journal homepage: www.pktm.my

International Journal of Technical Vocational and Engineering Technology

e-SSN2710-7094, Vol.5, No.1 (2024)

Student's Perception of Virtual Gallery Walk (VR-InToWeb) in a Web Design Technology Course at Politeknik Balik Pulau

Wan Haniza Wan Hassim[1]*, Nurhani Mohd Sabri[2], Liyana Mat Rani[3]

[1, 2]Politeknik Balik Pulau, Pinang Nirai, Mukim 6, 11000 Balik Pulau, Pulau Pinang, Malaysia
[3]Politeknik Sultan Mizan Zainal Abidin, KM08, Jalan Paka, 2300 Dungun, Terengganu, Malaysia

*Corresponding Author email: whaniza@pbu.edu.my

ARTICLE INFO

Article History:
Received 10 December 2024
Revised 22 February 2024
Accepted 18 April 2024

Keywords:
ArtStep 3D platform,
Web Environment,
Virtual Gallery Walk

ABSTRACT

The Web Design Technology course is a specialization course taken by students of Diploma in Information Technology (Digital Technology) at Polytechnic Malaysia. Topic 1 of this course is theoretical learning related to Introduction to the Web Environment, which is usually explained through presentation slides. This method is unattractive, lacks technology integration, and does not follow the latest trends, causing the teaching and learning (TnL) process to receive less interest and attention from students. This learning method also ignores the need for personalization in learning, causing isolation and preventing maximizing the potential of each student. Therefore, an application called Virtual Reality for Introduction to Web Design (VR-InToWeb) was developed using several digital applications, such as Powtoon and Canva, which were then displayed through the Artstep 3D platform. This application features learning material through 3D objects, animation, audio and video. The main objective of this application is to create interesting teaching and learning (TnL) tool and personalization by allowing students to choose learning topics at their own pace. This study employed a quantitative research approach, utilizing a questionnaire as the primary method for data collection. The questionnaire was distributed to 33 students through the use of a Google Form. In general, the results of the study indicate that all of respondents gave positive feedback. Based on the findings, it is found that the interpretation of mean scores for all positive statements were high and moderately high while the interpretation of mean score for negative statement was low. In conclusion, based on the statements of the items in the questionnaire, the findings and data analysis at the same time proved that Virtual Gallery Walk (VR-InToWeb) is suitable to be used as teaching and learning (TnL) tool in Politeknik Balik Pulau.

1.0 Introduction

In the 21st century education, digital literacy is a critical skill as it empowers students to effectively utilize digital resources and technologies to solve problem and attain their objectives. Many educational institutions are utilizing digital technologies (Zain, 2020) as it can help improving digital literacy skills and Teaching and Learning (TnL). With the emergence of technologies from the Fourth Industrial Revolution (IR4.0) particularly Virtual Reality (VR), there are vast options to revolutionize the way TnL are conducted. Research studies has shown that the

use of VR in TnL has positive impact in improving the student's engagement and learning outcomes (Pirker et al., 2021; Rafiq et al., 2022). Schier et al. (2022) mentioned that the spatial presentation in VR has advantage in stimulating the mnemonic mechanisms thereby facilitating learning and recall. To gain the advantage of VR, the researchers has developed a VR application namely VR-InToWeb. VR-InToWeb is a collection of learning videos crafted for chapter one in DFT40163 Web Design Technology course which is offered for students in Diploma Information Technology (Digital Technology) in Polytechnic Malaysia. These videos are displayed as a virtual gallery of learning materials in the Artstep platform. The VR-InToWeb has been implemented as Virtual Gallery Walk in Polythecnic Balik Pulau to overcome issues lack of student interest in traditional slide presentations. The objective is to create a more interesting TnL by combining the virtual environment and the real environment in the classroom. However, does the implementation of VR-InToWeb able to improve student interest and achieve learning outcomes? This paper investigates the acceptance level of the Virtual Gallery Walk using VR-InToWeb. A survey has been conducted to 33 students who took Web Design Technology Course in Session 2, 2022/2023.

