

An introduction to the creating and embedding digital learning spaces in education: Suggested Reading/Bibliography

1.1 INTRODUCTION

As part of the THETA project useful sources are provided here to help in the provision of research-informed pedagogical decision-making.

1.2 LEARNING THEORIES AS THE BASIS FOR EMBEDDING AND DEVELOPING NEW IMMERSIVE EDUCATIONAL CONTENT FOR HOSPITALITY

In the field of education and instructional design, various learning theories and models have been developed to understand different learning styles and enhance the learning process (Cassidy, 2004). With the advent of immersive technologies, such as virtual reality (VR), new theories and models have emerged to explore the unique opportunities offered by these immersive learning environments. The subsequent table provides an overview of key learning theories and models synonymous with immersive learning, highlighting their underlying concepts and proponents.

Learning Theory/Model	Key Concepts	Main Proponents	Year of Publication
Constructivism	<ul style="list-style-type: none">- Learning as a process created by the learner- Integration of new knowledge with prior knowledge- Comparing and connecting new information to life experiences- Changing mental models to reflect new knowledge	Vygotsky	2016
Experiential Learning	<ul style="list-style-type: none">- Learning from experience- Reflecting on experiences to draw new learning- Applying new knowledge to future situations	Kolb	1984
Situated Cognitive Theory	<ul style="list-style-type: none">- Context as a crucial factor in learning- Interactions between people in specific contexts	Lui & Goel	2022
Cognitive Theory of Multimedia Learning	<ul style="list-style-type: none">- Benefits of multimedia in education	Mayer	2009

	<ul style="list-style-type: none"> - Processing text and pictures to build mental representations - Creating meaning through combining words and pictures 	
Cognitive Affective Model of Immersive Learning (CAMIL)	<ul style="list-style-type: none"> - Framework for immersive learning in VR environments - Emphasis on instructional methods in VR learning experiences - Technological factors (immersion, control, environmental realism) - Learner presence and agency - Affective and cognitive aspects (interest, motivation, self-efficacy, etc.) - Positive educational outcomes 	Makransky & Petersen 2021

Table 1: Illustrative overview of learning theories for developing immersive content

Based on these insights into theories and models synonymous with immersive learning, it is evident that generative learning strategies play a significant role in making meaning from information and enhancing understanding (Makransky & Petersen, 2021). Generative learning strategies to increase understanding include summarizing, mapping, drawing, imagining, self-testing, explaining, teaching and enacting. Parong & Mayer (2018) found that a high-end immersive content based on VR was less effective than a traditional powerpoint presentation for obtaining factual knowledge. VR can be more suited to procedural learning or practical knowledge due to providing the conditions for procedural rehearsal.

However, generative learning strategies such as summarization can enhance factual and conceptual knowledge when used in conjunction with an immersive learning activity. Providing learners with factual knowledge (an understanding of key terms and concepts) prior to immersive learning activities, allows learners to interpret their learning experiences more meaningfully. Furthermore, due to high cognitive load (high levels of stimuli overloading working memory) and high presence and agency of immersive learning, reflection can serve as a method to decouple experience and allow time for enactment of cognitive processes related to making the experience meaningful for the learner by integrating the new knowledge into existing knowledge structures (Makransky & Petersen, 2021).

Building on the insights on learning styles and theories, we understand virtual reality (VR) and augmented reality (AR) as the technological basis for embedding immersive content within hospitality education.

Recent studies from other fields have revealed the positive impacts of the incorporation of immersive content on learning (de Back et al., 2021; Cárdenas-Sainz et al., 2022), yet more research on interactive learning environments is required. In particular, de Back et al. (2021), highlighted the difficulties associated with introducing immersive virtual options with **large group sizes** and the practicalities in **timing** its introduction and use.

References:

- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211.
- Cárdenas-Sainz, B. A., Barrón-Estrada, M. L., Zatarain-Cabada, R., & Ríos-Félix, J. M. (2022). Integration and acceptance of Natural User Interfaces for interactive learning environments. *International Journal of Child-Computer Interaction*, 31, 100381. <https://doi.org/10.1016/j.ijcci.2021.100381>
- Cassidy, S. (2004). Learning styles: An overview of theories, models, and measures. *Educational psychology*, 24(4), 419-444.
- Davis, F. (1985). A technology acceptance model for empirically testing new end-user information systems: theory and results. Unpublished Doctoral dissertation, MIT Sloan School of Management, Cambridge, MA.
- de Back, T. T., Tinga, A. M., & Louwrese, M. M. (2021). CAVE-based immersive learning in undergraduate courses: examining the effect of group size and time of application. *International Journal of Educational Technology in Higher Education*, 18(1), 1-18. <https://doi.org/10.1186/s41239-021-00288-5>
- Hsu, L. (2016) Diffusion of Innovation and Use of Technology in Hospitality Education: An Empirical Assessment with Multilevel Analyses of Learning Effectiveness. *Asia-Pacific Education Researcher* 25, 135–145. <https://doi.org/10.1007/s40299-015-0244-3>
- Kolb, D. A. (1984). *Experiential learning*. New Jersey: Eaglewood Cliffs.
- Lui, T. W., & Goel, L. (2022). Learning effectiveness of 3D virtual reality in hospitality training: a situated cognitive perspective. *Journal of Hospitality and Tourism Technology*, 13(3), 441-460.
- Makransky, G., & Petersen, G. B. (2021). The cognitive affective model of immersive learning (CAMIL): A theoretical research-based model of learning in immersive virtual reality. *Educational Psychology Review*, 1-22.
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed). New York: Cambridge University Press.
- Parong, J. & Mayer, R. (2018). Learning Science in Immersive Virtual Reality. *Journal of Educational Psychology*., 110(6). 785-797. <https://doi.org/10.29333/ejmste/85874>
- Scherer, R., Siddiq, F., & Tondeur, J. (2019). The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers & Education*, 128, 13–35. <https://doi.org/10.1016/j.compedu.2018.09.009>

Vygotsky, L. S. (2016). Play and its role in the mental development of the child. *International Research in Early Childhood Education*, 7(2), 3–25

Bibliography:

Cherner, T. and Fegely, A. 2023. “Bridging the XR Technology-to-Practice Gap: Methods and Strategies for Blending Extended Realities into Classroom Instruction”. Association for the Advancement of Computing in Education. ISBN: 978-1-939797-67-4.

<http://tinyurl.com/bp7u5udv>

Cowan, P. and R. Farrell. 2023. “Using Virtual Reality to Support Retrieval Practice in Blended Learning: An Interdisciplinary Professional Development Collaboration between Novice and Expert Teachers”. *Digital 3*, no. 3: 251-272. <https://doi.org/10.3390/digital3030016>

Hamilton, D., McKechnie, J., Edgerton, E. and C. Wilson. 2021. “Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design”. *Journal of Computing Education*, no.8: 1–32. <https://doi.org/10.1007/s40692-020-00169-2>

Peisachovich, E., Appel, L., Sinclair, D., Luchnikov, V., & C. Da Silva. 2021. “CVRriculum program faculty development workshop: outcomes and suggestions for improving the way we guide instructors to embed virtual reality into course curriculum”. *Cureus*, no. 13(3): e13692. https://assets.cureus.com/uploads/technical_report/pdf/52352/20210401-2538-10i8ewx.pdf