e-ISSN 2963-2870
Vol 3 2022

AUGMENTED REALITY VIDEO AS A LEARNING MEDIA FOR DOING CHEMISTRY PRACTICUM

Sandra Sukmaning Adji

Universitas Terbuka (INDONESIA)

Abstract

Augmented reality videos in this study are learning videos that contain practical activities on experimental topics that can be accessed via smartphones, but do not describe the direct interaction of the user. The purpose of this study was to explore the views of students and lecturers on the need for augmented reality video learning media about the introduction of laboratory equipment and examples of experiments to help students prepare for practicum. This research is survey research with an instrument in the form of augmented reality video which is equipped with a questionnaire and interview guide. A survey through a questionnaire was conducted on 39 Chemistry Education students and interviews were conducted on 4 lecturers of the Chemistry Education study program. Data were analyzed descriptively qualitatively. The results obtained show that (1) The experimental material can be accessed by students via smartphones and is considered efficient because it does not require the use of a large internet network, (2) The results of student respondents' impressions of the learning media provided are considered good and necessary, easy to use, have pictures interesting, showing clear articulation, in accordance with learning objectives, can be used to introduce students to experimental material. In addition to the good response given by respondents, there are several suggestions including 1) The use of markers should only appear on the camera so that the markers do not have to be scanned again, 2) it is necessary to revise this application because when the camera shifts the video will disappear and if it is re-scanned then the video will start again from the beginning. Although there are several obstacles, in general, augmented reality videos are useful as a provision for doing practicals.

Keywords: augmented reality video, the chemistry practicum course, student's response.

1 INTRODUCTION

The introduction of laboratory equipment is provided in order to obtain the required learning outcomes in one subject in one study program such as the Chemistry Education study program at the Open University. The course in question is the Chemistry Practicum course. The introduction of laboratory equipment, especially chemical laboratories, needs to be introduced to its users. This is so that dangerous things do not happen due to the nature and presence of chemical substances. There are limited materials and tools at secondary school partners if practicum activities are carried out there, resulting in several experimental topics that students cannot carry out (Sunarsih and Hamda (2017). Students who are in areas far from cities and far away from university partners, practicum activities can be carried out in partner schools. practicum activities can generally be carried out well. With the conditions of the presence of students and independent study students, students need to be equipped with an introduction to laboratory equipment as well as experimental examples before they actually work in the laboratory. Provision of knowledge that can describe / visualize the existence of a tool that will be used as well as examples of practicum activities aimed at avoiding obstacles to doing practicum.In addition, the development of web and internet

technology is currently playing a role in the development of a learning media lesson. Learning media are becoming more interesting and more concise even though they do not reduce the essence of the material (Heinich, R., Molenda, M. & Russel, J.D.; 1989). One of the developments in learning media that is currently still new is learning media using Augmented Reality.

Augmented Reality is an application that combines the real world with the virtual world in two-dimensional and three-dimensional forms that are projected in a real environment at the same time. (The use of Augmented Reality as an alternative learning media is expected to be more attractive to students. Another benefit that can be found is what is obtained is that Augmented Reality learning media can be a solution to overcome the constraints of sufficient modules or trainers and students can still carry out practicums by seeing goods as they are, but in virtual form. The Chemistry Education study program at UT offers chemistry practicum courses that students must follow. Some students experience problems in doing practicum due to lack of familiarity with the nature and use of laboratory equipment. Therefore students are equipped with augmented reality video-based learning, even though the level of direct interaction from this media cannot be achieved. The results of the development need to be tested on students. In connection with this then

1. How is the development of augmented reality applications based on videos of laboratory equipment and chemical experiments?
2. How do students respond to augmented reality shows from videos of laboratory equipment and chemical experiments?

2 METHODOLOGY

This research is a research on the development of augmented reality applications from videos of chemical experiment tools and examples of chemical experiments. The video has previously been developed and validated. Then made a marker and its application program. Furthermore, to assess the quality of the results of developing this augmented application, a questionnaire was used through a survey given to 39 students and 4 chemistry lecturers. The questionnaire instrument developed was validated by 2 Chemistry Education lecturers and 1 learning designer. In collecting data, students are collected in one room given an initial briefing, then divided into small groups of 2-4 students to try the augmented reality application one by one. After trying the students were given an instrument in the form of questions to assess the quality of the augmented reality application. The results of the questionnaire received were analyzed descriptively qualitatively.

e-ISSN 2963-2870
Vol 3 2022

3 FINDINGS AND DISCUSSION

3.1 Development of augmented reality video program applications

The existence of Chemical Education student respondents includes 39 regular class students, meaning they are students participating in class learning. Students of the Chemistry Education study program who were the respondents consisted of 79.5% women and 20.5% men, and their ages ranged from 18 to 21 years.

In the development of augmented reality applications, it was initially developed in the form of a marker that was read via an Android cellphone with an application address link. Then download and install the AR application and then the icon will appear on the HP screen. Then open the application that has been installed by clicking on the icon on the Android cellphone and the HP camera directed to the marker to access the video, and an animated video related to the practical procedures for simple laboratory tools will appear on the cellphone screen.