2.0 Literature review

In this digital era, emerging technology that can substitutes computer-generated sensory input with real-world sensory input is known as Virtual Reality (VR). VR able to creates a computer-generated simulation of an environment, allowing users to interact with and explore a virtual world. It is aimed at creating an experience of presence in the virtual environment by activating the user's senses, such as vision and hearing. (Marougkas et al., 2023). As a result, virtual reality (VR) is widely applicable and has been used in a variety of educational applications, such as sciences, archaeology, architecture and history. The advantage of virtual reality above traditional explanation methods is that it allows students to experience subject matter that would be difficult, if not impossible, to show or convey using traditional methods. The immersive and interactive nature of VR can increase learners' motivation and engagement in the learning process. The sense of presence and the ability to actively participate in the virtual environment can make learning more enjoyable and (Radianti et al., 2020).

ArtSteps virtual gallery is a web-based program that allows you to watch and create virtual exhibitions. The features in ArtSteps such as catalog entries, archival frames, accompanying music, and a virtual guestbook for feedback and suggestions are valuable tools that can enhance student learning and understanding (Samsiyah & Ludwinia Azzahra, 2022). ArtSteps virtual and immersive learning environments may include two-dimensional resources like images and posters, as well as three-dimensional items like small installations or streaming videos. ArtSteps is an innovative web-based technology that enables producers to construct virtual exhibitions, events, and a virtual narrative environment (Cruz & Torres, 2022). By using VR-InToWeb application makes student more interesting in class because they can explore the gallery virtually and it's very easy to used. ArtSteps is simple to use; users may create their own settings and rooms and add information to them such as online connections, text, music, and video. (Samsiyah & Ludwinia Azzahra, 2022). Table 1.1 summarize the finding on related works in application of VR in education.3.0 Methodology.

3.0 Methodology

3.1 Quantitative Design Methods

The main objective of this study is to evaluate the effectiveness of TnL method which is the Virtual Gallery Walk using VR-InToWeb for Topic 1 Introduction to Web Environment that has been conducted at Politeknik Balik Pulau. This study used survey as a method for data collection. There 10 questionnaires used in the study, which is intended to measure the effectiveness of the TnL method.

3.2 Sample

The study involved 33 students from Semester 4, Department of Information and Communication Technology (JTMK) at Politeknik Balik Pulau who took Web Design Technology course in session 2, 2022/2023.

3.3 Instrument

This study employed a quantitative research approach, utilizing a questionnaire as the primary method for data collection. The questionnaires were distributed to 33 students through the use of a Google Form. Questionnaire is a widely acknowledge effective instruments for data collection (Taherdoost, 2019). A total of 33 respondents were selected through purposive sampling to participate in the study. A survey was conducted utilizing a questionnaire that was adapted from a study conducted by (Setiawan et al., 2022).The questionnaire consists of 10 items, which were assessed using a Likert scale. The specific details and measurements can be found in Table 1.2, as referenced from the work of (Taherdoost, 2019). The Likert scale is widely recognized as a fundamental and commonly employed psychometric tool in research within the fields of education and social sciences (Joshi et al., 2015). The participants were instructed to indicate their responses to the statement items using a scale ranging from 1 to 5.

Table 1.2: Likert Scale (Taherdoost, 2019)

Declaration Scale	Scale
Strongly Agree	5
Agree	4
Neither Agree or Disagree	3
Disagree	2
Strongly Disagree	1

3.4 Data Analysis Method

The interpretation of mean scores is shown in Table 1.3 below, adapted from Ibrahim et al. (2015) The level of effectiveness of VR-InToWeb as a learning tool at Politeknik Balik Pulau has been determined through a descriptive analysis using the mean and standard deviation scores analyzed with Microsoft Excel 2016 software.

