

The Effects of Teachers' Whole Body Presence on the Learning Outcomes and Flow Experience of Students

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01 Background

HoloLearn is a multidisciplinary project that attempts to boost social interactions in online/remote/hybrid education via holograms.

- Social cues in multimedia messages invoke social response in learners, which leads to better **learning outcomes** (Mayer, 2014).
- **Flow experience** is expected to be more intense due to the immersive ambience enabled by the hologram; another study also found higher flow in students of the holographic lectures than the physical lectures (Paredes & Vazquez 2020).

02 Research Question

Research Question: How does viewing the whole body of the teacher affect learning outcomes and flow experience for students?

Hypothesis 1: Holographic lectures lead to better learning outcomes than Zoom lectures

Hypothesis 2: Holographic lectures lead to better flow experience than Zoom lectures

03 Research Method

Participants

6 (control) + 6 (treatment) = 12 participants, mostly B.Sc. CSE students.

Procedure

Two randomly separated groups of participants were invited to sign the consent forms, then took the pre-test. Their levels of knowledge were not different. Group A watched a Zoom lecture, Group B a holographic lecture of the same content. After each of the lectures, they took the post-test that measured learning outcomes. At the same time, questionnaires were given to students to measure flow experience.

Measurements

- Questionnaire → flow experience: 6 multiple-choice questions + 1 open question
- Pre-test + Post-test → learning outcomes: 7 identical questions

Design

Control Group: Zoom lecture; Treatment Group: holographic lecture

Independent variable: the modality of teaching

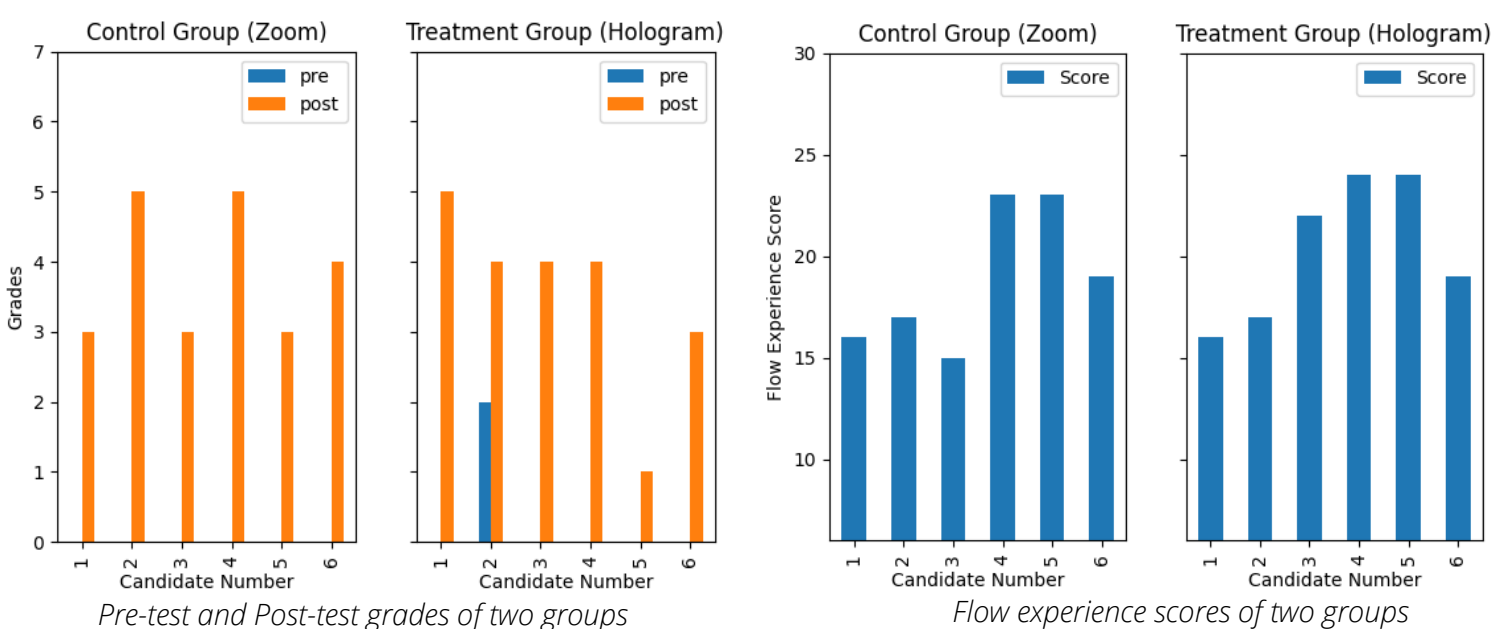
Dependent variables: the learning outcomes of students, students' flow experience

Confounding variables: previously existing knowledge of the subject

Apparatus

Video player (for Zoom lecture), HoloDisplay (for the hologram), monitors (for slides)

04 Results



The Mann-Whitney non-parametric test: for small sample size

Post-test	Mean	P value	Significance
Control	3.83	0.60	No difference
Treatment	3.50		

Flow Experience	Mean	P value	Significance
Control	18.83	0.21	No difference
Treatment	20.33		

05 Conclusion

Conclusion: for learning outcomes and flow experience, **no** statistically significant difference is found between the holographic and Zoom lectures

→ we do **not** reject the null hypothesis, H1 and H2 are not accepted

Future work: more diverse topics, longer duration, more participants, less information per lecture, difference post-tests

Mayer, R. E. (2014). *The Cambridge Handbook of Multimedia Learning* (2nd ed.). Cambridge University Press.

Paredes, S. G., & Vazquez, N. R. (2020). Is holographic teaching an educational innovation? *International Journal on Interactive Design and Manufacturing (IJIDeM)*, 14(4), 1321–1336. <https://doi.org/10.1007/s12008-020-00700-w>