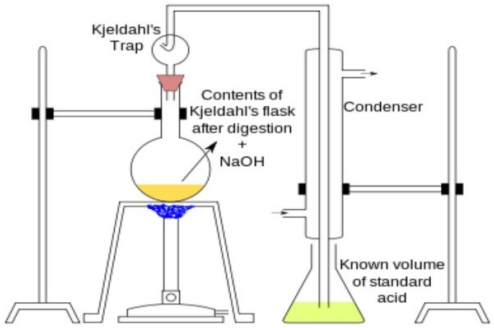

Figure 1. Kjeldahl Destruction Tool

After the augmented application has been developed, students are gathered in one room given an initial briefing, then divided into small groups of 2-4 students to try the augmented reality applications one by one. As shown in Figures 2 and 3. The results obtained show that the experimental material can be accessed by students via smartphones

e-ISSN 2963-2870
Vol 3 2022

Figure 3. Group Briefing

Figure 4. Small Group Briefing

3.2 Student response to the augmented reality video program application

The results of student respondents' impressions of the learning media provided are considered good and necessary, easy to use, have interesting pictures, show clear articulation, in accordance with learning objectives, can be used to introduce students to the material. El-Ariss et al. (2021). Video-based e-learning provides better learning outcomes through the e-learning approach and effectively engages an audience and provides a multi-sensory learning environment to present information interestingly (Preradović et al., 2020). In addition, video programs can be used for practicum activities. (Tembrevilla & Milner-Bolotin, 2019;; Adji, S.S. and Nurhayati, S., 2022). While augmented reality is also able to give a real picture of an object, through augmented reality students seem to be directly interacting with the actual object (Sallow, A.B. and Younis, M., 2020). If the topic or chemical experiment requires long stages and a long time, the use of augmented reality applications for video experiments can be an option because it is easy to use, does not change the message and can be made interactive by adding button clicks and marker scans. In addition, learning with Augmented Reality is easier to access from anywhere at any time without requiring a large internet quota because the application can be installed directly on each student's smartphone.

The results of the development of augmented reality applications that students responded to are shown in Table 1.

Table 1. Student responses to the results of the augmented reality video program application

	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	AR video display introducing laboratory equipment and examples of practical experiments showing Image Clarity/Sharpness	25.6%	74.4%	0.0%	0.0%	0.0%
2	AR video display Introduction to laboratory equipment and examples of practical experiments showing the suitability of illustrations	38.5%	61.5%	0.0%	0.0%	0.0%
3	AR video display Introduction to laboratory equipment and examples of practical experiments have interesting Captions/Graphics	17.9%	69.2%	12.8%	0.0%	0.0%
4	AR video display Introduction to laboratory equipment and experimental examples has an easy-to-understand presenter's voice	15.4%	74.4%	7.7%	2.6%	0.0%
5	AR video display The introduction of laboratory equipment and experimental examples show that the presenter's voice is too fast	0.0%	25.6%	41.0%	33.3%	0.0%
6	AR video shows introduction to laboratory equipment and experimental examples have illustrations of easy-to-remember tools	30.8%	59.0%	10.3%	0.0%	0.0%
7	AR video display Introduction to laboratory equipment and experimental examples showing Sound Effects well	35.9%	61.5%	2.6%	0.0%	0.0%
8	AR video display Introduction to laboratory equipment and experimental examples showing interesting pictures	30.8%	66.7%	2.6%	0.0%	0.0%
9	AR video display Introduction of laboratory equipment and experimental examples show clear articulation	25.6%	66.7%	7.7%	0.0%	0.0%
10	AR shows use communicative and easy-to-understand language	30.8%	64.1%	5.1%	0.0%	0.0%

4 CONCLUSION

Although there are several obstacles, in general, augmented reality videos are useful as a provision for doing practical's. This is because this application can still make it easy for students to understand chemistry concepts which are mostly abstract in nature, besides providing real representation in the introduction of laboratory equipment for students. The visualization of chemistry learning becomes more real, especially helping students with the concept of Distance Education in the depiction/imagination of several tools in a chemical laboratory through the use of augmented reality applications. However, the results of this application still need to be revised because when the camera shifts the video will disappear and if it is re-scanned then the video will start again from the beginning.

ACKNOWLEDGEMENTS

First of all, I wish to acknowledge to the anonymous reviewers who gave effort, constructive recommendations that enhanced the value of this manuscript. I also would like to express our deepest thanks and appreciation to Universitas Terbuka Indonesia for supporting the studies and students' at UT who participated in the research.

REFERENCES

Adji, S.S. and Nurhayati, S. (2022)., The Need of Using Videos to Teach Distance Education Students in Chemistry Practicum, *International Journal of Innovative Science and Research Technology*, 7 (8), pp. 1436-1451.

EL-Ariss, B., Zaneldin, E. & Ahmed, W. 2021. Using Videos in Blended E-Learning for a Structural Steel Design Course. Educ. Sci. DOI: https://doi.org/10.3390/educsci11060290

Heinich, R., Molenda, M. & Russel, J.D. (1989). *Instructional Media and Technologies For Learning*. New York: Mc. Millan

Sallow, A.B. and Younis, M. (2020). Augmented Reality: A Review, *Academic Journal of Nawroz University (AJNU)*, pp. 76-82, doi : 10.25007/ajnu.v8n3a399

Sarah-Jane Gregory and Giovanna Di Trapani (2012). A Blended Learning Approach to Laboratory Preparation, *International Journal of Innovation in Science and Mathematics Education*, 20(1), 56-70.

Scriven, M. (1999). The Nature of Evaluation Part I: Relation to psychology. Practical Assessment, Research & Evaluation, 8(11). [available online: http://[pareonline.net/]

Sunarsih dan Hamda (2017). Evaluasi Pelaksanaan Praktikum di Sekolah., Laporan Penelitian, LPPM Universitas Terbuka.

V. Potkonjak, M., Gardner, V., Callaghar et.al., (2016). Virtual laboratories for education in science, technology, and engineering: A review. *Computer & Education*, vol 95, p.309-327.

e-ISSN 2963-2870
Vol 3 2022