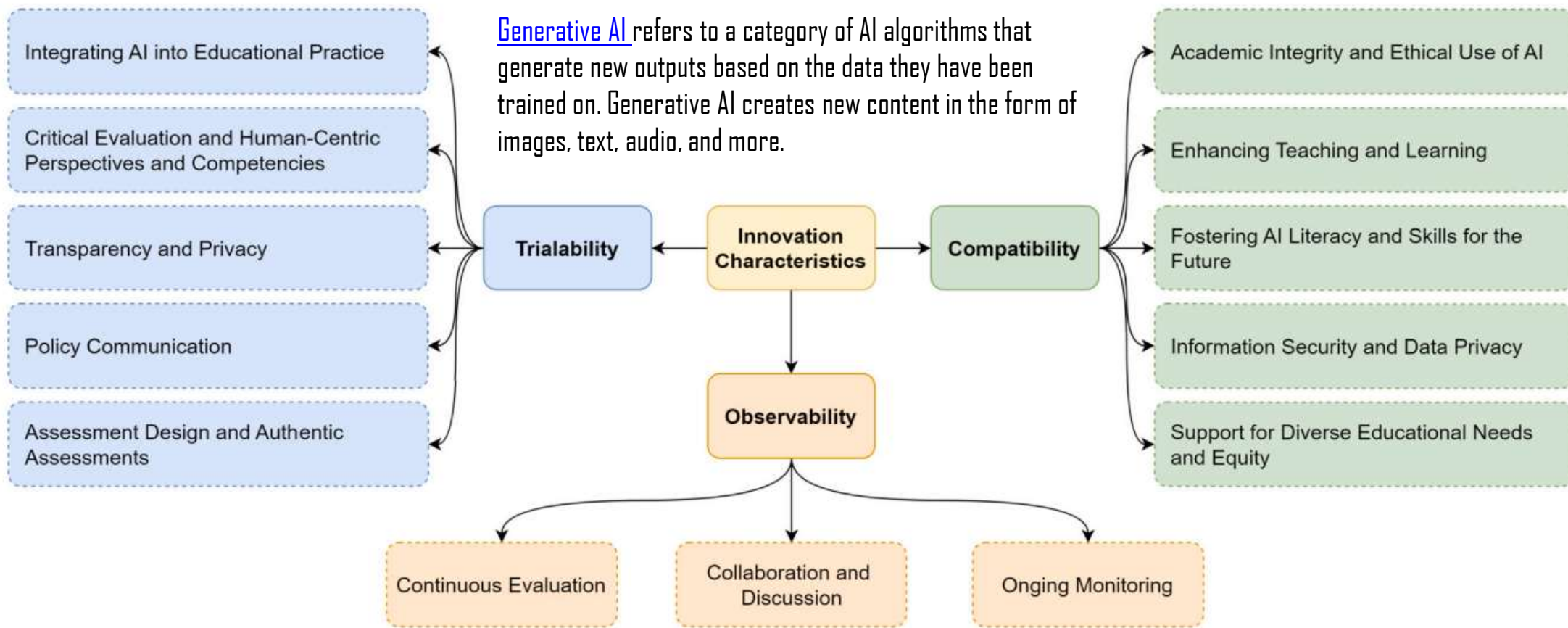
Education Enterprise AI Pricing About Us Support Download Login Investors Contact Us

Home » Pricing

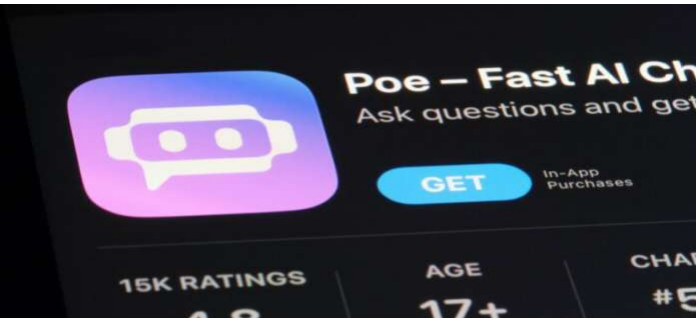
\$ USD € EUR

Plan	Price	Key Features
K12	\$130 / year	Full ENGAGE Feature Set, School of AI, AI Character Builder, BioLab, 4X Standalone Quest Titles, OptimaED Demo Content
University & Colleges	\$190 / year	Full ENGAGE Feature Set, AI Character Creator, BioLab, Create & Publish Content, Student Management Portal, SSO, 2FA, GDPR, ISO 27001
Enterprise & Training	Get In Touch	AI Development Tools, Large Scale Events, Training & Development, Onboarding, Colloboration & Meetings, Sales Training, Digital Twins

1.2 Generative AI



Key themes related the compatibility, trialability, observability of generative AI integration which emerged from the analysed universities' policies and guidelines (Jin et al., 2025)



- ChatGPT
- Text
- ChatGPT
 - Claude-3-Haiku
 - MythoMax-L2-13B
 - Mixtral-8x7B-Chat
 - Claude-instant
 - Claude-2 (Subscriber access)
 - Gemini-1.0-Pro
 - Claude-2-100k (Subscriber access)
 - Claude-instant-100k
 - GPT-4 (Subscriber access)
 - GPT-4-128k (Subscriber access)
 - Llama-2-70b
 - Claude-3-Sonnet
 - Claude-3-Opus (Subscriber access)
 - Claude-3-Haiku-200k
 - Claude-3-Sonnet-200k (Subscriber access)
 - Claude-3-Opus-200k (Subscriber access)

Issue 1 :
Expensive fees

Issue 2:
Focus on AI tool applications instead of customising them for instructional design and implementation

Issue 3:
Personal privacy issues

Issue 4:
Fairness and equity

Subscribe to Poe

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- ✓ Access exclusive bots, including o1-preview, Runway, and many more
- ✓ Unlock each bot's maximum input size and chat history

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1 million points/month	HK\$159.00/mo
2.5 million points/month	HK\$399.00/mo
5 million points/month	HK\$799.00/mo

What's included? >

By subscribing, you are enrolling in automatic payments of HK\$799.00/month (plus tax, where applicable). Cancel or manage your subscription through Stripe's customer portal from Settings. Subscriber Terms apply.

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<p>Team</p> <p>\$25 <small>港币/月</small></p> <p>利用安全的协作型工作空间来加强团队的工作</p> <p>添加 Team 工作空间</p> <ul style="list-style-type: none"> ✓ 获取比 Plus 套餐更高的 GPT-4 和 GPT-4o 消息限额，以及 DALL·E 等工具、网页浏览、数据分析和更多功能 ✓ 访问多个推理模型 (o3-mini, o3-mini-high 和 o1) ✓ 标准和高级语音模式 ✓ 创建 GPT 并与您的工作空间共享 ✓ 适用于工作空间管理的管理员控制台 ✓ 默认情况下，团队数据不会用于训练。了解更多信息 <p>适用于 2 名以上的用户，按年结算</p> <p>贵组织需要更多功能吗? 查看 ChatGPT Enterprise</p>
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Our solution for future education

To integrate generative AI into the metaverse





2. The metaverse platforms - Learningverse and LearnverseVR and digital human

2.1 Learningverse



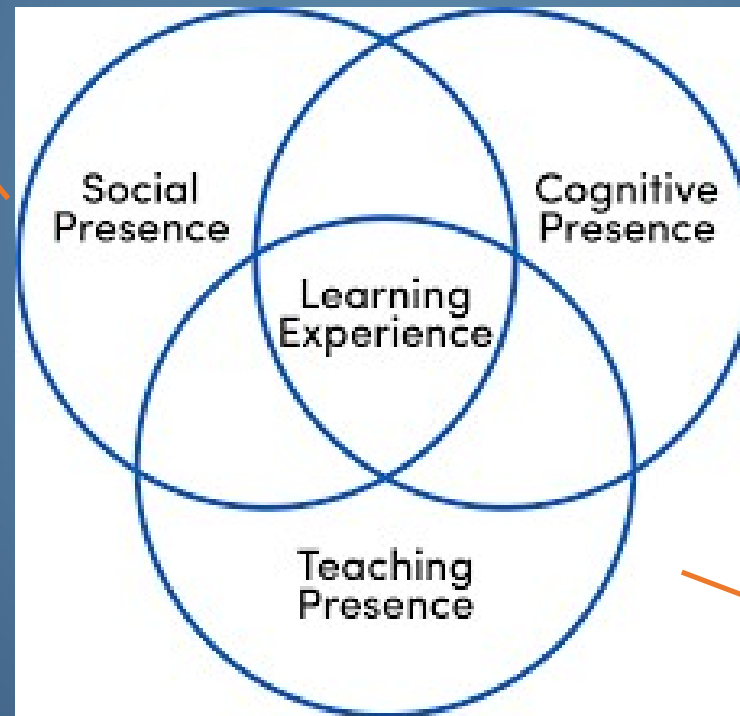
- Learningverse is a 3D metaverse platform, integrating a range of AI technologies for learners to conduct immersive and interactive learning activities in online or blended contexts.



Community of inquiry as a theoretical underpinning for setting up the platform



Song, Y., Cao, J., Wu, K., Yu, P. L. H., & Lee, J. C. K. (2023). Developing “Learningverse” - A 3-D Metaverse Platform to Support Teaching, Social, and Cognitive Presences. *IEEE Transactions on Learning Technologies*, 16(6), 1165-1178.
<https://doi.org/10.1109/TLT.2023.3276574>



(Garrison et al., 2010)



Specialised features for educational use

Grouping

Group A: Ava, Akira, Maggie, Bobby, Lucas
Group B: James, Emma, William, Olivia, Benjamin
Group C: Noah, Isabella, Samuel, Sophia, Alexander
Group D: Mia, Daniel, Charlotte, Michael, Amelia
Group E: [Color grid]
Group F: Abigail, Jacob, Emily, Ethan, Andrew
Group G: Christopher, Scarlett, Joshua, Grace, Ryan
Group H: Chloe, Nathan, Victoria, Jonathan, Lily
Group I: Anthony, Zoe, Tyler, Stella, Nicholas

Task controller

Open

Task navigation

Task 1
Task 2
Task 3
Task 4
Task 5
Map
Reaction
Chat
Cancel

Chat

student27 : I know nothing.
2024 3:26:22 PM

student23 : hi
1/16/2024 3:26:45 PM

student23 : good to see
1/16/2024 3:27:06 PM

Type here to chat

Whiteboard

Whiteboard content: Power plant image, Solar panels image, Text notes.

Chatboard

Chatboard content: Messages, Group icons (Group 1, Group 2, Group 3, Group 4).



