For official use

Reference No.: Ref: 20260128135

Human Research Ethics Committee for Non-Clinical Faculties

Application Form for Ethical Approval

Please complete Parts A - B and F – H. If you are collecting new data, please also complete Part C. If you are studying existing personal data, document or records, please also complete Part D. If you are collecting new data, and seeking a waiver of informed Consent, please also complete Part E.

Part A: Summary

Principal Investigator

( )* Surname: _____ First Name: _____

Department: _____

Position / Staff Grade: _____ Staff No.: _____

Office telephone: _____ PI email: _____

For students, please provide the following additional information:

Name: *LU YAO* Degree Programme/Year: PHD 1/Year Student No.: U25092110269

Name of Supervisor: Pohsun Wang Supervisor email: phwang@cityu.edu.mo

Co-Investigator(s), if any

*Name: Staff No:

*Position: *Department/Unit:

Degree Programme/Year (for students only):

Name: Staff No:

Position: Department/Unit:

Degree Programme/Year (for students only):

Name: Staff No:

Position: Department/Unit:

Degree Programme/Year (for students only):

Research Proposal/Project:

Title:

Start date: Expected completion date:

Funding Source (please tick as appropriate):			
University internal research grants#	☐	RGC General Research Fund	☐
Innovation Technology Fund	☐	Public Policy Research	☐
Contract Research#	☐	Other external grant#	☐
No funding	☒		
# Please specify funding source: _			

**Delete as appropriate*

Part B: Research Proposal

Please summarise on ONE page the objectives of the project and methodology used, and attach a copy of your proposal including any questionnaire and informed consent form to be used.

Objectives of the proposal:

Research Objectives:

This study aims to conduct a rigorous empirical investigation to systematically explore the impact of the application of pedagogical agents (PA) in virtual reality (VR) educational environments on learners' cognitive load, social presence, and learning outcomes, and to reveal the intrinsic mechanisms of interaction among these factors. This will provide theoretical and empirical support for optimizing the design of VR pedagogical agents (PA).

RQ1: What are the differences in learning outcomes between virtual reality learning environments and traditional MOOC teaching videos?

This study aims to conduct a comparative experiment to examine whether the immersive and embodied experiences provided by virtual reality (VR) can produce significant advantages over traditional two-dimensional MOOC videos in terms of knowledge retention, depth of understanding, and skill transfer, and to explore whether these advantages vary depending on the subject matter (e.g., spatial structure knowledge vs. theoretical narration).

RQ2: Does the presence of a pedagogical agent (PA) in a virtual reality learning environment affect students' learning outcomes and learning experience?

Building on the confirmation of the effectiveness of the VR environment, this study further investigates whether the embedded pedagogical agent (PA), as a social and instructional design, can significantly enhance students' learning outcomes by providing guidance, demonstration, and interaction, and improve their sense of social presence, motivation, and engagement during the learning process.

RQ3: Does the presence of a pedagogical agent (PA) in a virtual reality learning environment increase cognitive load and thereby affect learning outcomes?

This study focuses on the potential negative effects of PAs, specifically examining whether the additional social cues and information they provide compete with the main learning content for limited cognitive resources, thereby increasing students' extraneous cognitive load and ultimately having a complex (possibly facilitating or inhibitory) impact on learning outcomes.

RQ4: How do multi-dimensional learning experiences and other factors influence learning outcomes?

Expansion: This study aims to go beyond a single comparison of effects and construct an integrated model to explore how factors such as immersion, presence, cognitive load, learning motivation, and emotional experience interact with each other and jointly predict and explain the final learning outcomes.

Research questionnaire

1. Informed Consent

Dear Sir/Madam, Hello! Thank you for participating in this research project. Before you start, we need you to carefully read and sign this informed consent form.

1. Background Introduction:

Research Title: The Impact of Virtual Teachers on Learning Outcomes and Learning Experience in VR Immersive Teaching Environments

Project Leader: Lu Yao

Affiliated Institution: School of Innovation and Design, City University of Macau

Contact Information: U25092110269@cityu.edu.mo

This research aims to explore the influence of virtual teachers (PA) on students' learning outcomes and attention in the field of virtual reality (VR) education. To ensure the quality and accuracy of the research, we invite you to participate in this study to help us collect relevant data and allow us to use your data with your explicit permission.

2. Research Objectives:

Through your participation, we hope to gain a deeper understanding of whether the presence or absence of PA in VR educational environments has a significant impact on students, thereby providing useful references and suggestions for the development and improvement of this field.

