Jurnal Mantik, 5 (3) (2021) 1479-1482

Published by:Institute of Computer Science (IOCS)

Jurnal Mantik

Journal homepage: www.iocscience.org/ejournal/index.php/mantik/index

Interactive Virtual Reality For Fun Mathematics Learning With Deep Understanding At SMP Swasta Ar-Rahman Percut

Herman Mawengkang[1], Syahril Efendi[2], and Muliawan Firdaus[3]

[1]Department of Mathemtics, Faculty of Mathematics and Science, University of Sumatera Utara, Jl. Dr. T. Mansur No. 9, Medan, 20155, Indonesia
[2]Department of Computer Science, Faculty of Computer Science and Information Technology, University of University of Sumatera Utara, Jl. Dr. T. Mansur No. 9, Medan, 20155, Indonesia
[3]Graduate School of Mathemtics, Faculty of Mathematics and Science, University of Sumatera Utara, Jl. Dr. T. Mansur No. 9, Medan, 20155, Indonesia

E-mail: hmawengkang@yahoo.com

ARTICLE INFO

Article history:

Received: Jul 20, 2021
Revised: Aug 15, 2021
Accepted: Oct 06, 2021

Keywords:

Virtual Reality;
Mathematics Learning;
Junior High School.

ABSTRACT

This partnership program was intended to solve problems that arose at SMP Swasta Ar-Rahman Percut such as the lack of teacher skills in developing learning media to foster students' motivation and implementing online teaching that optimizes the use of technology. In the context of online learning, such difficulties will increase. The solutions offered were training through workshops on the development of interactive virtual reality (VR) using OpenSpace3D and assistance in the implementation. Five stages: Learn, Teach, Evaluate, Acknowledge, and Fostering in the method were held sequentially. Adult learning principles, focusing on experiential learning and self-motivation, were applied to encourage participants and instructors to actively participate. Results showed that the program has made a significant impact on teachers' skills in developing and implementing interactive VR in fun mathematics online learning.

1. Introduction

The Internet seems increasingly important in all aspects of life including education as the number of its users continues to increase. APJII's survey in the second quarter of 2019-2020 reported that there were 196.7 million Indonesian internet users. It also reported that there was 13.3 percent of teenagers (aged 13-17 years) as social media users and 21.1 percent of them actively playing games every day using smartphones as the main choice of communication devices [1]. This number has been projected to continue to increase, especially during the Covid-19 pandemic where the government urges the public to stay, work, worship, and study at home to prevent its spread.

However, while studying at home, it is not uncommon to find complaints from parents to the school about their children spending more time playing games and accessing social media. Distance learning using smartphones and weak parental control seem to make students tend to seek entertainment and forget about studying. The same thing also happened at the SMP Swasata Ar-Rahman Percut, a junior high school owned by the Yayasan Hajjah Rachmah Nasution which is located on Jl. Percut, Desa Kangungan, Kecamatan Percut Sei Tuan, Kabupaten Deli Serdang. The teacher at the school always finds complaints from parents, which are not only about their children who are often caught playing games and accessing social media during study hours but also the topic of conversation among their children's friends is no longer about lessons but is dominated by games or the latest issues on social media. In addition, teachers were also worried about the negative effects of uncontrolled use of mobile devices such as inhibited development of social interactions in the real world, boredom, reduced physical activity, and laziness.

Accredited "Rank 4"(Sinta 4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

Answering these complaints, the school added several tasks so that students focus on learning activities. However, these additional assignments are still ignored, even causing new complaints from diligent students who really want to do assignments. From interviews with several students, it was revealed that their strong tendency to play smartphones during learning, especially learning mathematics, was not only caused by their difficulty in understanding concepts but also caused by boring and unpleasant learning. No wonder their motivation to use smartphones is much greater than their motivation to study. If this problem is not addressed immediately, the quality of the teaching and learning process will deteriorate which has a direct impact on student learning outcomes. Thus, SMP Swasta Ar-Rahman Percut needs a solution that can not only solve this problem in a short time but also a solution that allows it to be implemented.

2. Methods

The implementation method refers to the Learn-Teach-Evaluate-Acknowledge method proposed by Buckenmeyer *et al*. [2] with several modifications made through the addition of a Fostering phase for the continuation of activities and the adjustment of each phase to the principles of adult learning. Programs that focus on experiential learning and self-motivation are intended to encourage participants and instructors to actively participate [3]. The participants in this activity were three mathematics teachers at SMP Swasta Ar-Rahman Percut.

3. Results

The partnership program is carried out face-to-face by implementing strict health protocols. The description of the implementation of activities which includes the stages of Learn, Teach, Evaluate, Acknowledge, and Fostering is described as follows.

3.1 Learn

This stage begins with a teaching experience sharing session that focuses on the learning design process. This session involved three resource persons who delivered material on the role of technology in learning, fun learning for junior high school students, and learning with a depth of understanding (Figure 1).