WeCreate

Group 1

Group 2

Back

Task

- Task 1
- Task 2
- Task 3
- Task 4
- Task 5
- Cancel

Map

Reaction

Chat

Type here to chat

- Wave
- Clap
- Great
- Yeah
- Raising hand

- Happy
- Surprise
- Fear
- Confused
- Frustrated
- Bored

Rotate

Move

2.2 AI-driven digital human in the metaverse platform

- Human-like Interaction:
 - GenAI and LLMs represent cutting-edge technologies capable of mimicking human-like cognitive processes (Fan et al., 2023)
- Adaptive Learning:
 - AI can adapt instructional strategies based on real-time student responses and learning progress (Rane, Choudhary, & Rane, 2023)
- Personalised Feedback and Guidance:
 - Individualized Support (Lim et al., 2023)
 - Retrieval-Augmented Generation(RAG)



2D digital human



3D digital human

2D Digital human teacher



Publication and awards

This article has been accepted for publication in IEEE Transactions on Learning Technologies. This is the author's version which has not been fully edited and content may change prior to final publication. Citation information: DOI 10.1109/TLT.2023.3278574

DEVELOPING THE 'LEARNINGVERSE' – A 3D METAVERSE PLATFORM TO SUPPORT TEACHING, SOCIAL AND COGNITIVE PRESENCES 1

Developing 'Learningverse' – a 3D Metaverse Platform to Support Teaching, Social and Cognitive Presences

Yanjie Song*, Jiaxin Cao, Kaiyi Wu, Philip Leung Ho Yu and John Chi-Kin Lee

Abstract—Despite the metaverse having been increasingly designed, developed and applied to education, critical issues regarding the lack of truly immersive learning environments, custom tools, clear instructional design and inconvenience of using the platform and ethics and privacy concerns exist. This study aimed to design and develop a 3D metaverse platform—'Learningverse'—to support teaching, social and cognitive presences. Learningverse combines the key features of an immersive learning environment with (1) avatars that mirror the real users, (2) rich social interactions among avatars, (3) custom tools that allow users to construct or create their own artefacts and (4) a low threshold for users to join the metaverse on an ordinary computer with a webcam and without having to wear a VR headset. A usability testing was conducted to understand students' perceived teaching, social and cognitive presences in a scenario called 'Assembling the Solar System', which had an immersive learning instructional design embedded in Learningverse. The study involved 36 postgraduate students in a course on the innovative design of interactive learning environments. The results showed that students perceived the three presences positively. Discussions were made, followed by design principles for the educational metaverse based on this study. Finally, future work was explored.

Index Terms—Metaverse, Avatar, Learningverse, Immersive Learning, Teaching, social and cognitive presences

I. INTRODUCTION

THE metaverse is the next generation [1] and embodied version [2], [3] of the Internet. There is no unified definition for the metaverse. According to Xu [3], it is a network of digital worlds with a focus on social connections where people act as avatars to interact and collaborate with each other in real time supported by virtual reality (VR), augmented reality (AR), and the tactile Internet. The metaverse also generates a mirror system of the real world termed the 'digital twin world' [4], which allows each user to produce content and edit the world [5].

Early versions of the metaverse have been applied in games, movies, e-commerce, health care, and the like [6]. The metaverse has regained attention in various fields, including education, during the COVID-19 pandemic to cope with the sudden transition from face-to-face to online learning. Such transition has brought immediate challenges to both teachers and students [7], such as teachers' lack of experience and capacity to conduct intensive online lessons with innovative pedagogical strategies as well as students' social-emotional problems, which lead to poor learning performance due to the limitations of online activities [8], [9]. Mark Zuckerberg's announcement changing the name of Facebook to Meta and the rapid development of digital technologies have sped up the metaverse's popularity [1], [3]. Providing an immersive learning environment through the Community of Inquiry [10] to develop students' communication and collaborative problem-solving skills and enhance their well-being in online or blended learning environments has become essential [11]. However, the present design and implementation of the metaverse in education are still in its nascency.

Although some metaverse platforms, such as 3D virtual worlds, provide users with immersive gaming experiences for educational use, social interactions and collaboration for pedagogical purposes are scant. In addition, many platforms require high-performance devices to render 3D graphics, or external or wearable devices (e.g. sensors, headsets, and controllers) for better immersive experiences and interaction, which may lead to many restrictions for daily use [12]. For example, Meta Horizon Worlds just released a new headset—Quest Pro VR—in October 2022 at the cost of USD 1499.99 [13]. The high cost of the headset raises the threshold for adopting the platform as the educational metaverse. Furthermore, few metaverse platforms can truly provide a digital twin world in which avatars can mirror real users' poses, fingers and facial expression tracking. Last but not least, most of the current 3D virtual worlds do not allow users to edit content and create learning spaces to cater for their own needs [14].

Against this background, our research team has developed Learningverse, a 3D metaverse platform with the following features: (1) allowing users to act as avatars that mirror the real users, (2) enabling social interactions among avatars to interact and collaborate with each other and virtual objects in an

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Ethical approval of this study is granted by the Human Research Ethics Committee (HRETC) of The Education University of Hong Kong.
Y. Song, J. Cao, K. Wu and P. L. H. Yu are with the Department of Mathematics and Information Technology at The Education University of Hong Kong, Hong Kong SAR, China (e-mail: ysong@eduhk.hk, jcao@eduhk.hk, kw@eduhk.hk, pily@eduhk.hk).
J. C.-K. Lee is with the Department of Curriculum and Instruction at The Education University of Hong Kong, Hong Kong SAR, China (e-mail: jklee@eduhk.hk).

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“Learningverse” won “Bronze Medal” at the 48th International Exhibition of Inventions in Geneva, Switzerland 2023; and “Silver Medal” and “Special Award” at The International Invention Innovation Competition in Canada (iCAN) 2023

Song, Y., Cao, J., Wu, K., Yu, P. L. H., & Lee, J. C. K. (2023). Developing “Learningverse”—A 3-D Metaverse Platform to Support Teaching, Social, and Cognitive Presences. *IEEE Transactions on Learning Technologies*, 16(6), 1165-1178.

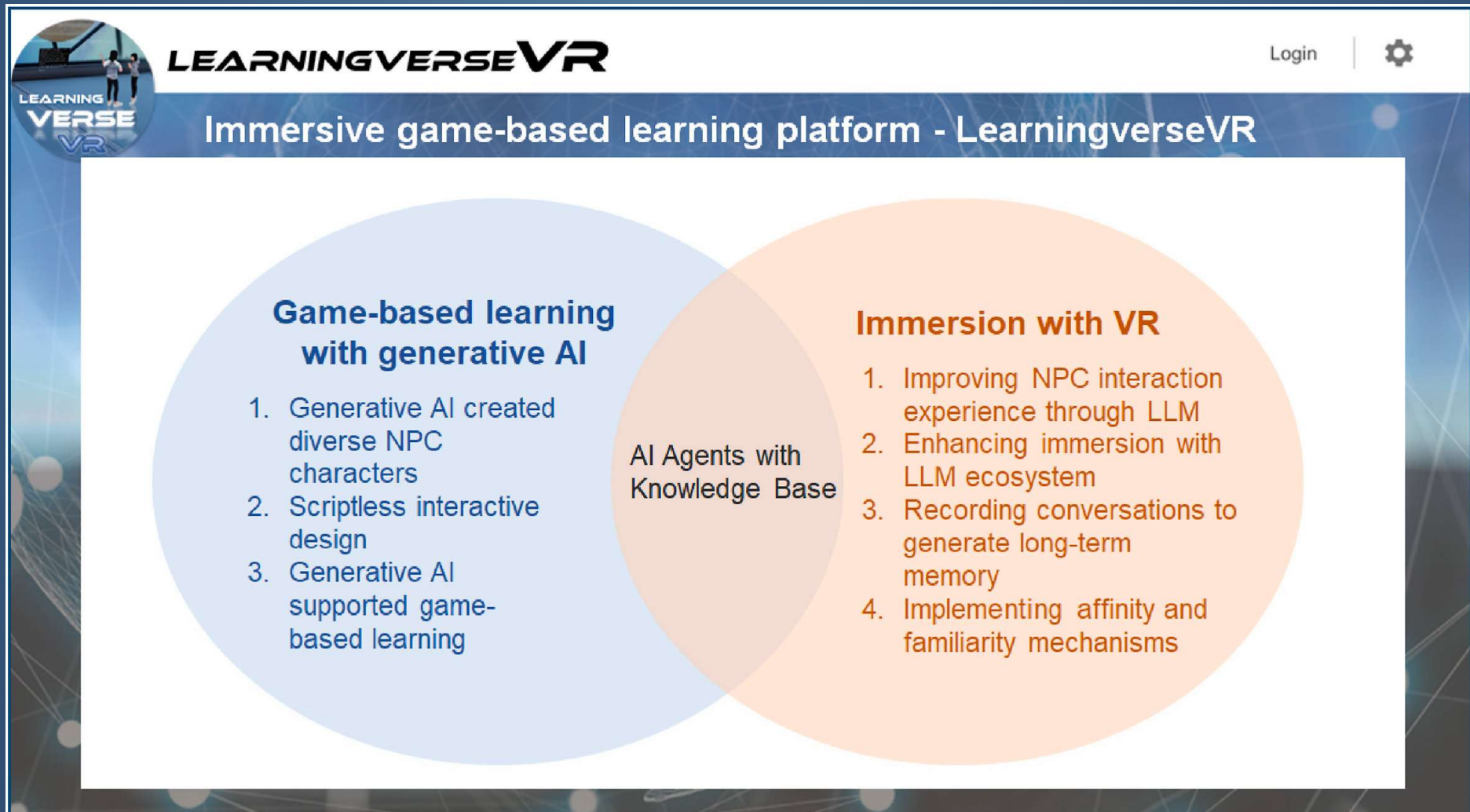
2.3 LearningverseVR

An immersive game-based learning platform based on Learningverse that uses generative AI and virtual reality to improve learners' immersive and interactive experiences and offer novel views on digital game-based learning.