Table 1.3: Interpretation of means score (Ibrahim et al., 2015)

Mean Score	**Interpretation**
1.00 – 2.00	Low
2.01 – 3.00	Moderately Low
3.01 – 4.00	Moderately High
4.01 – 5.00	High

4.0 Discussion of analysis and findings

The information that has been collected from the questionnaire is analyzed descriptively and the results as per shown in Table 1.4, Table 1.5 and Figure 1.1.

Table 1.4: Mean score, Standard Deviation, and Interpretation of all items in the questionnaire

No	Item	Mean	Standard Deviation	Score
1	The application and method used increase my interest in learning	4.33	0.69	High
2	The application and method of virtual gallery walk is better than the traditional lectures.	4.00	0.43	Moderately High
3	I hope to have TnL using the application and method again.	4.00	0.66	Moderately High
4	I feel free and more flexible using this application to understand Topic 1.	4.21	0.65	High
5	I understand Topic 1: Introduction to Web Design which has been presented in each gallery (subtopic).	4.36	0.60	High
6	This application makes it easy for me to review this topic at any time.	4.88	0.33	High
7	I like lecturers using this application and method in TnL.	4.00	0.56	Moderately High
8	This application and the method used help me visualize learning theory better.	4.03	0.73	High
9	I think this application and method is boring	1.76	0.61	Low
10	This application and method are suitable to be applied in other subjects.	3.97	0.59	Moderately High

Table 1.5: Percentage distribution of all items in the questionnaire based on Likert Scale

No	Item	Strongly Agree and Agree	Neither Agree nor Disagree	Disagree and Strongly Disagree
1	The application and method used increase my interest in learning	87.9%	12.1%	0.0%
2	The application and method of virtual gallery walk is better than the traditional lectures.	90.9%	9.1%	0.0%
3	I hope to have TnL using the application and method again.	78.8%	21.2%	0.0%
4	I feel free and more flexible using this application to understand Topic 1.	87.8%	12.1%	0.0%
5	I understand Topic 1: Introduction to Web Design which has been presented in each gallery (subtopic).	93.9%	6.1%	0.0%
6	This application makes it easy for me to review this topic at any time.	100.0%	0.0%	0.0%
7	I like lecturers using this application and method in TnL.	84.9%	15.2%	0.0%
8	This application and the method used help me visualize learning theory better.	75.8%	24.2%	0.0%
9	I think this application and method is boring	0.0%	9.1%	90.9%
10	This application and method are suitable to be applied in other subjects.	81.8%	18.2%	0.0%

