Title of Unit with Author Information

***Utilising Virtual Reality to Enhance Learning Outcomes in Basic Programming: A Study on Engagement and Conceptual Understanding***

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Level and Year of Study: Level 6, Year 3

Chosen Research

***i. Description of Theme and Topic Rationale***

The study proposes investigating the integration of Virtual Reality into teaching of programming with the intention of addressing common challenges in teaching. Oftentimes, learners tend to have low attention spans, and even when they do pay attention, their comprehension is commonly termed as subpar due to their inability to understand programming as a material. The intended project aims to foster the use of VR technology and gamification with the objective to motivate learners to become actively engaged, learn, and remember information. This inquiry has been based on extensive works which demonstrate the positive effect of interactive learning environments and gamification on educational achievements. In the light of this investigation, learners will intuitively and efficiently grasp programming with the aid of interactive virtual classroom simulations.

***ii. Positioning and Research Onion***

This study pertains to the field of education, technological advancement and is particularly concerned with the teaching of programming.

Philosophy: A blend of qualitative and quantitative is proposed to make sure that both dimensions of the study are adequately catered to.

Approach: The hypotheses are tested employing deductive logic of game-based learning and VR integration theorization.

Strategy: Empirical Research, observational studies, and semi-structure interviews serve the purpose of collecting data from different resources.

Methods: Mixed methods combine statistical manipulation with the analysis of feedback from participants, and the qualitative examination of the pre-test/post-test procedure.

This approach guarantees effective data acquisition and analysis for the study while achieving the primary aims.

***iii. Background to This Research Theme***

The pedagogy of programming often hinges on the delivery of lectures which are monotonous and fail to captivate the learner’s attention. Research has proved that the application of gamification and VR into pedagogical practices has a positive impact on students’ motivation, understanding, and retention of concepts taught in class. For example, [1] designed a gamified educational application to teach Python programming and found that students became more engaged. [2] developed a VR game called “Thinkercise” that increased one’s ability to program by 40.8% and made learning both active and physical. Thematic studies by [3] showed that game-based methods considerably outperformed the traditional teaching approaches in both memory retention and student engagement. These results confirm that VR can fundamentally change the teaching of programming, which is the essence of this research.

***iv. Hypothesis***

*Students learning basic programming in a virtual reality environment will exhibit higher levels of engagement compared to those using traditional teaching methods.*

***v. Research Aim and Purpose Statement***

Aim: To investigate how virtual reality enhances engagement, comprehension, and retention in basic programming education compared to traditional methods.

Purpose: To provide educators with innovative tools that improve programming education outcomes while making learning more interactive, engaging, and effective.

[1] M. Hlavatý, A. Kozáková, and O. Haffner, "Application for Python Programming Language   
 Education Developed by Unity Engine," in Proceedings of the 29th International Conference   
 on Cybernetics and Informatics, 2022, pp. 1-5, doi: 10.1109/CYBERI.2018.8337533.

[2] T. Theethum, A. Arpornrat, and S. Vittayakorn, "Thinkercise: An Educational VR Game for   
 Python Programming," in Proceedings of the 18th International Conference on Electrical   
 Engineering/Electronics, Computer, Telecommunications, and Information Technology (ECTI-  
 CON), 2021, pp. 1-6, doi: 10.1109/ECTI-CON51831.2021.9454730.

[3] D. López-Fernández, A. Gordillo, P. P. Alarcón, and E. Tovar, "Comparing Traditional Teaching   
 and Game-Based Learning Using Teacher-Authored Games on Computer Science Education,"   
 IEEE Transactions on Education, vol. 65, no. 1, pp. 1-10, 2022, doi: 10.1109/TE.2021.3057849.