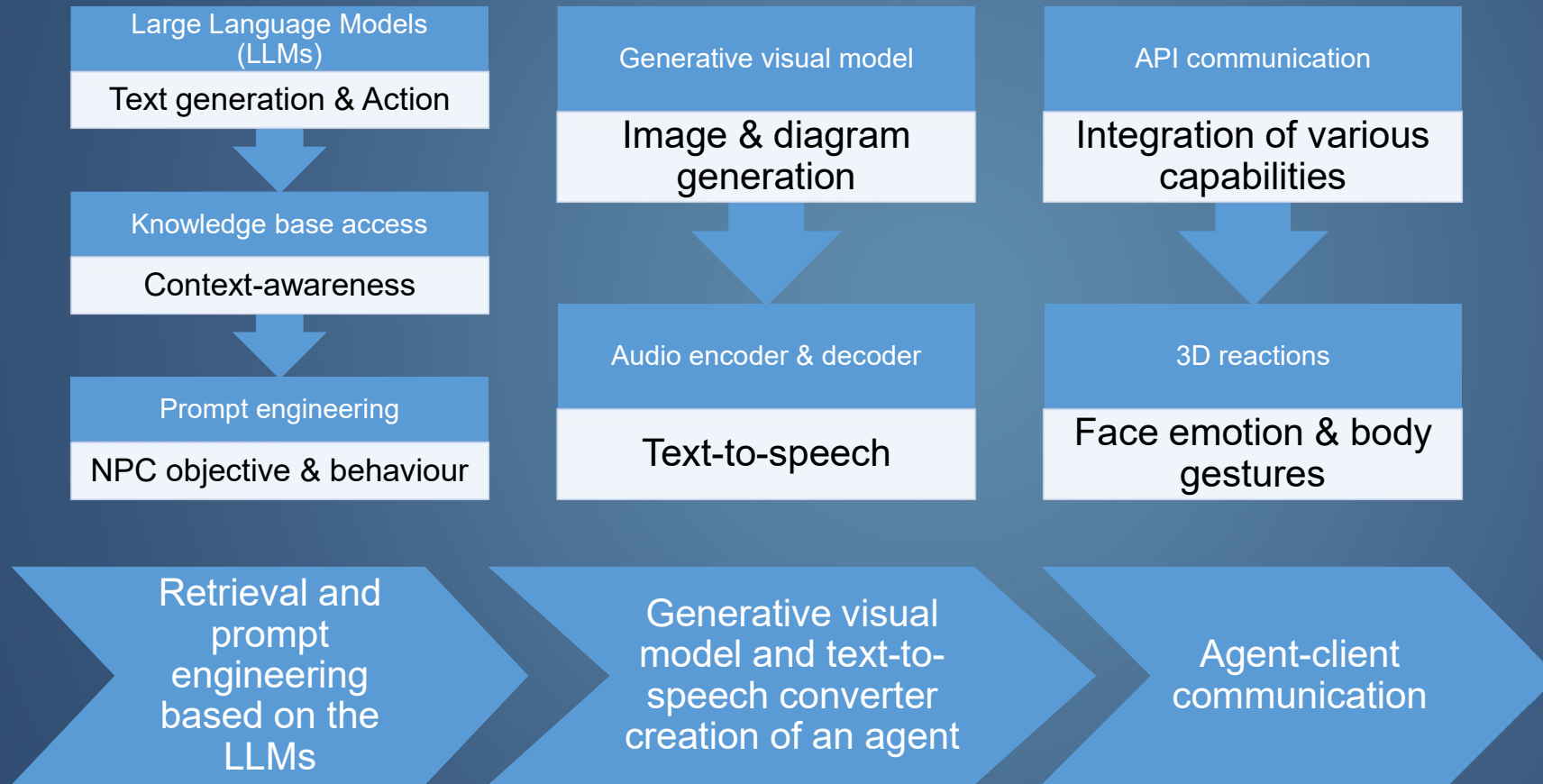


Song, Y., Wu, K., & Ding, J. (2024). Developing an immersive game-based learning platform with generative artificial intelligence and virtual reality technologies—“LearningverseVR”. *Computers & Education: X Reality*, 4, 100069.

Overview of LearningverseVR design framework



Design of generative AI-driven NPCs /digital humans

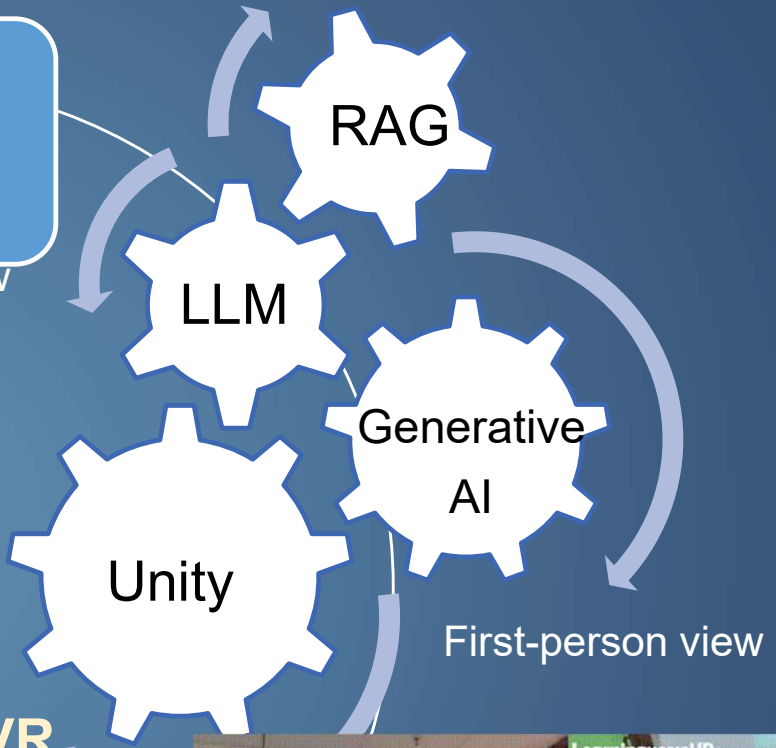


Multi-agent ecosystem

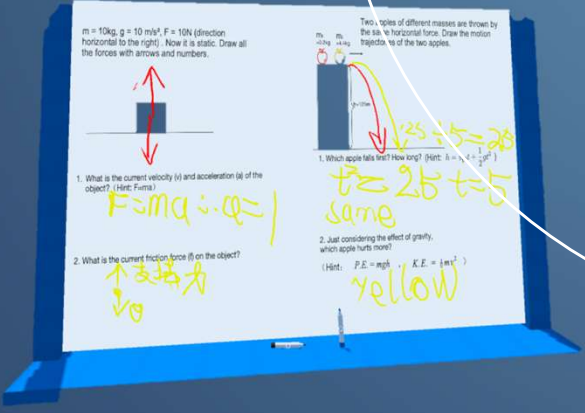


AI-driven NPC
Agent workflow

Game-based learning interaction



LearningverseVR Multi-Agent ecosystem



AI feedback



Multi-Agent ecosystem

Multi-agent ecosystem is an autonomous interactive system where multiple AI agents (including digital humans, objects, etc.) can communicate and share information with each other. Each agent possesses its own cognitive abilities and decision-making logic, enabling unscripted natural dialogue and behaviour simulation to create a more authentic and dynamic interactive experience.

Features	Multi-Agent ecosystem	Traditional ecosystem
Unscripted dialogues	✓	✗
Autonomous decision making	✓	✗
AI objects	✓	✗
AI plants	✓	✗
Dynamic behavior simulation	✓	✗
Inter-agent communication	✓	✗
Information sharing	✓	✗
Preset script interactions	✗	✓



3. Demos of learning scenarios



3.1 Collaborative inquiry-based learning in Learningverse on the topic of “Double Ninth Festival (重陽節)”

Collaborative inquiry-based learning in Learningverse on the topic of “Double Ninth Festival (重陽節)”

WeEngage



Task 1 WeEngage: Students work in groups to make pre-reflections on what they know about Double Ninth Festival on the Whiteboard.

WeExplore



Task 2 WeExplore: Students work in groups to explore the Learningverse space based on A Dream of Red Mansions, exploring and experiencing the ancient Double Ninth Festival folk customs

WeAnalyse



Task 3 WeAnalyse: Students analyse the Intangible Cultural Heritage knowledge and information about Double Ninth Festival.

WeReflect



Task 5 WeReflect: Quiz and post reflection on Whiteboard

WeExplain



Task 4 WeExplain: Students perform in groups to show their understanding of the festival (both the key concepts learning in the novel and customs in real life).

Learning Chinese culture on “Double Ninth Festival (重陽節)” supported by a digital human teacher

Simulating human thinking and behaviour

Interactive learning experiences

Personalised learning pathways

Real-time problem solving

AI-scaffolded learning



Digital human teacher

(Drigas et al., 2023; Fink et al., 2024; Johri et al., 2023; Wang et al., 2023)

An empirical study - “The Double-Ninth Festival” in the metaverse platform - Learningverse

Research question

What were the interactions patterns between students in the experimental group scaffolded by the digital human teacher and students in the control group scaffolded by a real teacher?

Participants

Involving two classes of 85 Grade 6 students

- 41 students as the experimental group
 - 44 students as the control group
- Lasted three weeks



Experimental group: 6 groups with 41 students
Control group: 7 groups with 44 students

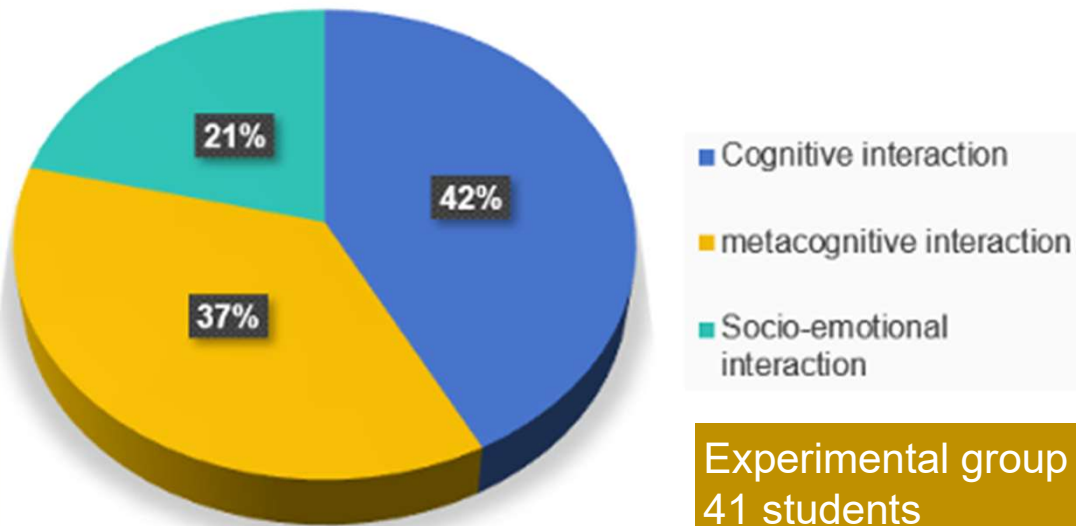
Chinese culture (Double Ninth Festival 重陽節)

The image shows a VR application interface for a lesson on the Double Ninth Festival. The main view is a 3D virtual environment with a central path leading to a building entrance. A character named 'Lucas' is visible in the distance. The interface includes several UI elements:

- Top Left:** A small profile picture of a man.
- Top Right:** A 'Back' button with a left-pointing arrow.
- Left Sidebar:** A vertical menu with icons for 'Task', 'Map', 'Reaction', and 'Chat'.
- Bottom Left:** A chat window showing a message from 'wSAa' at 2:38:13 PM. Below it is a 'Start a chat' button with a microphone icon.
- Bottom Center:** A row of gesture icons: Wave, Clap, Great, Yeah, and Raising hand.
- Bottom Right:** A row of emotion icons: Happy, Surprise, Fear, Confused, Frustrated, and Bored.
- Bottom Right (Control Pad):** A circular navigation pad with 'Rotate' buttons and directional arrows.