3. Research Process:

You will be required to complete a pre-test questionnaire, a post-test questionnaire, and a research questionnaire, and wear VR glasses to complete a series of learning operations. Please answer the questions carefully based on

your actual situation.

4. Confidentiality Agreement:

(1) We may ask you to provide some personal information, such as age, gender, education level, and major. This information will only be used for research analysis and will not be disclosed to any third party. Your personal information will be strictly confidential and used only by the research team.

(2) In research reports and published papers, we will anonymize your identity to ensure your privacy and security.

(3) According to the requirements of laws and regulations, the data and research results we collect may be provided to relevant regulatory or industry institutions, but your personal privacy will be carefully protected.

We promise to comply with relevant laws and regulations and handle your personal information and research data in strict accordance with research ethics. Your participation is voluntary, and you can choose to withdraw from the study at any time without any negative consequences.

5. Consent Statement

I have read and fully understand the above content and voluntarily agree to participate in this research. I confirm:

Agree to audio/video recording throughout the process (if applicable)

Agree to anonymous citation of experimental data

Permission to use data only for academic purposes

Participant's Signature: Date:

Researcher's Signature: Date:

(Electronic signatures and handwritten signatures have equal validity).

2. Immersion Tendency Questionnaire (ITQ) (Revised Chinese version)

(The following questions are a mixture of forward and reverse scoring questions, please note the distinction) (Even question numbers are reverse)

Question Content

1. When reading an interesting story, I can clearly imagine the scenes in the story in my mind.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

2. I often find myself unconsciously getting distracted and thinking about other things while studying or working.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

3. I get very excited when watching an exciting sports game (live or recorded video).

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

4. When visiting museums or art exhibitions, I seldom take the time to look closely at the details of the exhibits.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

5. When I am fully absorbed in a task, I often overlook the passage of time.Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

6. I find it very difficult to focus on activities like reading or attending lectures for long periods of time.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

7. When making a phone call, I can clearly form the other person's expression and posture in my mind.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

8. I play video games mainly to kill time, not because I can immerse myself in them.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

9. I feel nervous or scared when watching a horror movie, even in my own safe home.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

10. While listening to music, my thoughts tend to drift to other things.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

11. I can stay highly focused for longer than most people.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

12. I think playing role-playing video games is a kind of childish behavior

out of touch with reality.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

13. When I focus on an interesting project, I feel energetic and less

distracted.

Completely disagree -> Completely agree

1 - 2 - 3 - 4 - 5 - 6 - 7

14. While queuing or waiting, I often feel bored and irritable and have

difficulty finding ways to immerse myself in thinking.

Completely disagree -> Completely agree

1 - 2 - 3 - 4 - 5 - 6 - 7

When watching a wonderful live performance (such as a concert or a play),

I am easily infected by the atmosphere on the spot.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

16. I rarely get emotional (like crying or laughing) from watching movies

or TV series.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

17. When I do something I enjoy, my attention is highly concentrated as

if the world around me has vanished.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

18. Video games are less appealing to me compared to other forms of

entertainment.

Totally disagree -> Totally agree

1 - 2 - 3 - 4 - 5 - 6 - 7

3. Immersion Questionnaire (Igroup Presence Questionnaire)

Please assess your level of agreement with the following statements:		
"Number"	**Question item**	**Totally disagree ← → Totally agree**
GP 1	1. In the virtual world, I have a feeling of being there.	-3-2-1 0 +1 +2 +3
INV 1	2. During the experience, I was completely captivated by the virtual world.	-3-2-1 0 +1 +2 +3
REAL 1	3. How real the virtual world seems to you.	-3-2-1 0 +1 +2 +3
SP 2	4. In the virtual world, I have a feeling of moving around.	-3-2-1 0 +1 +2 +3
INV 2	During the experience, I didn't think much about real-world matters.	-3-2-1 0 +1 +2 +3
REAL 2	6. The virtual world feels more like fantasy than real to me. (R)	-3-2-1 0 +1 +2 +3
SP 3	7. I felt as if I were really in a virtual world.	-3-2-1 0 +1 +2 +3
INV 3	8. During the experience, I was still aware of the existence of the real environment around me. (R)	-3-2-1 0 +1 +2 +3
REAL 3	9. The visuals in the virtual world make me feel like I'm right there.	-3-2-1 0 +1 +2 +3
SP 4	10. I feel like the virtual world is like a real space around me.	-3 -2 -1 0 +1 +2 +3
INV 4	11. During the experience, my attention was completely focused on the virtual world.	-3-2-1 0 +1 +2 +3
SP 5	12. In the virtual world, I have a feeling of visiting somewhere rather than just looking at some pictures.	-3-2-1 0 +1 +2 +3
REAL 4	13. How consistent is your experience in the virtual world with your experience in the real world	-3-2-1 0 +1 +2 +3
SP 1	13. For some reason, I feel like the virtual world surrounds me.	-3-2-1 0 +1 +2 +3