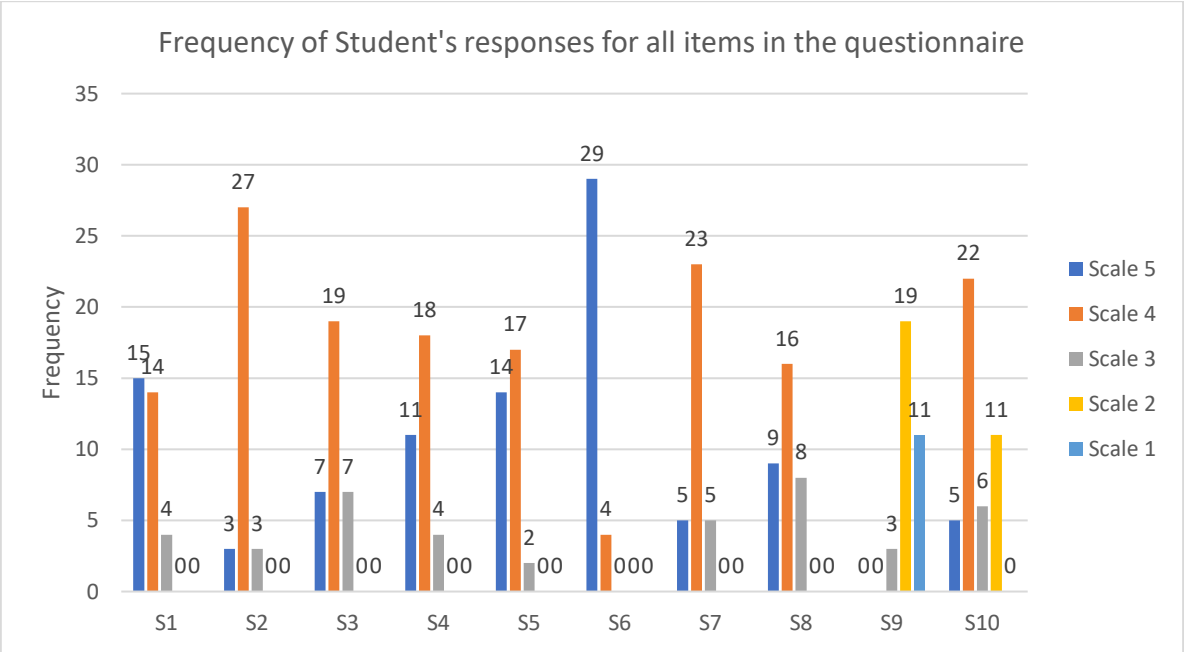

Figure 1.1: Frequency of student's responses for all items in the questionnaire

In general, the results of the study indicate that most respondents gave positive feedback. Based on the findings from Table 1.4, Table 1.5 and Figure 1.1, it is found that the frequency of respondents who strongly agree and agree is greater than those who strongly disagree and disagree for each questionnaire item except item 9 (Negative Statement). At the same time, overall Mean Score for positive items is 4.16 which is high. All of the respondents strongly agree and agree (100.0%) that VR-InToWeb makes it easy for them to review the topic at any time. Most of the respondents (93.9%) strongly agree and agree that the VR-InToWeb help them to understand Topic 1 and 90.9% respondents agree and strongly agree that the virtual gallery walk is better than the traditional lectures. Besides that, 87.9% strongly agree and agree that the VR-InToWeb increase their interest in learning, 87.8% agree that they feel free and more flexible while using VR-InToWeb to understand Topic 1, 84.9% respondents like lecturers using this application and method in TnL and 81.8% agree that this application and method are suitable to be applied in other subjects. Besides, 90.9% strongly disagree and disagree that VR-InToWeb application and method is boring. In conclusion, based on the statements of the items in the questionnaire, the findings and data analysis at the same time proved that VR-InToWeb is suitable to be used as learning tool for students in Politeknik Balik Pulau.

The items in the questionnaire were designed to obtain information about the level of student's acceptance towards the use of VR-InToWeb as learning tool. Items 1 to 6 were used to see if the application can increase their interest in learning, can feel free and more flexible while using the application, it can help them to understand about the topic and makes it easy for them to review the topic at any time. From the analysis conducted, it was found that more than 78.8% strongly agreed and agreed with the statement of the items. This showed that almost all respondents strongly agree and agree with the usefulness of the VR-InToWeb that has been produced and this coincides very well with the response shown for statement item 7.

Items 8 was used to assess if the VR-InToWeb can help them visualize learning theory better where more than 75.8% agree with that statement. This was also proven by the agreement of more than 81.8% of respondents with the statement of Item 10 which stated that the VR-InToWeb is suitable to be applied in other subjects.

However, the percentage of respondents who strongly disagree and disagree with the statement of item 9 is greater than the percentage of respondents who strongly disagree and disagree with the statement of other items. There are almost 90.9% of respondents who do not feel that VR-InToWeb is boring. It shows that all respondents agree that VR-InToWeb is suitable to be used as learning tool for Topic 1 in Web Design Technology at Politeknik Balik Pulau.

The result from these studies is in line with the findings that has been done by the previous studies (Ab Wahab et al., 2022; Pirker et al., 2021;, 2021; Schier et al., 2022; Setiawan et al., 2022). It shows that the use of virtual reality is more effective and able to increase student interest. Table 1.6 shows the comparison of current study and previous study.