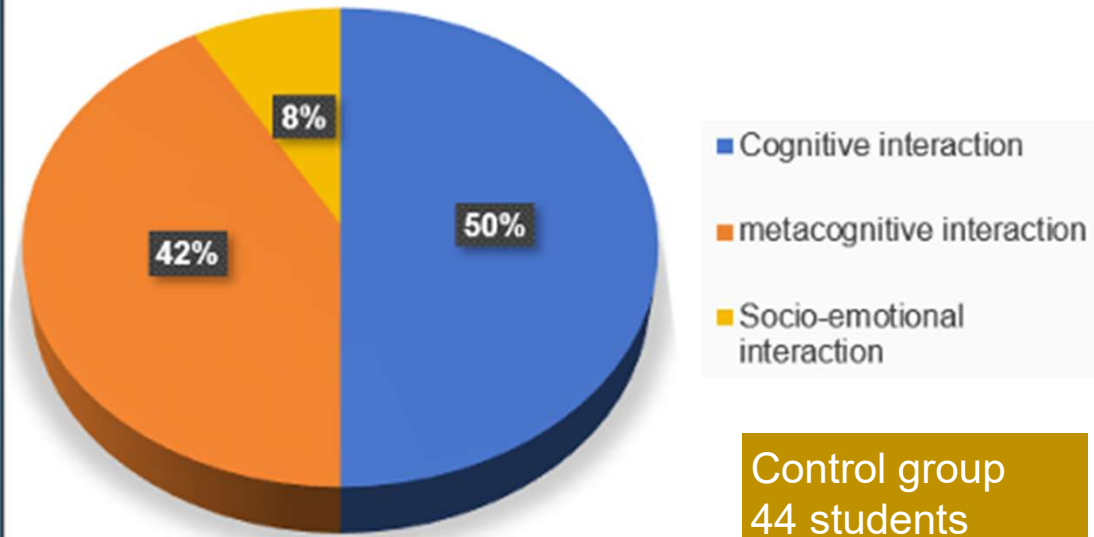
Results of interaction patterns between experimental and control groups

Number of interactions with the digital human teacher



This Figure shows that in the experimental group, cognitive, metacognitive and socio-emotional interactions accounted for 42% (66 interactions), 37% (57 interactions) and 21% (33 interactions) between the digital human teacher and students respectively (156 interactions in total).

Number of interactions with the real teacher



This Figure shows that in the control group, cognitive, metacognitive and socio-emotional interactions accounted for 50% (6 interactions), 42% (5 interactions) and 8% (1 interaction) between the real teacher and students respectively (12 interactions in total).



3.2 Collaborative Science inquiry-based learning on the topic of "Green energy" in Learningverse

3.2 Collaborative Science inquiry-based learning on the topic of "Green energy" in Learningverse



Task 1 WeEngage: Students interact with a steam engine model in the Learningverse, sharing their prior knowledge about energy.



Task 2 WeExplore: Students design power supply solutions for a virtual town using various energy sources and converters.



Task 3 WeAnalyse: Students analyse their power supply solutions based on cost, efficiency, sufficiency, and pollution.



Task 5 WeShare: Students share their power supply solutions with peers.



Task 4 WeCreate: Students create their power supply solutions using interactive features in Learningverse.



LEARNING
VERSE

LEARNINGVERSE



3.3. STEM in LearningverseVR– “Newton’s Laws of Motion”

3.3 STEM in LearningverseVR– “Newton’s Laws of Motion”

Topic

Magical VR adventure: Newton’s laws of motion through apples and archery


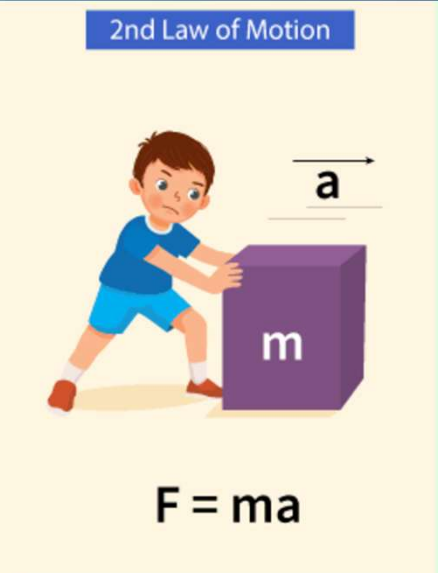

Target students

Grade Level: Hong Kong Secondary 4 Students (Approximately 15-16 years old)

Prior knowledge

- Basic understanding of gravity and its effects
- Familiarity with concepts of mass and weight

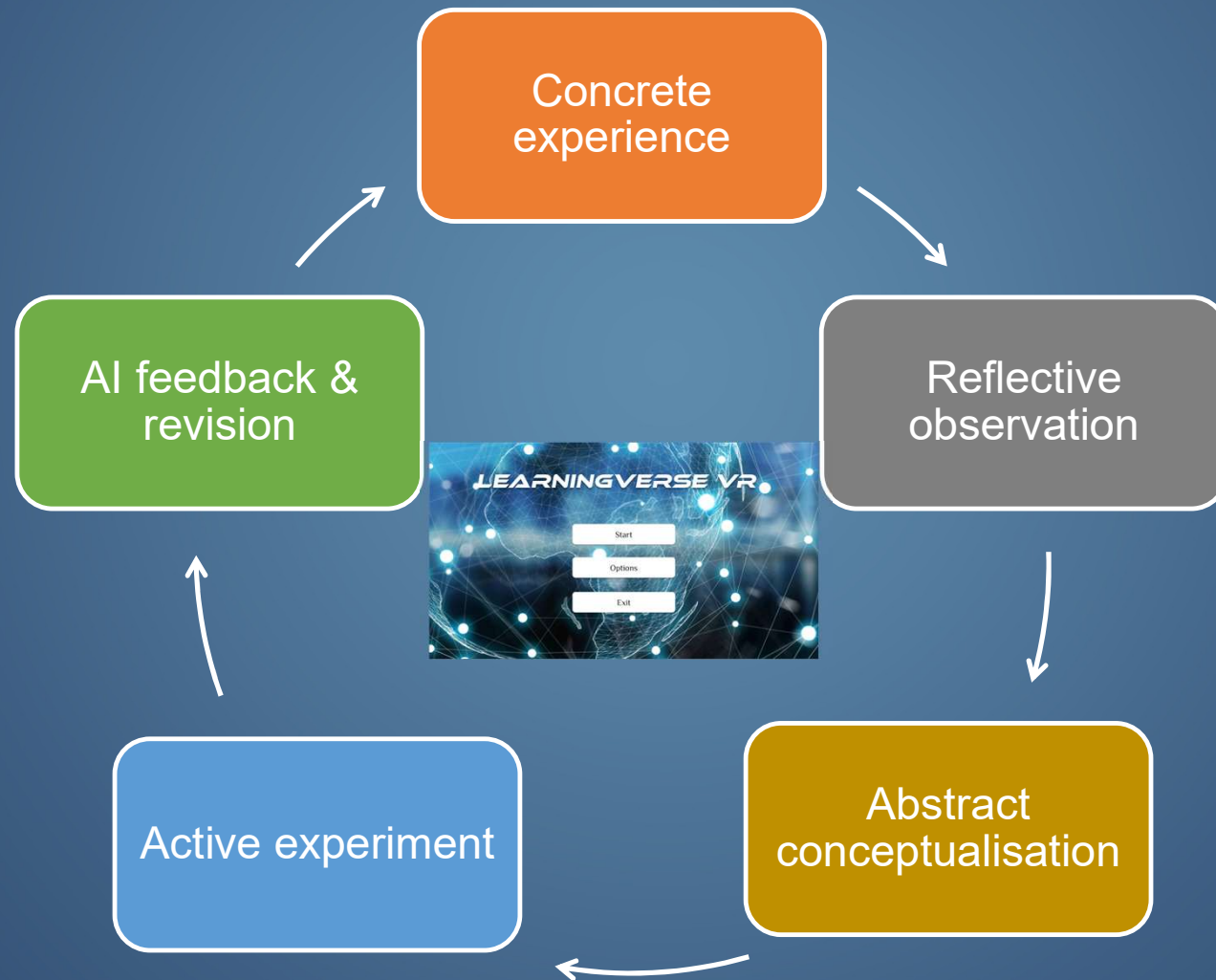
Learning objectives

1st Law of Motion	2nd Law of Motion	3rd Law of Motion
		
<p>Body remains in a state of rest or uniform motion unless acted upon by a net external force</p>	<p>$F = ma$</p> <p>The amount of acceleration of a body is proportional to the acting force & inversely proportional to the mass of the body</p>	<p>$F_{AB} = -F_{BA}$</p> <p>For every action there is an equal but opposite reaction. If an object A exerts a force on object B, then object B will exert an equal but opposite force on object A.</p>

Adapte from: EDB Science Education Curriculum Documents

[https://www.edb.gov.hk/attachment/en/curriculum-development/kla/science-edu/Science\(S1-3\)_supp_e_2017.pdf](https://www.edb.gov.hk/attachment/en/curriculum-development/kla/science-edu/Science(S1-3)_supp_e_2017.pdf)

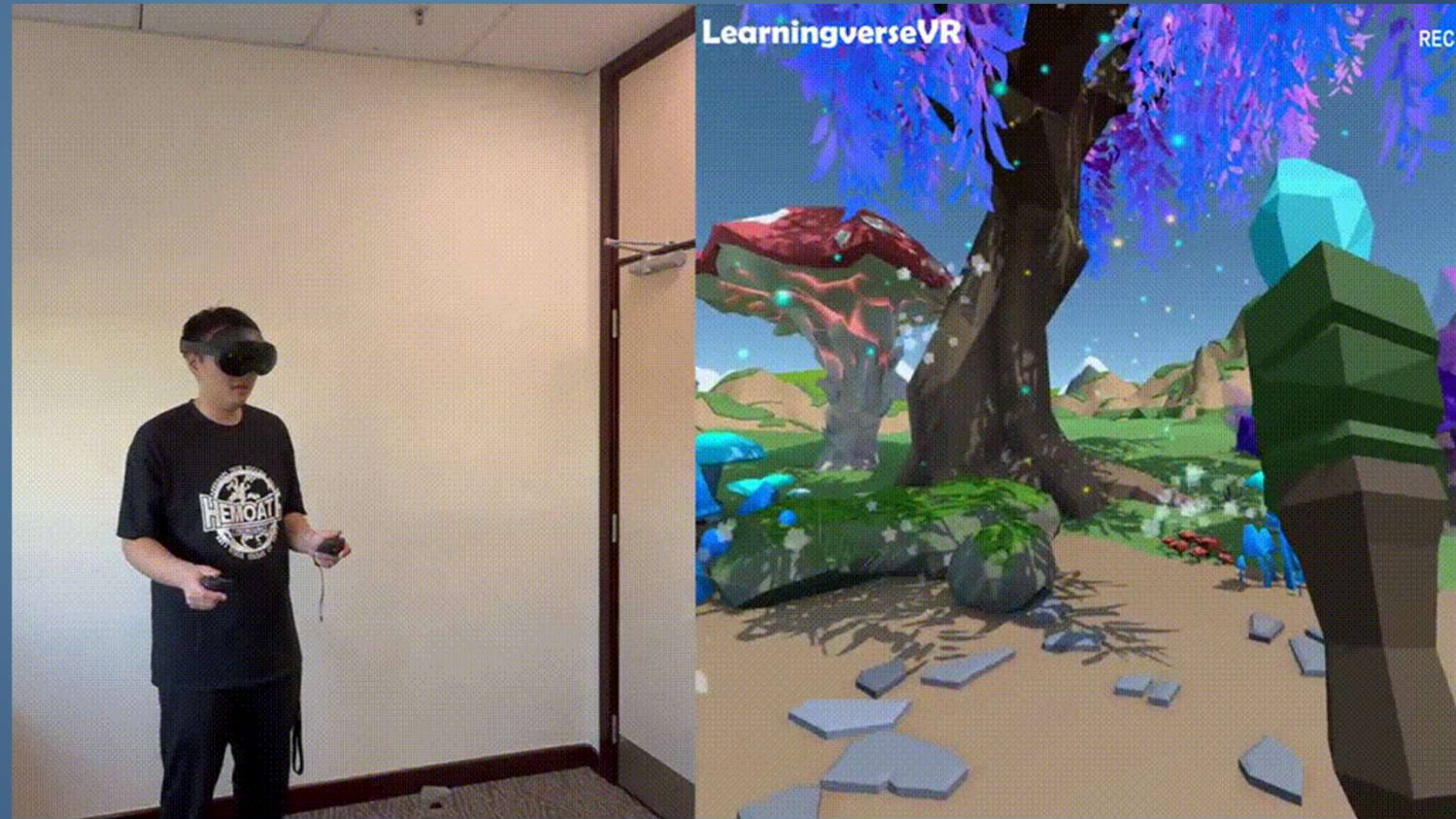
Research design Immersive game-based experiential learning [(adaptive from experiential learning model (Kolb, 1984))]