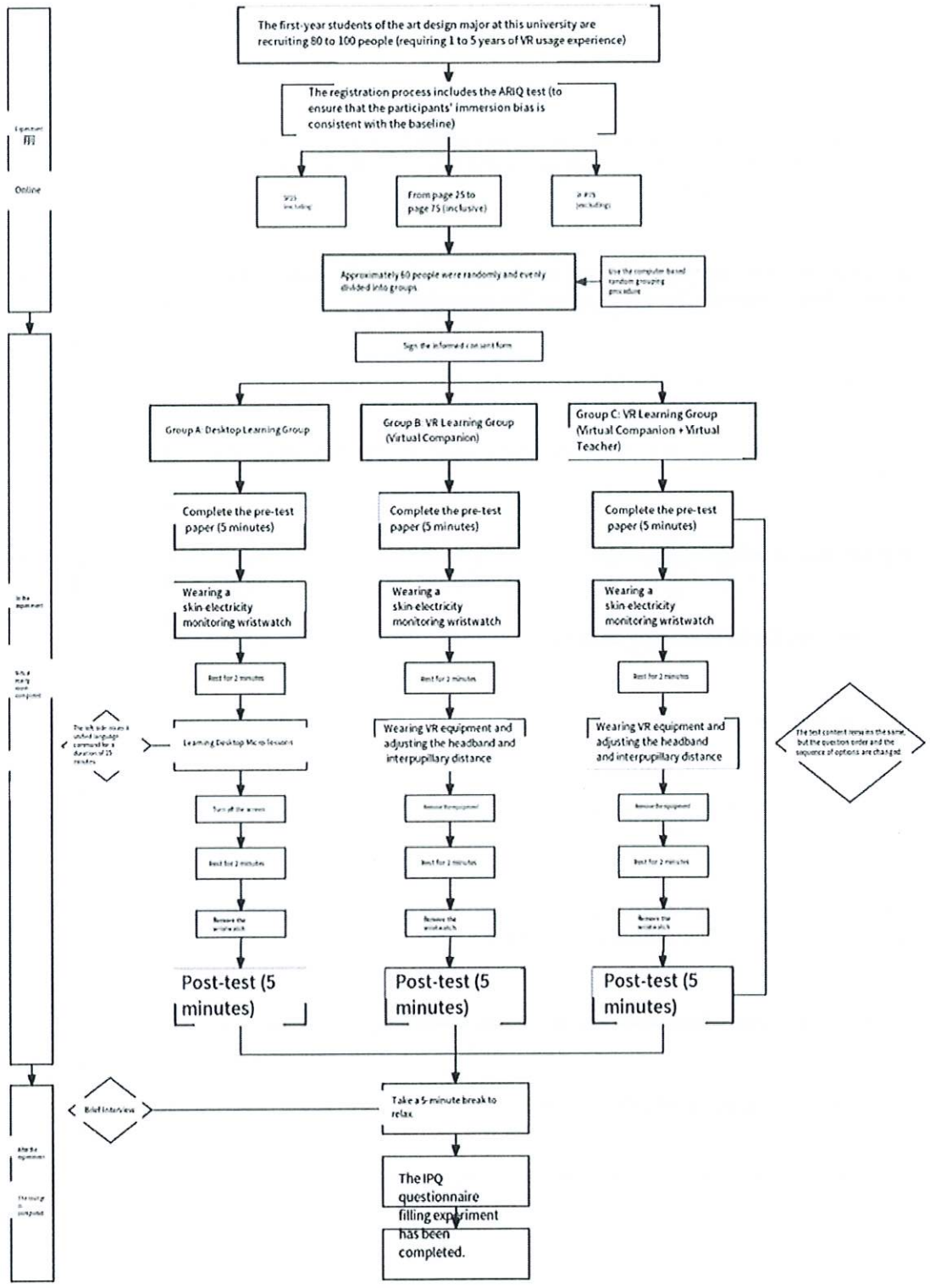
Note: (R) indicates that the question is a reverse scoring question.
Dimension composition:
Spatial presence: Composed of question items SP 1, SP 2, SP 3, SP 4, SP 5 (a total of 5 items).
Participation: Composed of question items INV 1, INV 2, INV 3, and INV 4 (a total of 4 items).
Realism: Consisting of question items REAL 1, REAL 2 (R), REAL 3, REAL 4 (4 items in total).
Overall presence: Assessed by question item GP 1.

