The Impact of Guidance on Learning and Agency in a Virtual Reality Game for STEM Education

WORK IN PROGRESS

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Immersive Learning Research Network

Does having a guide in an open-ended VR educational game impact learning and sense of agency?

Providing guidance in a VR learning experience may help learners improve their focus and reduce cognitive load, but too much structure restricts their freedom to explore and direct their own learning, lessening their agency.[1,2] How effective self-directed versus instructor-directed learning is has been widely debated in learning sciences, but has not been widely studied in VR environments.[3,4]

In this study, we are testing whether having a guide in an open-ended and multiplayer educational game increases student learning, and whether it decreases learners' sense of agency. We are also assessing the impact of guidance on learners' communication with each other.

VIRTUAL EXCURSIONS FOR SCIENCE LEARNING (VESL)

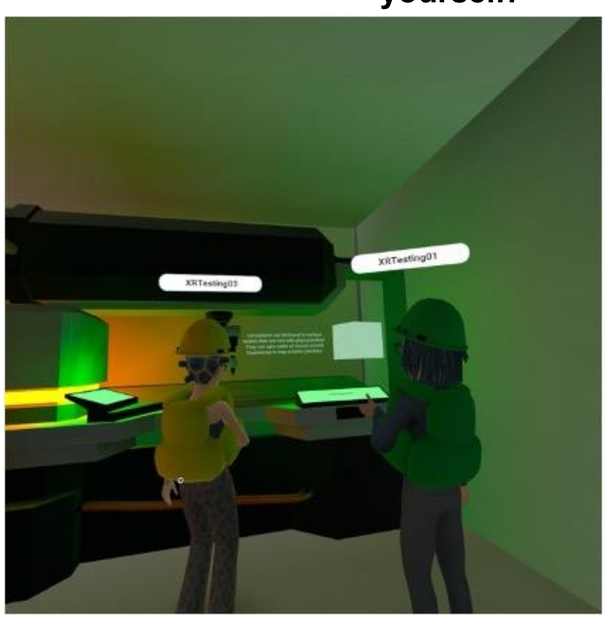
- VESL is an immersive educational VR game within Meta's Horizon Worlds where players take on the role of marine biologists on a research cruise to collect and analyze plankton samples.
- Players play in teams of 2-4 and take on different roles aboard the ship, working collaboratively to complete research tasks.
- The objective of VESL is to teach about plankton and the process of conducting research on a research cruise.
- The game is open-ended, and participants find their own way of navigating the tasks by following instructions.

Scan to try the game for yourself!

Guided Condition: A guide greets players at the port and shows them how to play

Players collaborate to collect plankton samples with the Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS)

Players use the ship's wet lab to extract plankton

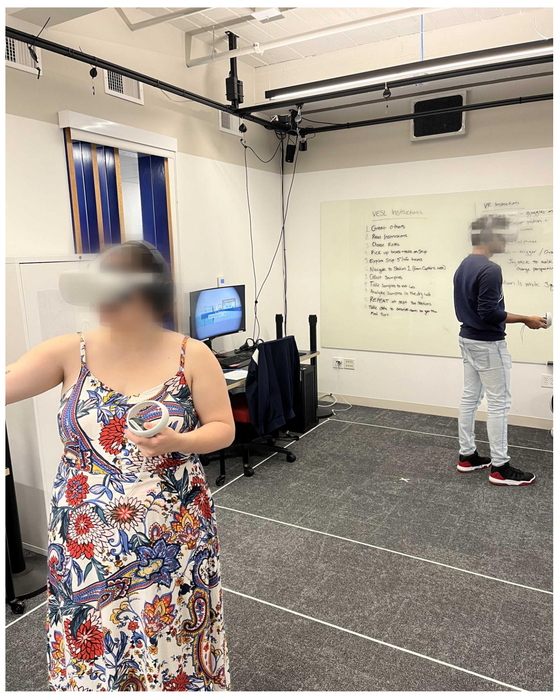


Players use the ship's dry lab to analyze plankton samples and learn about different species.

METHODOLOGY

Procedure

- Two participants joined each session to play the game.
- Participants were randomly assigned to either the 'guided' or 'unguided' condition.
- In the guided condition, a member of the research team joined remotely into the VESL session in Horizon Worlds and showed them how to play the game.
- In the unguided condition, players were given instructions prior to playing the game and then left to play on their own with no intervention.
- Participants were allowed to customize their avatar as it suited them.



Players in VESL during VR session

100 PARTICIPANTS

Gender Identity	
Female	53%
Male	42%
Non-Binary	3%
No Response	2%
Mean Age	22
Degree Level	
Undergraduate	52%
Graduate	47%
None Selected	1%

DATA

PRE-SURVEY : Multiple-choice content assessment, STEM Interest, Self-efficacy & Familiarity with Partner

POST-SURVEY : VHIL Presence Scale (Place, Body, and Social), Sense of Agency Scale (Learning, Actions, and Attention), Avatar Embodiment + Pre-Survey Measures

SESSION RECORDING : External capture of participant interactions and speech during VR session

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