LearningverseVR supported immersive game-based experiential learning

1) Concrete experience:

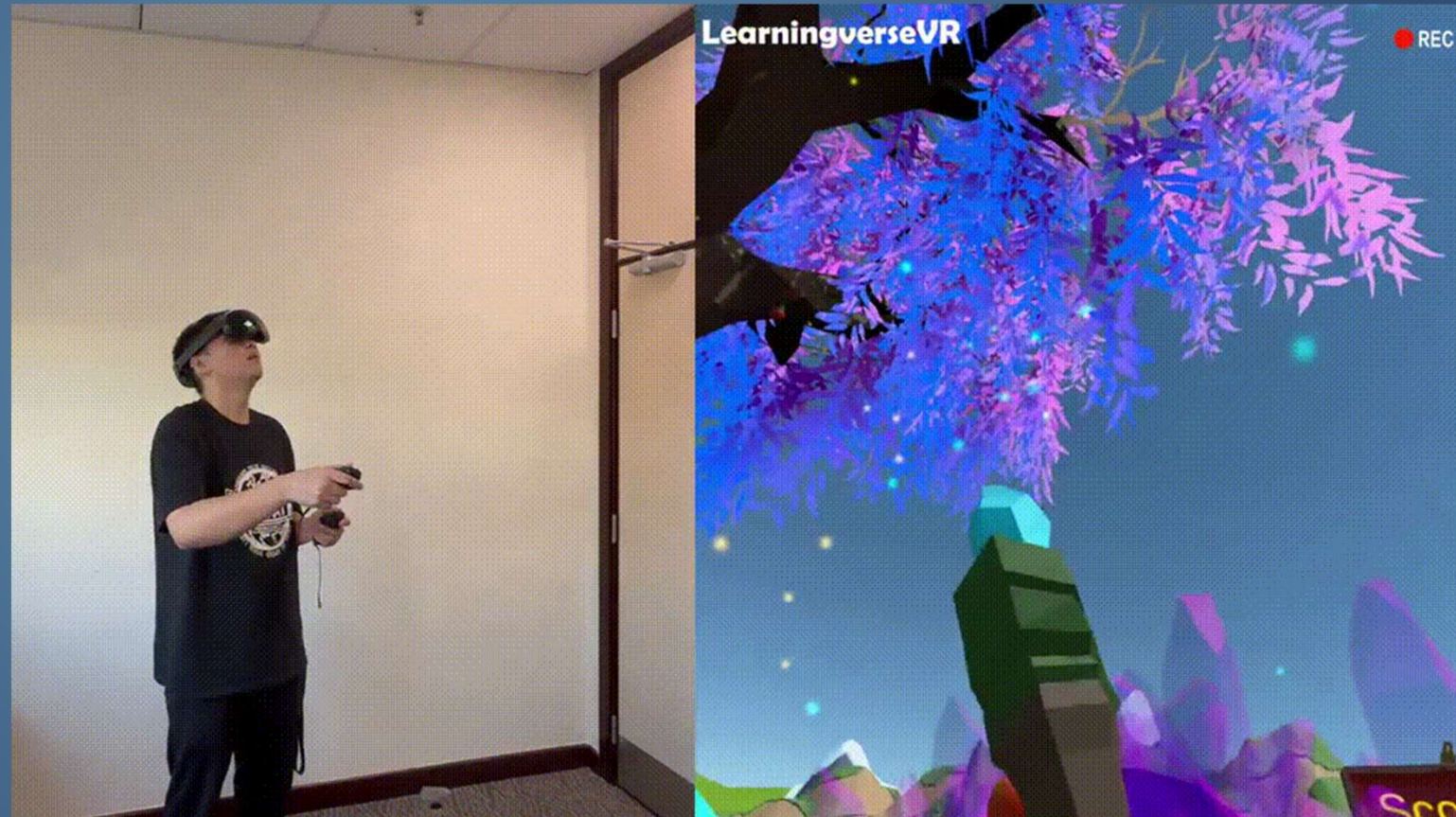
Students engage in hands-on activities like catching falling apples, providing direct experience with the concepts of gravity and mass.



LearningverseVR supported immersive game-based experiential learning

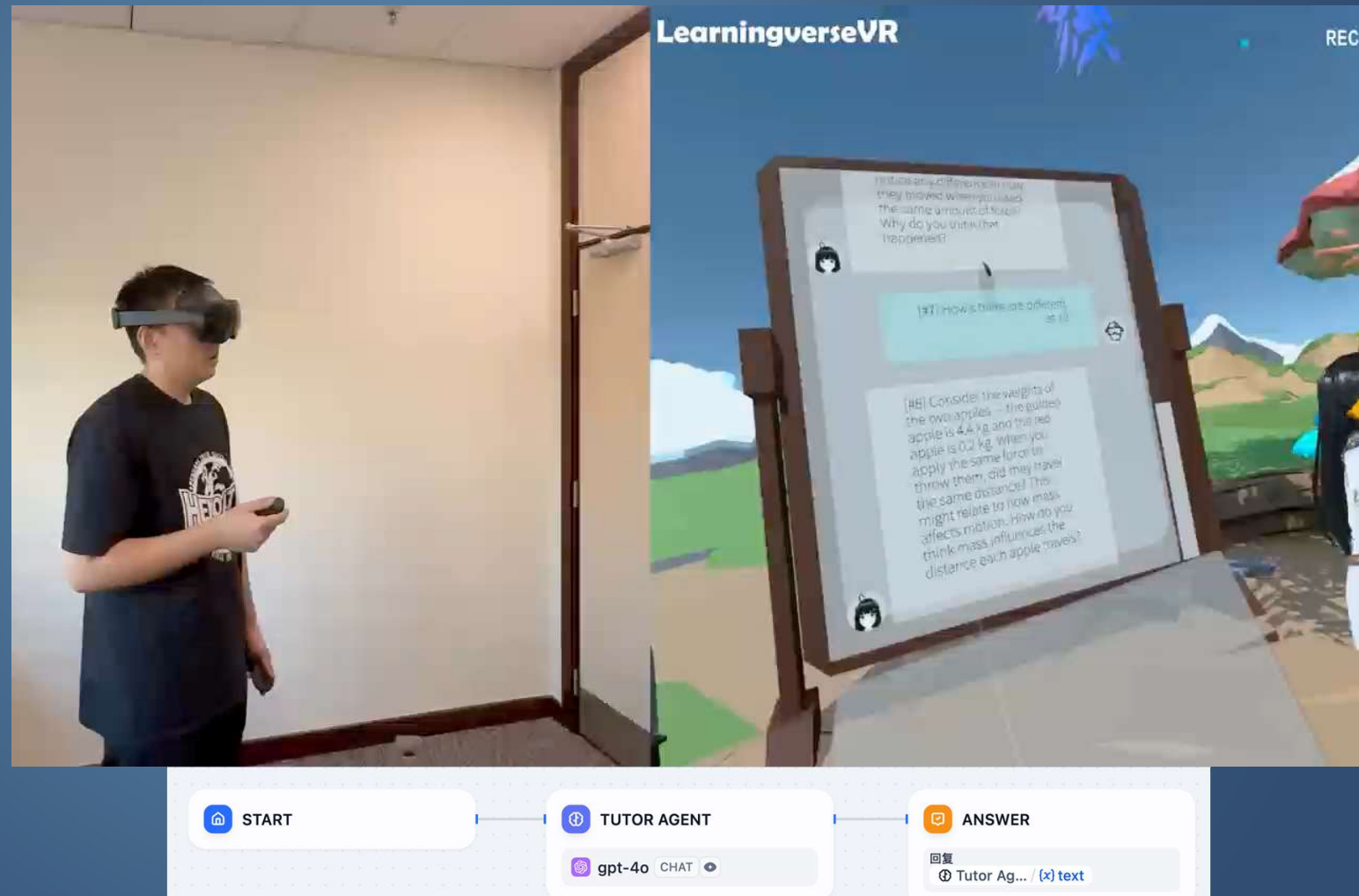
2) Reflective observation:

Tasks like throwing apples into storage areas help students observe the effects of force and mass on motion.



LearningverseVR supported immersive game-based experiential learning

3) Abstract conceptualization: The AI-driven NPC guides students in understanding of Newton's laws and related equations.