Table 1.6: Comparison with the current study and previous study

Studies	VR Tool	Teaching Topic	Method	Conclusion
Setiawan et al. (2022)	ArtStep	Plant and Animal Classification	Survey	Students responded positively to the use of Gallery Walk Method with the ArtSteps program for online learning. Studies shows the method increased creativity, engagement in online learning, and enjoyment of peer presentations. However, challenges with internet access and limited genuine communication were observed. The results suggest that utilizing the ArtSteps application alongside the Gallery Walk Method can empower students to engage in constructivist, student-centered, cooperative, and collaborative learning.
Schier et al,. (2022)	TeachInVR	The Neurobiological Correlates of Compassion vs. Empathy	Survey	TeachInVR offers an immersive multi-user teaching and learning experience, allowing for both in-person and remote connections. It enables teachers to easily bring existing content into VR, promoting engagement and co-presence among students and teachers. The platform supports various activities like teaching, presenting, studying, and collaborating, providing a sandbox environment for testing new teaching methods in VR.
Pirker et al., (2021)	Unity 3D	Sorting Algorithms	Survey	The study highlights the potential of virtual reality as a learning tool for computer science education, specifically focusing on sorting algorithms. By comparing web-based and VR-based environments, the research demonstrates that VR offers a more interactive and engaging experience for learners. Participants preferred the VR environment over the web-based one, citing reasons such as increased interactivity, user-friendliness, and overall enjoyment.
Ab Wahab et. Al (2022)	Virtual Reality 360-Degree Video	Universal Design	Survey	The study on teaching and learning Universal Design through Virtual Reality 360-Degree Video showed that 100% of respondents agreed that VR technology could enhance interest in learning Universal Design. Additionally, the technology was found effective in clarifying the concept of Universal Design and overcoming constraints in teaching and learning this topic.
Our Study	ArtStep	Introduction To Web Environment	Survey	The study findings indicate that the Virtual Gallery Walk (VR-InToWeb) is suitable as a teaching and learning tool. Results show high acceptance and positive feedback from students, with most respondents strongly agreeing with the effectiveness of VR-InToWeb. The VR application was found to increase student interest, improve understanding of topics, and provide flexibility in learning, making it a valuable tool for education.

5.0 Conclusion and future research

This study aimed to investigate the student's perception towards Virtual Reality (VR) application namely VR-IntoWeb. This application has been developed for Chapter 1 in Web Design Technology course taken by Diploma students in Polytechnic Balik Pulau. The VR-InToWeb has been implemented in the classroom as virtual gallery walk. The method used in the study is using questionnaire to 33 students from Semester 4, Department of Information and Communication Technology (JTMK). The result from the study shows that the use of VR application is more effective and able to increase student interest compared to traditional way of lecture using slide presentation. VR technology offers a lot of potential in education which can be used and expand to provide more interesting environments to the classroom. By implementing VR in teaching and learning process can help overcome difficulties for students in challenging courses such as theory courses, which can be achieved through increased participation, collaboration, sharing and exchanging of ideas and perspectives, thus enabling and supporting active learning. With the interactive visual experience of VR, it also makes it easier for student to recall information in the virtual environment and thus increase understanding and learning outcome.

This research is very important to identify the implications for future investment in VR application for teaching and learning in polytechnics. VR technologies are now embedded in our society. Focus has shifted from whether to use them in teaching and learning, to understanding which technologies can be used for what specific educational purposes and then to investigate how best they can be used and embedded across the range of educational contexts in polytechnics. In future, the researchers would like to develop and explore more customize VR applications which can be used to improve TnL especially in Polytechnic.

Acknowledgements

The research was supported by Politeknik Balik Pulau (PBU) and Politeknik Sultan Mizan Zainal Zainal Abidin (PSMZA).