4. Cognitive Load Scale

Dimensions	Number	Question item	Rating scale (1-7 points)
Intrinsic cognitive load (Caused by the complexity of the learning material itself and the interactivity of elements)	1	The content of the learning topic is very complex.	1-2-3-4-5-6-7
	2	I have a lot of information fragments to deal with at the same time.	1-2-3-4-5-6-7
	3	Understanding a single concept or step is difficult in itself.	1-2-3-4-5-6-7
Extrinsic cognitive load (Ineffective load from instructional design or environment)	4	The way the teaching content is presented (such as graphic layout, navigation) makes it difficult for me to concentrate.	1-2-3-4-5-6-7
	5	I need to spend energy trying to understand some unnecessary, confusing explanations or designs.	1-2-3-4-5-6-7
	6	I feel that the way learning activities are organized is inefficient.	1-2-3-4-5-6-7
Related cognitive load (Payload for schema construction and automation)	7	I actively relate new knowledge to what I already have.	1-2-3-4-5-6-7
	8	I strive to gain a deeper understanding of the intrinsic structure and patterns of the learning materials.	1-2-3-4-5-6-7
	9	I put in the necessary mental effort to build a deeper understanding of the problem.	1-2-3-4-5-6-7
Mental effort/mental load (Direct measurement of overall load)	10	Overall, completing this learning task requires a very great mental effort from me.	1-2-3-4-5-6-7

Research plan and methodology:

1、Research Methods



Part C: Risk Assessment for Newly Collected Data

Please answer the following questions, if your proposal involves any newly collected data, to decide if your proposal should be submitted for expedited review.	Yes	No
a) Will the study involve action/participatory/treatment research?	☐	√
b) Is it possible that the study will involve greater than minimal privacy risks, which could induce stress to research participants, such as political behaviour, illegal conduct, drug or alcohol use and sexual conduct?	☐	√
c) Is it possible that the participants' burden to complete the procedures will induce greater than minimal stress, in particular, for children, given their age and capacity?	☐	√
d) Is it possible that the study will induce greater than minimal physical or psychological stress/pain/discomfort?	☐	√
e) Is it possible that the study will expose participants to greater than minimal physical or medical risk?	☐	√
f) Will deception be used during the study?	☐	√
g) Will video-recording be used during the study?	☐	√
h) Will audio-recording be used during the study?	☐	√
i) Is there potential conflict of interests? (e.g. financial gain to the investigators, power over participants such as teacher/student relationship)	☐	√
j) Will the study involve vulnerable participants who are unable to give informed consent, e.g. under the age of 18, mentally handicapped individuals? - If "Yes", please specify details of the age group and/or vulnerability: _____ (Parent/Guardian Consent Form should be attached.)	☐	√

For Expedited Review:

- ***If you have answered "No" to all of the questions (a) – (j) above, your application may qualify for an expedited review, meaning that your research involves minimal risk[1]. However, informed consent is still required unless reasons why this is infeasible are adequately justified.***

[1] Minimal risk means that the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examination or tests.

For Full Review:

- ***If you have answered "Yes" to any of the above questions (a) – (j), please give more details on your study design and methodology in the questions (k) to (t).***

k) The selection and recruitment of participants (Attach any initial letter of contact and Consent Form)

l) Rationale for sample size calculation

m) How will participants be recruited/identified?

n) What are the inclusion and exclusion criteria?

o) Description of any specific data collection, such as interviews, questionnaire (including telephone) survey or experimental procedures like deception (please attach Deception Form) and any treatment or intervention.

p) Please state who will perform the data collection, how long it will take and where the data collection will take place.

q) Can the participants be allowed to withdraw at any time without prejudice?

r) Will there be any stress/discomfort to participants?

s) Please provide details of any audio and/or video recording including the justifications for the recording.

t) Please identify any potential conflict of interests and how that potential conflict will be addressed.