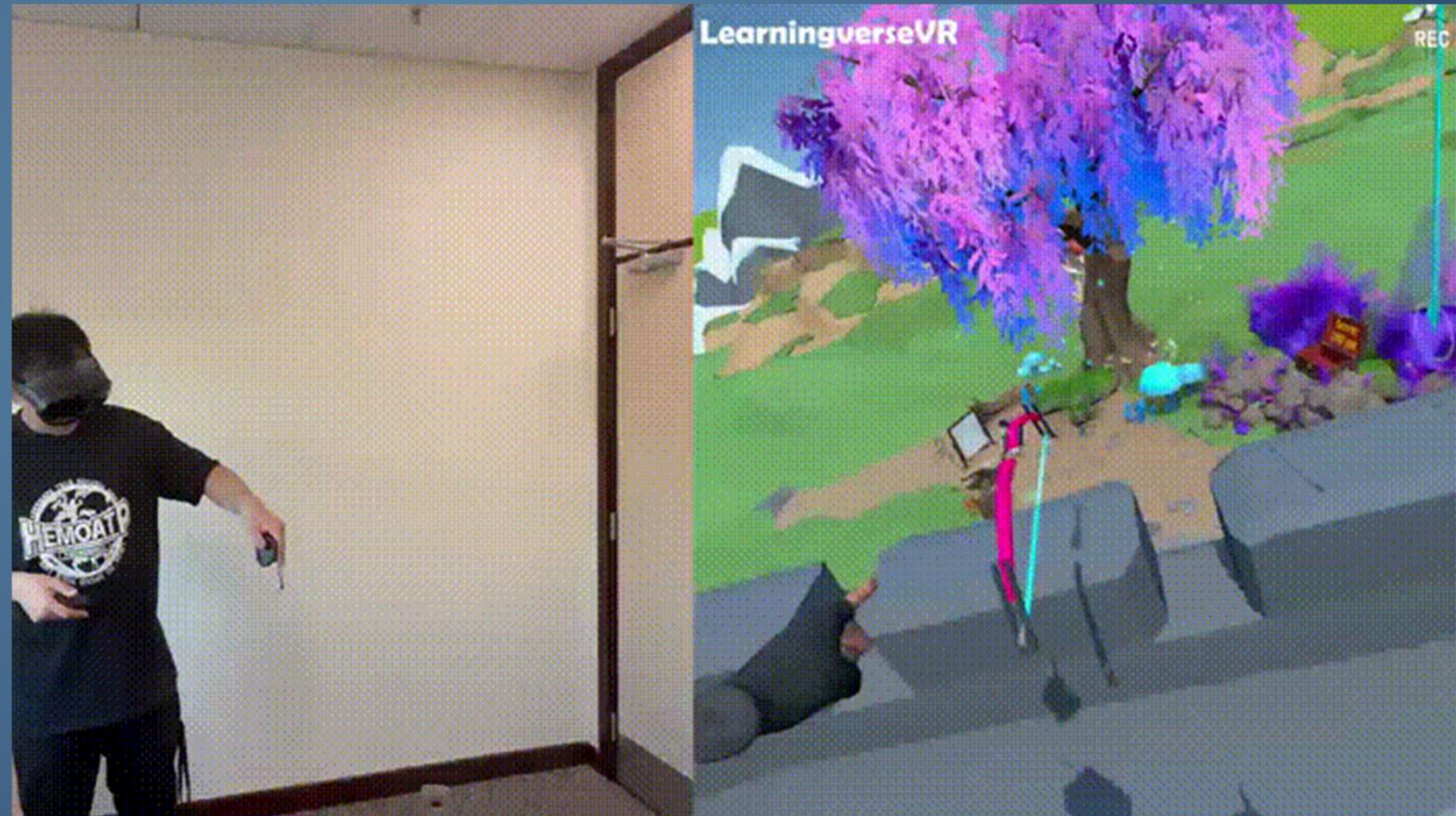


LearningverseVR supported immersive game-based experiential learning

4) Active

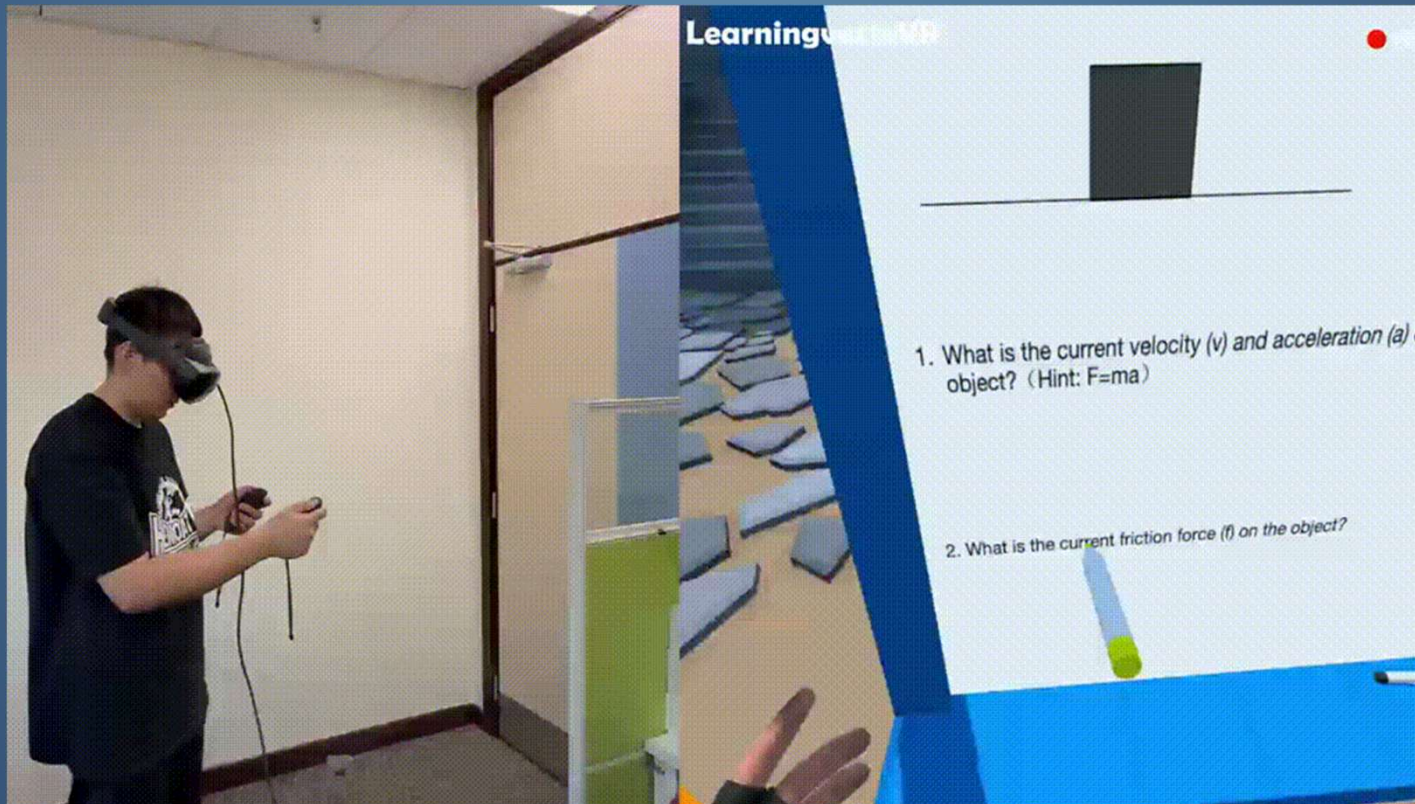
experimentation:

In the Archery challenge arena, students apply learned concepts to new challenges, experimenting with and observing arrows with different mass and weight (e.g. ice and wood), which results in different trails and air/flying speed.



LearningverseVR supported immersive game-based experiential learning

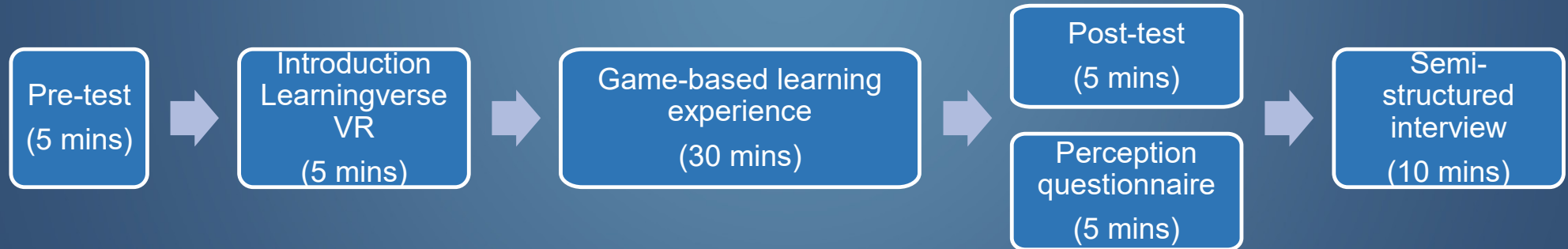
5) Immersive learning and AI feedback: Drawing and writing equations on a virtual whiteboard with AI feedback.



A pilot study:

RQ1: What is the impact of LearningverseVR on students' understanding of Newton's Law of Motion?

RQ2: What are students' perceptions of the usability and effectiveness of LearningverseVR as a game-based learning platform?



Research procedure

Data collection

Both quantitative data and qualitative data.
Participants: 27 students (N=27)

RQ1: What is the impact of LearningverseVR on students' understanding of Newton's Law of Motion?

RQ2: What are students' perceptions of the usability and effectiveness of LearningverseVR as a game-based learning platform?

	RQ 1	RQ 2
Pre-test and post-test	√	
Perception questionnaire		√
Dialog data	√	
Whiteboard data	√	
Interview data	√	√

Results: Conceptual understanding

RQ1:

Students demonstrated improved conceptual understanding of Newton's Law of Motion.

Descriptive Statistics	N	Minimum	Maximum	Mean	Std. Deviation	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
preScore	27	2.00	5.00	3.8000	.73485	1.64317
postScore	27	6.00	9.00	7.9000	.37417	.83666
Valid N (listwise)	27					

Descriptive Statistics from pre-test and post test

Results: Perceptions

RQ2:

What are students' perceptions of the usability and effectiveness of LearningverseVR as a game-based learning platform?

1	I think learning on a VR platform is detrimental to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I think learning with a VR platform must be approached with caution.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I think using a VR platform involves risks.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	I believe the VR platform is designed to support my best academic performance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I believe using a VR platform can help me learn.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	I believe the VR platform meets my academic needs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	I think the VR platform is capable of introducing knowledge and inspiring thinking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	I think the VR platform introduces course content and inspires thinking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	I believe the VR platform has all the functionalities I expect.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	I think I can fully rely on the VR platform.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	I think I can always trust the VR platform to help me better understand Newtonian mechanics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I believe the VR platform provides reliable information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No.	Item	1	2	3	4	5
		Strongly disagree	disagree	neutral	agree	strongly agree
1	Do you think the topics covered in learningverseVR are very complex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Do you think learningverseVR covers terms considered very complex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Do you think learningverseVR covers concepts and definitions that are very complex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Do you think the instructions and explanations provided during learningverseVR sessions are very unclear?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Do you think the instructions and explanations provided during learningverseVR sessions are filled with unclear language?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Do you think the guidance and explanations provided during learningverseVR sessions are very ineffective for learning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Do you think the interactive technologies used in learningverseVR are very unclear?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Do you think the interactive technologies used in learningverseVR are very inefficient?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Do you think the interactive technologies used in learningverseVR make learning more difficult?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Do you think the interactive technologies used in learningverseVR are difficult to master?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Do you think the design elements in learningverseVR make learning very unclear?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Do you think the learningverseVR environment is very inefficient?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Do you think the learningverseVR environment is filled with irrelevant content?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Do you think it is difficult to find relevant learning information in the learningverseVR environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Do you think learningverseVR has truly enhanced your understanding of the topic of Newtonian mechanics?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Do you think learningverseVR has truly enhanced your understanding of Newtonian mechanics concepts and definitions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Do you think learningverseVR has truly enhanced your understanding of the Newtonian mechanics learning process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Adaptive from Technology acceptance model(TAM)

Results: Perceptions

RQ2:

Participants positively perceived learningverse VR's usability and effectiveness, highlighting deeper knowledge understanding and enhanced learning interest.

However some raised concerns about excessive distraction, VR related discomfort, and limited course coverage.