Author Contributions

Wan Hassim, H. Author: Application, Methodology, Supervision; **Mohd Sabri. N. Author**: Conceptualization, Application, Writing- Original Draft Preparation; **Mat Rani. L. Author**: Application, Validation, Writing-Reviewing and Editing.

Conflicts Of Interest

The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its Submission and declare no conflict of interest in the manuscript.

6.0 References

Ab Wahab, S., Daud, N. A., & Hussain, H. (2022). An Experimental Study on Teaching and Learning Universal Design Through Virtual Reality 360-Degree Video. *E-Proceedig of 4th International Conference on Applied Science, Engineering, Information and Techonology (ICo-ASCNITech2022)*.

Bukhari, S. A. R. (2020). A Graduate's Handbook for Writing High-Quality Thesis (1st Edition) Strategic Management View project Islamic Banking View project. *Research Gate*.

Cruz, S., & Torres, A. (2022). Virtual and Immersive Learning Environments Using Artsteps: Exploratory Study With Teachers. *Proceedings of the International Conference E-Learning 2022*.

Ibrahim, W. N. A., Bakar, Ab. R., Asimiran, S., Mohamed, S., & Zakaria, N. S. (2015). Impact of Entrepreneurship Education on the Entrepreneurial Intentions of Students in Technical and Vocational Education and Training Institutions (TVET) In Malaysia. *International Education Studies*, *8*(12), 141.

Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, *7*(4).

Marougkas, A., Troussas, C., Krouska, A., & Sgouropoulou, C. (2023). Virtual Reality in Education: A Review of Learning Theories, Approaches and Methodologies for the Last Decade. In *Electronics (Switzerland)* (Vol. 12, Issue 13). Multidisciplinary Digital Publishing Institute (MDPI).

Pirker, J., Kopf, J., Kainz, A., Dengel, A., & Buchbauer, B. (2021). The potential of virtual reality for computer science education -engaging students through immersive visualizations. *Proceedings - 2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops, VRW 2021*, 297–302.

Qorbani, H. S., Arya, A., Nowlan, N., & Abdinejad, M. (2021). ScienceVR: A Virtual Reality Framework for STEM Education, Simulation and Assessment. *Proceedings - 2021 4th IEEE International Conference on Artificial Intelligence and Virtual Reality, AIVR 2021*, 267–275.

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers and Education*, *147*.

Rafiq, A. A., Triyono, M. B., & Djatmiko, I. W. (2022). Enhancing student engagement in vocational education by using virtual reality. *Waikato Journal of Education*, *27*(3), 175–188.

Samsiyah, S., & Ludwinia Azzahra, D. (2022). Artstep Application As An Effective Practical Learning Alternative For Students Diploma IV Archives (A Case Study Of The Use Of Artstep Applications For Diploma IV Archival Science Students In The Publication Practice Course And Archive Exhibition). *Proceeding of the International Conference on Innovation in Open and Distance Learning : Emerging Technology for Open and Distance Education: Opportunity, Agility, and Adaptibility*, *3*, 2022.

Schier, F., Chandran, K., & McGinity, M. (2022). TeachInVR: A Virtual Reality Classroom For Remote Education. *Proceedings - 2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops, VRW 2022*, 283–286.

Setiawan, H., Riandi, R., & Supriatno, B. (2022). Inovasi Metode Gallery Walk pada Pembelajaran Online dengan Aplikasi Artsteps selama Pandemi Covid-19. *Asatiza: Jurnal Pendidikan*, *3*(2), 78–94.

Taherdoost, H. (2019). What Is the Best Response Scale for Survey and Questionnaire Design; Review of Different Lengths of Rating Scale / Attitude Scale / Likert Scale. In *International Journal of Academic Research in Management (IJARM)* (Vol. 8, Issue 1).

Zain, S. (2020). Digital transformation trends in education. In *Future Directions in Digital Information: Predictions, Practice, Participation* (pp. 223–234). Elsevier. https://doi.org/10.1016/B978-0-12-822144-0.00036-7