# AI-powered and Analytics-supported Virtual Reality Content Creation: A multi-year study in a Common Core course

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## 1. Introduction

- **Maker activities** empower students in creating personally meaningful and real-world physical/digital artefacts
  - Learning process: exploratory and experimental
  - LOs: content knowledge and 21st century skills
- **VR content creation** has emerged due to democratization of digital technologies and a shift to the creator-centric paradigm
  - Low tech-barrier, low-cost approach

**Hu, X., Ng, J., & Lee, J. H. (2019). VR creation experience in cultural heritage education: A preliminary exploration. *Proceedings of the Association for Information Science and Technology, 56*(1), 422-426.**

## 2. Context: a Common Core Course

- **CCCH9051 *Digitizing Cultural Heritage in Greater China***
- First offered in 2018, and will be the 9th delivery in 2025/26
- Course LOs: (1) To understand the values of cultural heritage
  (2) To promote cultural heritage to global audience
- **Maker-based assessment tasks**: Video production, poster creation, digital gallery creation, **VR story creation**

**Ng. J. T. D. & Hu, X. (2024). Digitizing cultural heritage in Hong Kong: An overview. *Digital Humanities and Intelligent Computing of Cultural Heritage: Global Development and China Solutions*.**

## 3. Research-informed pedagogical design

| Stage | Learning task | Principle |
|---|---|---|
| **1. Authoring** | Capture a spherical panorama and create a draft VR story | Democratizing use of technology |
| **2. Peer evaluation** | Evaluate peers' drafts | Community of Practice Collective innovation |
| **3. Finalizing** | Incorporate peers' feedback and finalize work | Student agency and autonomy |

**Hu, X., & Ng, J. T. D. (2025). Low tech-barrier virtual reality content creation for cultural heritage education: learning outcomes and pedagogy. *Technology, Pedagogy and Education*, 1-28.**

## 4. Framework of learning outcomes

| Dimension of LOs | Description |
|---|---|
| **Learning *about* cultural heritage** | Socio-historical knowledge and information about cultural heritage |
| **Learning *for* cultural heritage** | Sense of identity for preserving and promoting cultural heritage |
| **Learning *beyond* cultural heritage** | Information and digital literacy related skills and competencies |

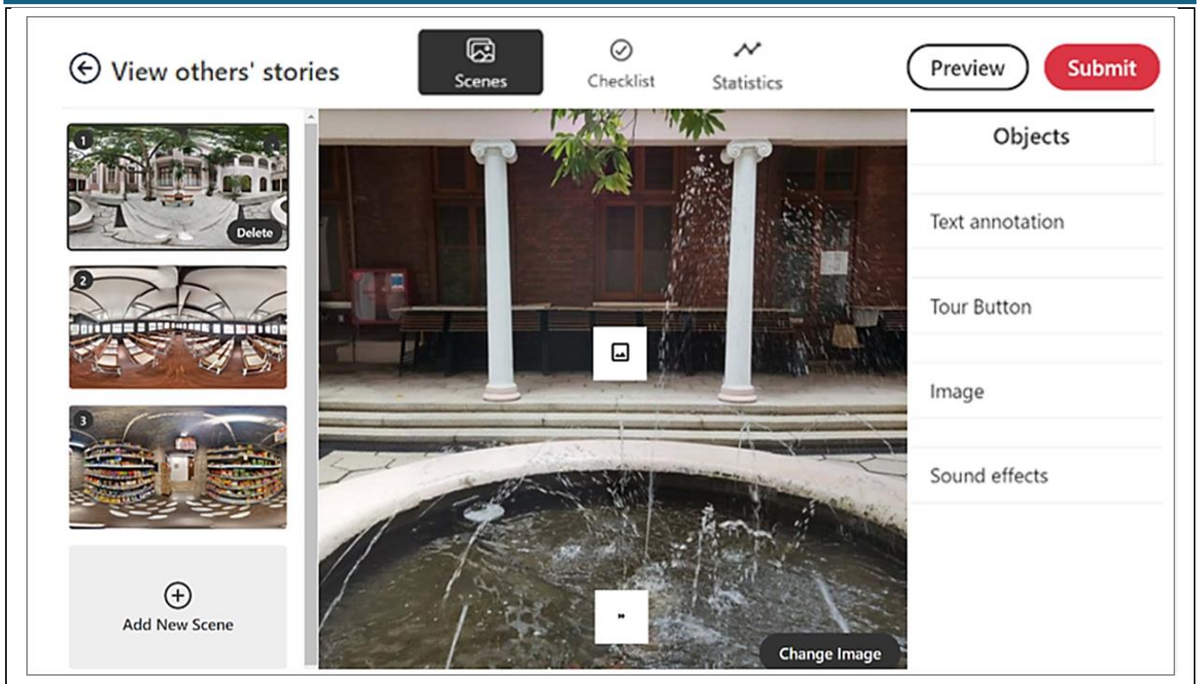
**Hu, X., & Ng, J. T. D. (2025). Low tech-barrier virtual reality content creation for cultural heritage education: learning outcomes and pedagogy. *Technology, Pedagogy and Education*, 1-28.**