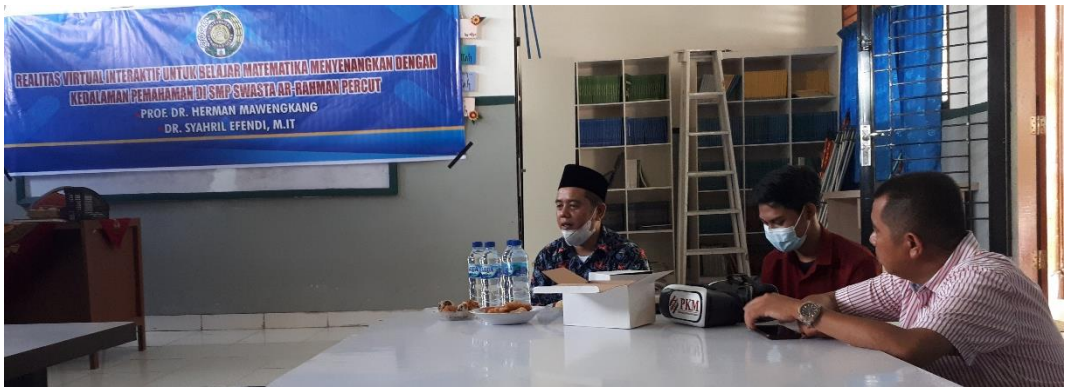

Figure 1. Teaching experience sharing session

The activity continued with a workshop session on the development of interactive VR using OpenSpace3D (Figure 2). This software is a free and open-source platform, designed to create virtual and augmented-reality applications which can be downloaded from https://www.openspace3d.com/.

3.2 Teach

Accompanied by an instructor, participants teach with interactive VR they designed and developed previously. Instructional design refers to the stages proposed by Firdaus, *et al*. [4] and teaching materials proposed by Darari & Firdaus [5] for online interactive learning. During the activity, the instructor reviews the teaching carried out by the participants and the interactive VR developed by the participants to provide opinions for improvement (Figure 3).

Accredited "Rank 4"(Sinta 4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

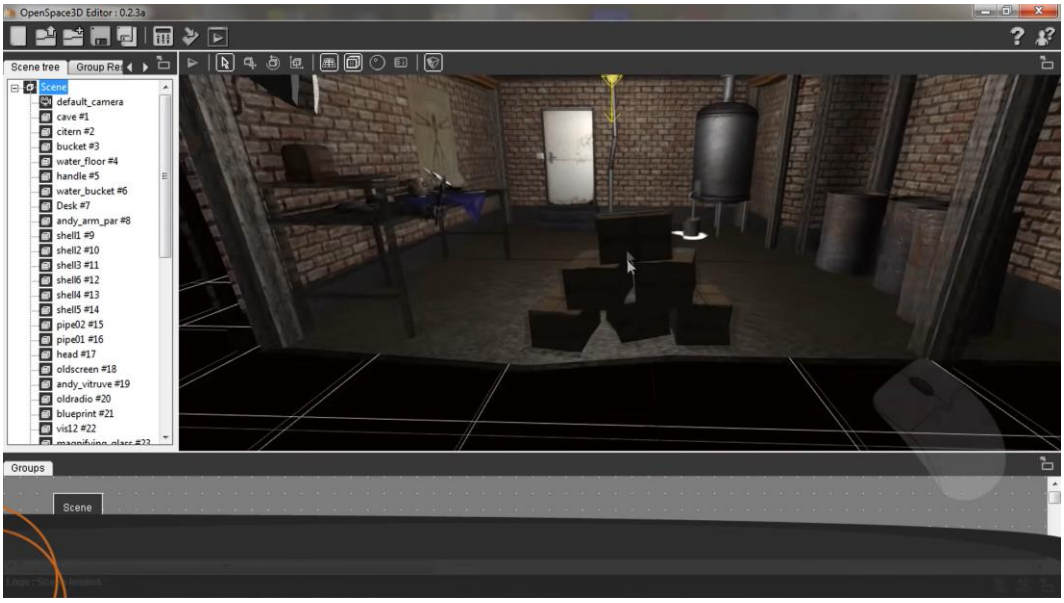

Figure 2. OpenSpace3D

3.3 Evaluate

The evaluation stage was carried out on participants teaching with interactive VR and the level of student success in the teaching practice. The assessment of teaching practice used an instrument adapted from Safitri & Sontani [6] consists of eight aspects of measurement: opening learning, explaining, closing learning, asking questions, giving reinforcement, doing variations, conducting demonstrations, and using interactive VR. The results showed that the ability of participants in carrying out learning practices was in a good category.

The level of student success in teaching practice was assessed using an instrument developed previously with reference to the online formative assessment suggested by Mukhtar *et al*. [7]. The results showed that student learning outcomes had reached 80% of the minimum completeness criteria (according to the provisions of SMP Swasta Ar-Rahman Percut) both classically and individually.