Construct	Mean	Std. Deviation	Min	Max	Cronbach's α
Perceived Usefulness (PU)	3.88	0.81	2	5	0.89
Perceived Ease of Use (PEOU)	4.73	1.25	2	5	0.91
Hedonic Motivation (HT)	3.83	0.83	2	5	0.87
System Quality (SQ)	4.42	0.69	3	5	0.93
Behavioral Intention (BI)	4.25	0.72	2	5	0.90

Adaptive from Technology acceptance model(TAM)

Descriptive Statistics of TAM Constructs

Scale: 1 = Strongly Disagree, 5 = Strongly Agree

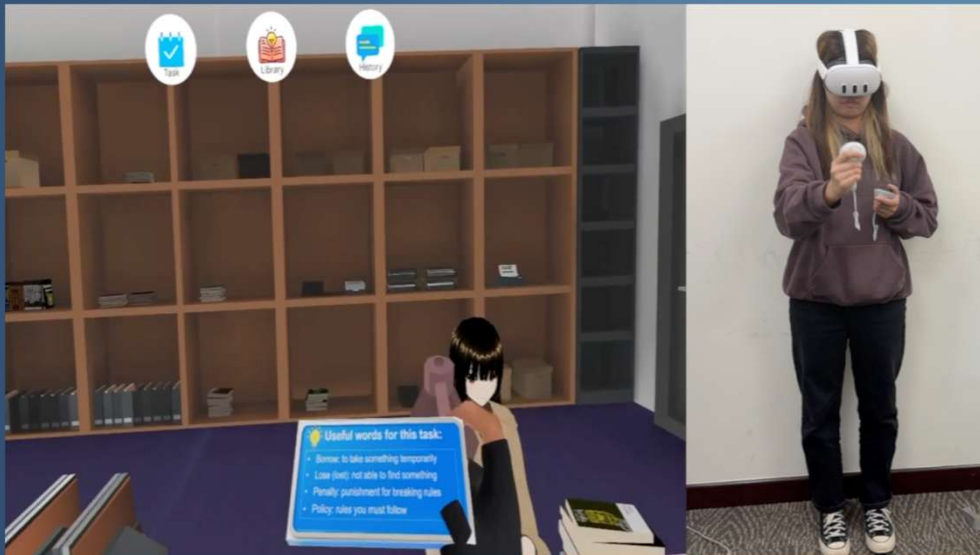
A virtual reality environment for learning English. The scene is a futuristic, blue-toned space station or planetarium. In the background, a large window displays a solar system with planets labeled: Jupiter, Saturn, Uranus, and Neptune. A red question mark is visible above the window. In the foreground, a large, detailed model of Jupiter is on a circular platform. A sign in the center reads "Task 3: Thinking". The floor is a grid of blue squares with glowing lines.

3.4 A pilot study on improving oral English in LearningverseVR with digital humans/intelligent agents

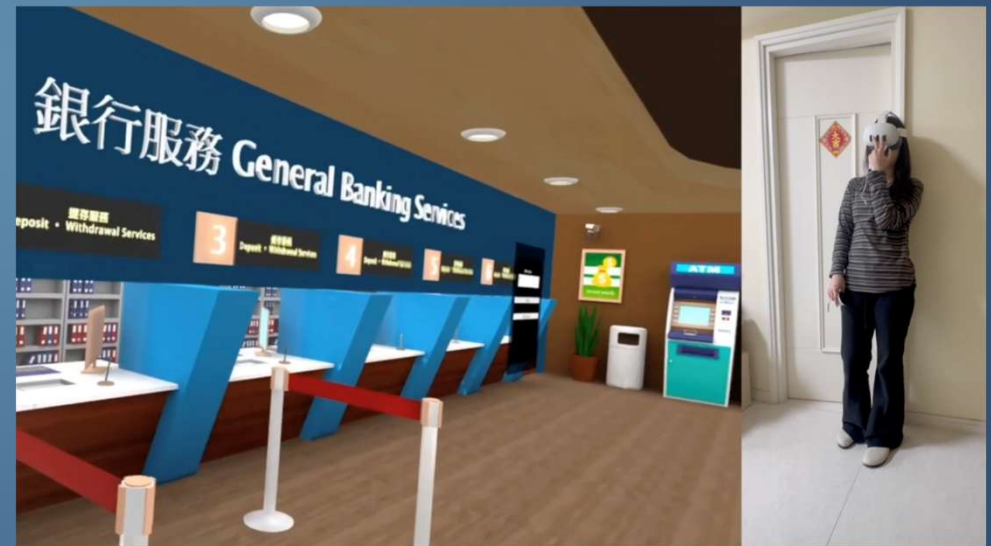
Learning tasks

Two learning tasks:

- Library task: Report a lost book and ask for help at the service counter
- Bank task: Open a savings account and complete basic service dialogues



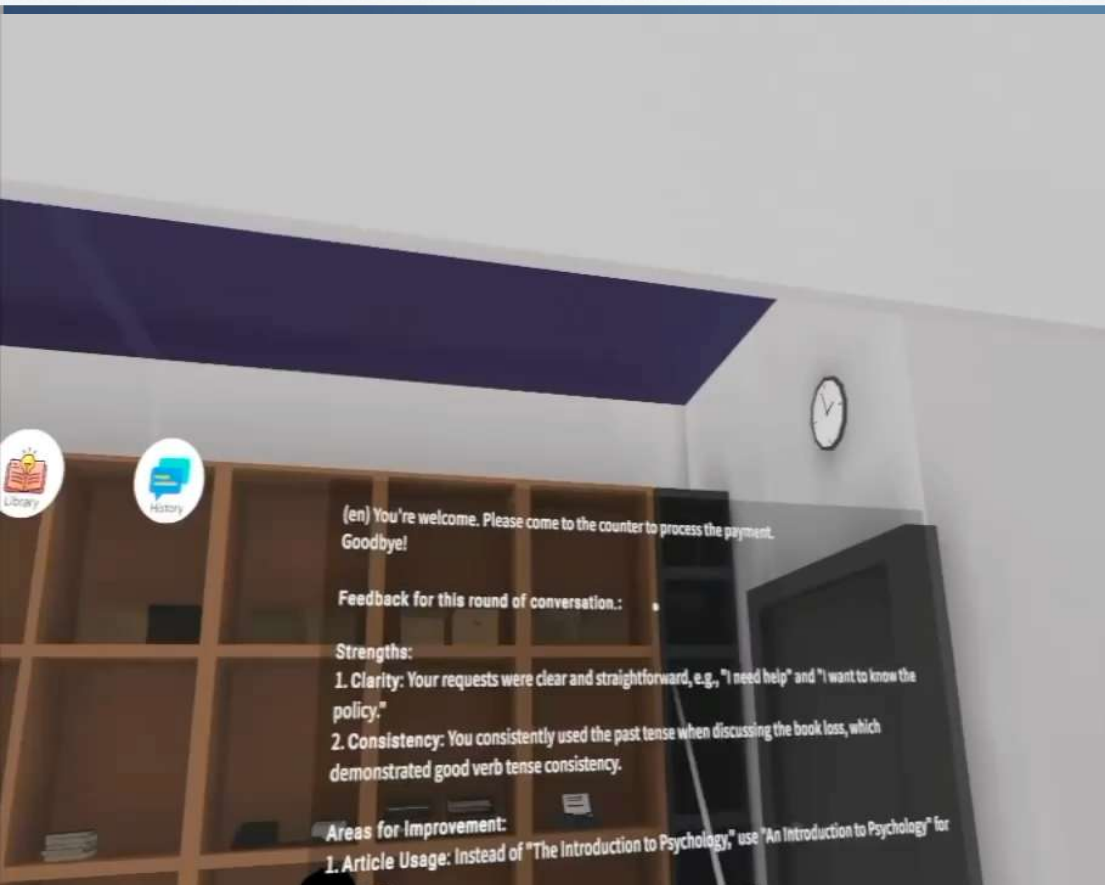
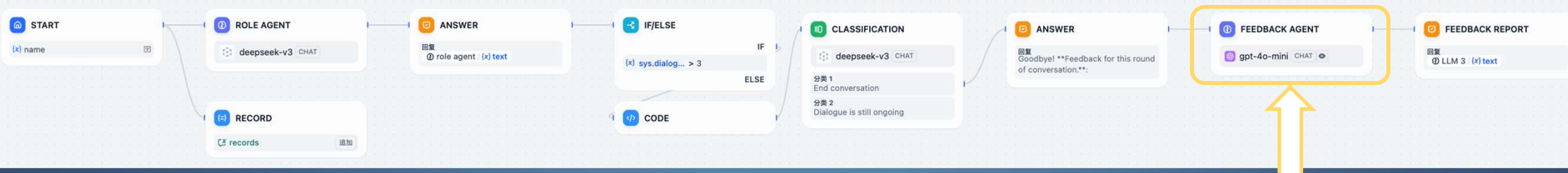
In the Library



In the Bank



Workflow of NPC's feedback



Band	Lexical resource	Grammatical range and accuracy
9	<ul style="list-style-type: none"> uses vocabulary with full flexibility and precision in all topics uses idiomatic language naturally and accurately 	<ul style="list-style-type: none"> uses a full range of structures naturally and appropriately produces consistently accurate structures apart from 'slips' characteristic of native speaker speech
8	<ul style="list-style-type: none"> uses a wide vocabulary resource readily and flexibly to convey precise meaning uses less common and idiomatic vocabulary skilfully, with occasional inaccuracies uses paraphrase effectively as required 	<ul style="list-style-type: none"> uses a wide range of structures flexibly produces a majority of error-free sentences with only very occasional inappropriacies or basic/non-systematic errors
7	<ul style="list-style-type: none"> uses vocabulary resource flexibly to discuss a variety of topics uses some less common and idiomatic vocabulary and shows some awareness of style and collocation, with some inappropriate choices uses paraphrase effectively 	<ul style="list-style-type: none"> uses a range of complex structures with some flexibility frequently produces error-free sentences, though some grammatical mistakes persist
6	<ul style="list-style-type: none"> has a wide enough vocabulary to discuss topics at length and make meaning clear in spite of inappropriacies generally paraphrases successfully 	<ul style="list-style-type: none"> uses a mix of simple and complex structures, but with limited flexibility may make frequent mistakes with complex structures, though these rarely cause comprehension problems
5	<ul style="list-style-type: none"> manages to talk about familiar and unfamiliar topics but uses vocabulary with limited flexibility attempts to use paraphrase but with mixed success 	<ul style="list-style-type: none"> produces basic sentence forms with reasonable accuracy uses a limited range of more complex structures, but these usually contain errors and may cause some comprehension problems
4	<ul style="list-style-type: none"> is able to talk about familiar topics but can only convey basic meaning on unfamiliar topics and makes frequent errors in word choice rarely attempts paraphrase 	<ul style="list-style-type: none"> produces basic sentence forms and some correct simple sentences but subordinate structures are rare errors are frequent and may lead to misunderstanding
3	<ul style="list-style-type: none"> uses simple vocabulary to convey personal information has insufficient vocabulary for less familiar topics 	<ul style="list-style-type: none"> attempts basic sentence forms but with limited success, or relies on apparently memorised utterances makes numerous errors except in memorised expressions
2	<ul style="list-style-type: none"> only produces isolated words or memorised utterances 	<ul style="list-style-type: none"> cannot produce basic sentence forms
1		