## 5. Self-regulated learning process

| SRL Phase | SRL strategy | Definition |
|---|---|---|
| **Forethought** | **Goal setting** | To define goals of the maker activity. |
| | **Observation** | To observe one's draft or product. |
| **Engagement** | **Formulation** | To create new components. |
| | **Reformulation** | To edit existing components. |
| **Evaluation and Reflection** | **Reflection** | To reflect on progress/performance. |
| | **Evaluation** | To evaluate others' progress/performance. |

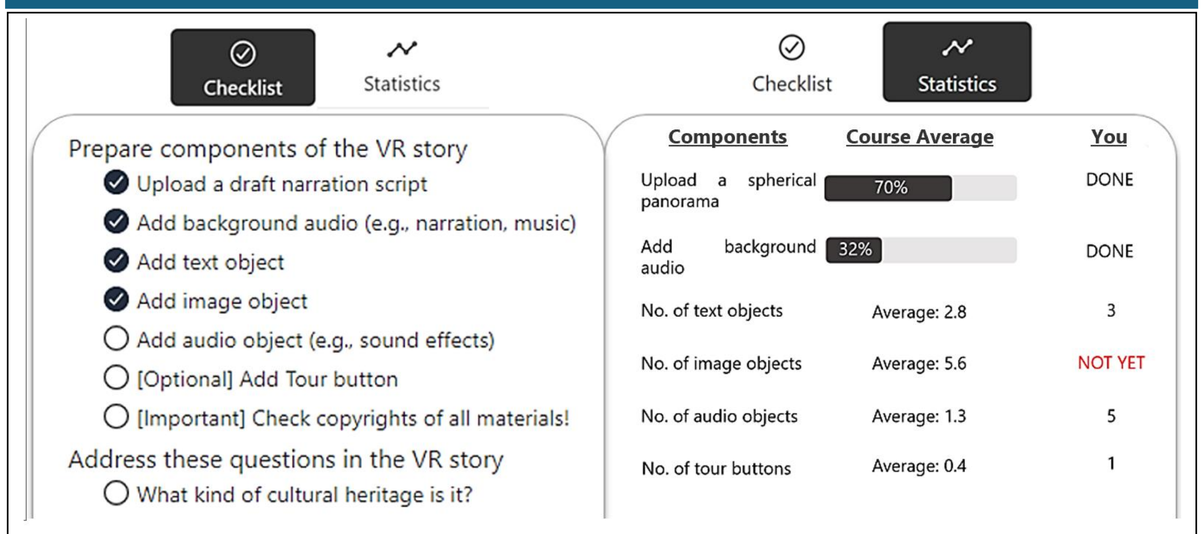
**Ng, J. T., Liu, Y., Chui, D. S., Man, J. C., & Hu, X. (2023, March). Leveraging LMS logs to analyze self-regulated learning behaviors in a maker-based course. In *LAK23: 13th international learning analytics and knowledge conference* (pp. 670-676).**