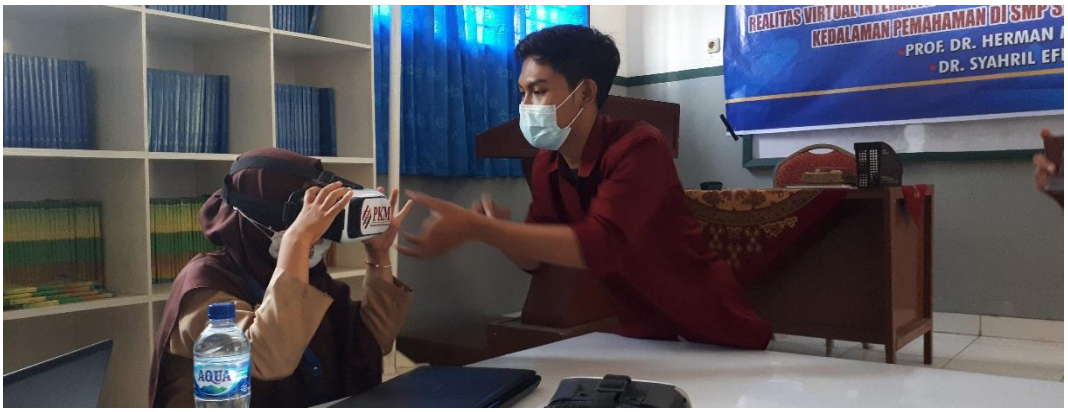

Figure. 3. Mentoring the participants

3.4 Acknowledgment

In this stage, a graduation certificate was given to participants who were declared to have passed based on the results of the evaluation of the learning implementation. This stage involves participants who pass as instructors (peers) in the process of improving the learning of other participants who have not passed.

Accredited "Rank 4"(Sinta 4), DIKTI, No. 36/E/KPT/2019, December 13th 2019.

3.5 Fostering

This stage was aimed at ensuring the sustainability of the activity. The activity plan consists of meeting with participants every four months, creating and distributing discussion guides for the meetings, and reviewing the results and implementation of the meetings annually for continuous improvement.

4. Conclusion

It should be the main concern that current junior high school students are the millennial generation, the generation of the digital era, and social networks, whose lives are very close to technology. Adjustment of the education system is a big challenge for the government, especially educators who must be addressed appropriately in order to meet the learning needs of students. Therefore, the integration of digital media through smartphones in learning is an important strategy to consider in an effort to meet the learning needs of students who generally have a strong preference for things related to technology.

The current availability of smartphones with increased usability, internet connectivity, data processing power, and accessibility at scale allows the use of VR applications on mobile devices for use in learning mathematics. Virtual reality applications that combine 3-D virtual objects with real 3-D environments and appear together in real-time allow students to see real objects interact with virtual objects superimposed on them so that students' understanding of 3-D objects is believed to be enhanced in a more comprehensive way of experience. Finally, this partnership program had shown that the learning experience created through this application which is the same as the experience in playing games on mobile devices is believed to make learning mathematics more enjoyable.

Acknowledgment

This partnership program and publication of the results have been supported by grants from the University of Sumatera Utara, Indonesia. Support from Zainuddin Hasibuan, Headmaster of SMP Swasta Ar-Rahman Percut, is also greatly acknowledged.

5. References

[1] APJII, Laporan Survei Internet APJII 2019 - 2020 [Q2], 2020, retrieved September 29, 2020.

[2] J. Buckenmeyer, E. Hixon, C. Barczyk, & L. Feldman, "Does Participation in a Faculty Distance Education Mentoring Program Comprehensively Improve Teaching Methods?," *International Journal on E-Learning*, vol. 12, no. 12, pp. 139-152. 2013.

[3] J. Walker, "Shame and Transformation in the Theory and Practice of Adult Learning and Education," *Journal of Transformative Education*, vol. 15, no. 4, pp. 357-374. 2017.

[4] M. Firdaus, Mukhtar, M.B. Darari, & Z. Azis, "Designing Interactive Videos in Online Multivariable Calculus Course to Support Student's Critical Thinking," *Journal of Physics: Conference Series*, 1819, 012057. 2021.

[5] M.B. Darari & M. Firdaus, "Development of Teaching Materials Based 'Activity or Resources' At Sipda Unimed to Enhance Students Learning Behavior," *Journal of Physics: Conference Series*, 1462, 012022. 2020.

[6] E. Safitri & U.T. Sontani, "Keterampilan mengajar guru dan motivasi belajar siswa sebagai determinan terhadap hasil belajar," *Jurnal Pendidikan Manajemen Perkantoran*, vol. 1, no. 1, pp. 144-153. 2016.

[7] Mukhtar, Mulyono, & M. Firdaus, "Enhancing Students Multivariable Calculus Learning Through Online Formative Feedback," *Journal of Physics: Conference Series*, 1819, 012058. 2021.