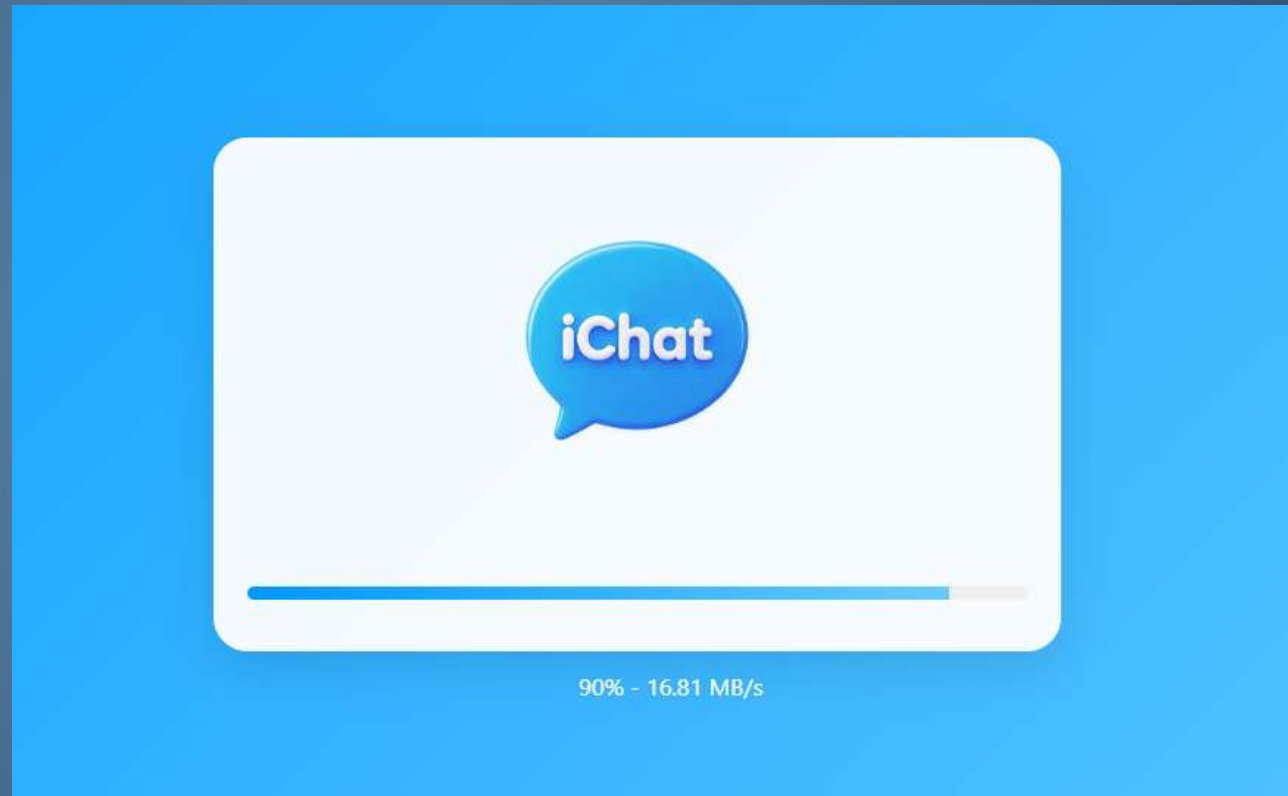
Feedback criteria from Cambridge English:
<https://assets.cambridgeenglish.org/webinars/ielts-speaking-band-descriptors.pdf>

A futuristic, blue-toned virtual environment with a grid floor and planet models. A sign in the center reads "Task 3: Thinking".

3.5 iChat - A generative AI-powered chatting platform

3.5 iChat - A generative AI-powered chatting platform


Visit the website : <https://metaai360.com/ichat/>



A generative AI-powered chatting platform integrated with “Learningverse” for personalized, and interactive learning, teaching and communication purposes in a more immersive and interactive environment

iChat

Welcome

 Sign in with Google

Skip





Please fill in the information to create a digital human.

Digital Character Settings

Digital Human Name

New Digital Human_2025

Personality

- Serious
- Encouraging
- Approachable
- Calm

Patient



Customise

Start chat

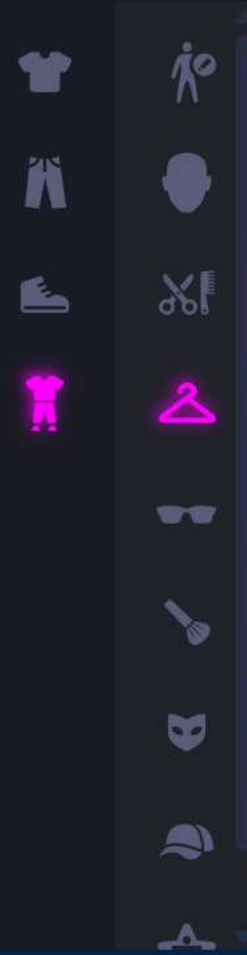
← Please fill in the information to create a digital human.



NEXT →



Search





Hi there! I'm Amy, your history teacher. I'm here to help you learn all about history in a fun and informal way. Whether it's ancient civilizations, world wars, or anything in between, just ask me anything history-related, and I'll do my best to guide you through it!



May I know where is Lantau Island?

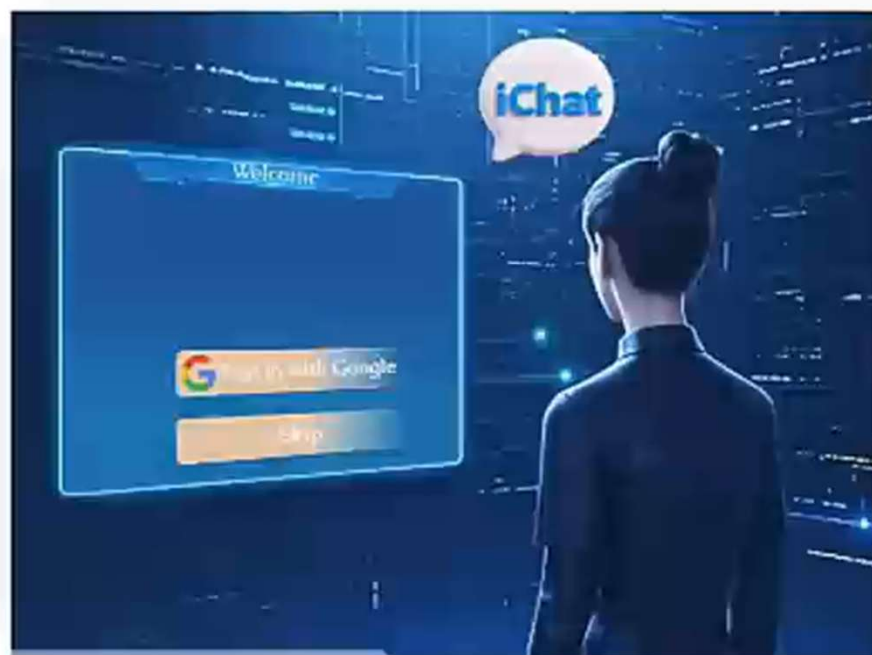
发送

Back

VIRTUAL COURSES

AI-powered digital human chat platform providing customizable interactive learning experiences for students of all ages.

Try iChat



Wrap-up

1. Introduction to metaverses and Gen AI



2. The metaverse platforms - Learningverse and LearningverseVR + digital human

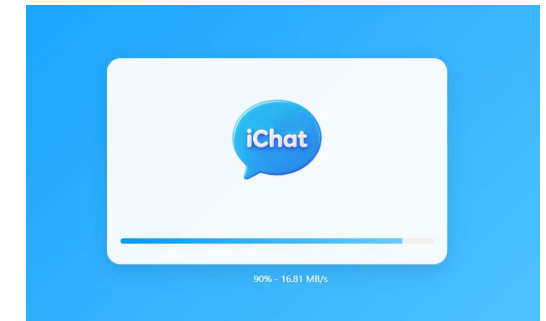
3. Five learning scenarios in Learningverse or LearningverseVR



1) "Double Ninth Festival (重陽節)" in Learningverse



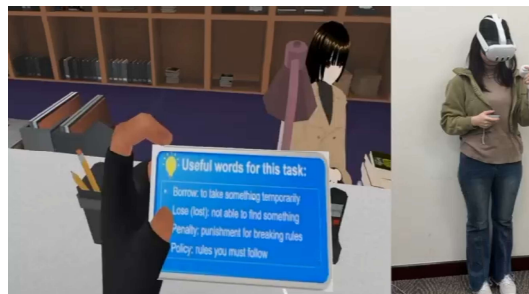
2) "Green Energy" in Learningverse



5) iChat for personalised learning, teaching and communication



3) "Newton's Law of Motion" in Learningverse VR



4) English Oral English practice

A futuristic, blue-toned virtual learning environment. The floor is a grid of glowing blue lines. In the background, there are large windows showing a space scene with planets labeled Jupiter, Saturn, Uranus, and Neptune. A red question mark is visible above a small display. In the foreground, a large model of Jupiter is on a raised platform, also labeled Jupiter. A sign in the middle ground reads "Task 3: Thinking".

4. The future of learning

Trends:

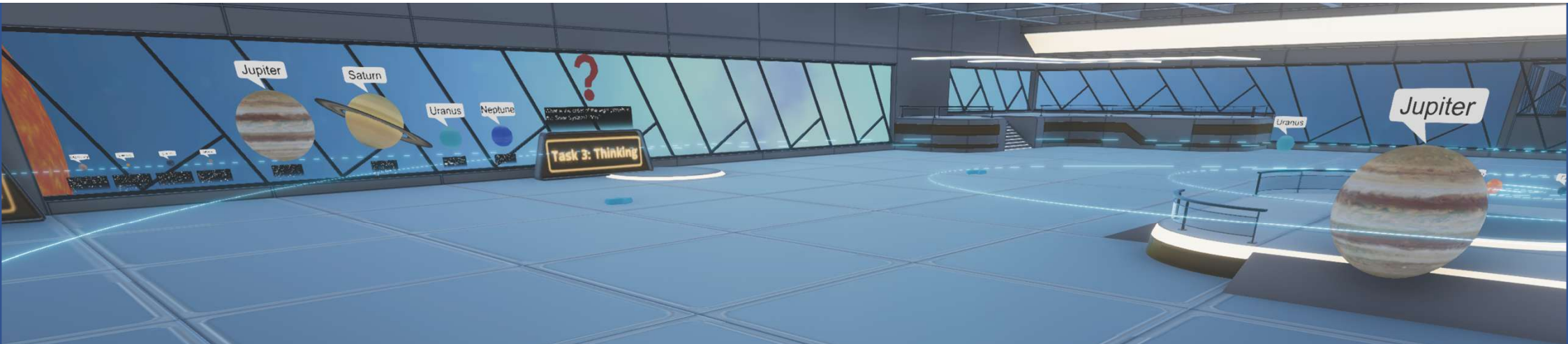
Education Trends

- Artificial intelligence
- Immersive learning
- Universal Design for Learning
- Bite-sized learning
- Outcomes-based contracting

<https://ace.edu/blog/whats-next-top-five-trends-in-education-for-2025/>

EmoCare

Start



Thank you!

Contact: Song Yanjie
Email: ysong@eduhk.hk