## 6. *LAVR*: self-developed VR authoring platform



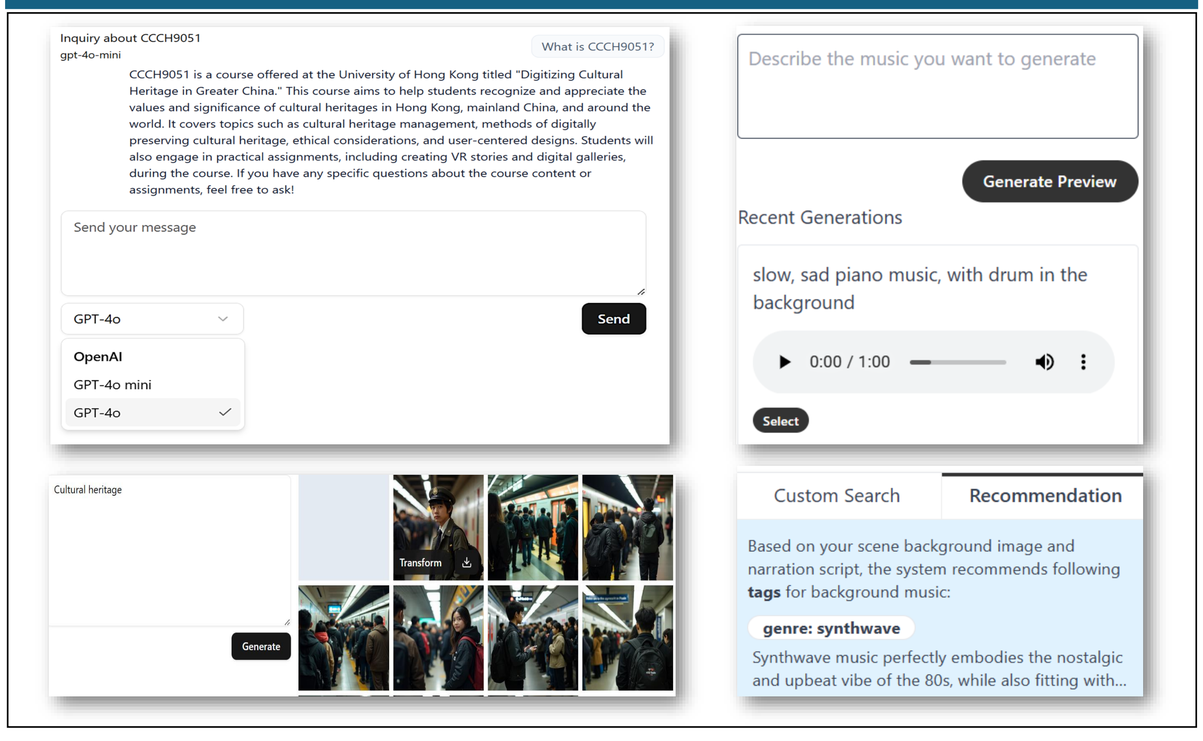

**Wang, Z., Ng, J. T. D., Liu, R., & Hu, X. (2022). Learning analytics enabled virtual reality content creation platform: system design and preliminary evaluation. In *2022 International Conference on Advanced Learning Technologies (ICALT)* (pp. 161-163). IEEE.**

## 7. Learning analytic dashboard




**Ng, J. T. D.., Wang, Z., & Hu, X. (2022). Needs analysis and prototype evaluation of student-facing LA dashboard for virtual reality content creation. In *LAK22: 12th International Learning Analytics and Knowledge Conference* (pp. 444-450).**

## 8. AI features and functions




## 9. Ongoing evaluation efforts

- Effectiveness of **student-facing learning analytic dashboards**
- Effectiveness of **customized AI functions**: course-customized chatbots, text-to-image generation, BGM recommendation
- **Multimodal** data sources, collected from students and teachers:

**Surveys** | **System logs** | **Artefacts**

**Performance scores** | **Reflections** | **Interviews**

- **Statistical** (e.g., regression), **data mining** (e.g., text mining), and **qualitative** methods (e.g., thematic content analysis)
- **Theoretical, methodological**, and **practical** contributions to **maker education, VR content creation**, **cultural heritage education**, **learning analytics,** and **GenAI-supported T&L**
- Related: **1 GRF, 1 ECF, 3 PhD, 1 EdD, 2 FYP** projects; a **UGC Team Teaching Award**, and a **RPg Student Teaching Award** (and beyond)

## 10. Acknowledgement

COMMONCORE THE UNIVERSITY OF HONG KONG

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*Research Grants Council, HKSAR Government*

TaLiC Teaching and Learning Innovation Centre

**(We are thankful to all colleagues and students who have contributed to this course and its related projects.)**