Part D: Using Existing Documents or Records containing Personal Data

Please complete this section if you are using existing documents or records that contain any personal data.

Will existing documents or records containing any personal data be used? Yes ☐ No ☐

- If "Yes", please give more details of the personal data being obtained by answering questions (a) – (h) in the following.
- If "No", please skip this Part D.

a) What is the source of the data?

b) Were the data originally collected for research purposes? Yes ☐ No ☐

- If "Yes" is checked, please attach a copy of the Consent Form for the original collection of data.
- If "No" is checked, please provide the Personal Information Collection Statement.
- For all situations, please explain how this research is consistent with the purpose and use specified when the data were originally collected.

c) Please list the types of personal data being used, if not already listed in the Consent Form for the original collection of data or Personal Information Collection Statement.

d) Are any of the data listed above sensitive? Yes ☐ No ☐

- If "Yes", please provide full details.

e) Is the source of data publicly available[2]? Yes ☐ No ☐

[2] Please note that the term "publicly available" means that the general public can obtain the data. Sources are not considered "publicly available" if access to the data is limited to researchers.

f) How are data identified when they are made available to your research team? (Please indicate by marking the appropriate box below.)

i) ☐ Direct Identifier (i.e. name, address, ID card number, medical record number, etc.)

ii) ☐ Indirect Identifier (i.e. an assigned code which could be used by the investigator or the source providing data to identify a subject, such as tracking code used by the source.)

iii) ☐ No Identifier (i.e. neither the researcher nor the source providing the data can identify a subject based upon information provided with the data.)

g) If i) or ii) is checked above and you are requesting permission to study archived data, will you abstract and record any subject identifiers as a part of the data collection process?

Yes ☐ No ☐ Does Not Apply ☐

h) Will any data be collected from subjects after the submission of this application?

Yes ☐ No ☐

- If "Yes", please complete Part C

Part E: Assessment for a Waiver of Written Informed Consent

The waiver of written informed consent is only applicable to data without personal identifiers, e.g. where data are tabulated or where oral consent is audio-recorded, PIs are required to clearly specify that they are using data without personal identifiers in their research grant proposals.

Please answer the following questions if you are collecting new data, and wish to apply for a waiver of informed consent.

When conducting research where seeking written consent is not practical or too sensitive, oral consent might be less of a privacy risk than written consent and can be considered as an alternative. Please submit a full justification below and attach an information sheet to this application.

a) Will there be oral consent? Yes ☐ No ☐

If "Yes", will the oral consent be audio recorded? Yes ☐ No ☐

b) Is participation anonymous? Yes ☐ No ☐

If "No", i.e. participation is not anonymous, your proposed research is not normally qualified for a waiver of informed consent. Measures should be taken to code the data collected and delete all personal identifiers on the spot.

c) If participation is not anonymous, please explain why the study is not practicable without a waiver.

d) Please explain why the proposed study presents no more than minimal risk to the participants.

e) Please explain why a waiver of informed consent will not adversely affect the rights and welfare of the participants.

Part F: Benefits

Please state any possible benefit to participants.

Part G: Attachments

Please tick as appropriate to indicate which of the following documents are enclosed to this application.

(1) Full research proposal including any questionnaire and/or interview script. (Note i)	☐
(2) Parent/Guardian Consent Form	☐
(3) Informed Consent Form (Note ii)	☐
(4) Deception: post debriefing consent form	☐

Notes:

(i) Mandatory

(ii) Mandatory unless waiver has been applied for or no data collection is being undertaken.

Part H: Declaration

In making this application, I certify that I have read and understand the University's *Policy for Ethical Practice*, and I will comply with the ethical principles of these documents. I will submit, as appropriate, a *Report for Research Progress or Amendment of an Approved Project* if there are significant changes to my research, or an adverse incident, or when the report for annual progress due.

Date: January 14, 2026 Signature: Yan Cu

(Signature of Applicant)

Date: January 14, 2026 Signature: Pohsun Wang

(Signature of supervisor)

(for RPG/TPG students only)

I hereby endorse this application with my approval and confirm that the investigator(s) are appropriately qualified in the research area involved to conduct the proposed research project, and am capable of undertaking this research study in a safe and ethical manner.

Date: 2026 -01- 28 Signature:

Head of Department/Dean of Faculty

Part I: Committee Approval

After discussion, this research plan is approved.

Date: 2026 -01- 28 Signature: