

STUDENT PERCEPTIONS REGARDING THE UTILIZATION OF VIRTUAL LABORATORY TO INCREASE INTEREST IN LEARNING CHEMISTRY AT SMAN 3 MATARAM

FamiliaNovita Simanjuntak^{1*}, Nelius Harefa², St. Fatimah Azzahra³, Sumiyati⁴, Nova Irawati Simatupang⁵, ElferidaSormin⁶, LeonySangaLamsari Purba⁷

^{1,2,3,4,5,6,7}Chemistry Education, Faculty of Teacher Training and Education, Indonesian Christian University

Corresponding author: familia.simanjuntak@uki.ac.id

Abstract. *The purpose of this study was to analyze students' perceptions regarding the use of VR-based virtual laboratories, increasing students' interest in learning chemistry. The chemicals used in this study are distillation materials and reaction rates. The research method used is a simple survey method. This research was conducted on August 3, 2022. The study population was all grade X students of SMAN 3 Mataram and the research sample was 51 students of SMAN 3Mataram. Data analysis of simple survey results using quantitative descriptive methods with sampling techniques, namely saturated samples. Questionnaire instrument is an instrument used to collect data and disseminate online using Google Form and has been tested for validity before being distributed to respondents. The data obtained shows the usefulness, use, responses and advantages and disadvantages of VR-based virtual laboratories. After conducting a survey, it turned out that the use of VR-based virtual laboratories received a positive response and perception from students.*

Keywords: *Virtuallab, Interests, Online learning*

INTRODUCTION

All sectors of human life have been affected by the Covid-19 Pandemic. The Covid- 19 pandemic has disrupted all community activities so the government has decided that all people should stay at home, work from home and study is carried out online [1]. This is a way out used by the government so that learning can continue and the spread of Covid-19 can be reduced [2].

Learning that is done online is expected to be able to foster students' interests, abilities, knowledge, and potential as well as learning in class. Because of this online learning, the use of e-learning media such as Google Classroom, Edmodo, Google Meet, Zenius, Zoom and other media is also very useful [3]. By utilizing online learning media, the quality of learning and student interest can still be improved. The use of online learning media also has an influence on learning [4].

The use of online learning media also answers global challenges where the role of science and technology development (IPTEK) can develop the quality of education [5]. After research, it turns out that the use of online learning media such as Google Classroom,

Zoom, Edmodo and other online learning media can be used effectively for theory-based learning and is less effective for practicum-based learning [6].

One of the subject matter that cannot be separated from theory and practicum is chemistry material. What really plays a role and supports the success of the chemistry learning process is practicum. This is also very helpful to help students increase their interest and understanding of chemistry lessons [7]. But to carry out high school level practicum there are several things that are a challenge in itself.

The factor of the availability of facilities and infrastructure to support chemistry practicum activities also greatly determines the sustainability of practicum activities in addition to the level of teacher ability and the motivation possessed by the teacher to carry out activities chemistry practicum [8]. The lack of practicum activities and the use of learning media that do not change have an impact on the low interest and motivation of student learning so that student learning outcomes experience a decrease [9].

Given these problems, efforts are needed to increase student's interests, abilities, knowledge

and laboratory skills. This is one of the efforts needed to increase students' skills even though laboratory facilities and infrastructure in schools are not complete.

Along with the development of science and technology, educational innovations were formed in the form of media, namely by using virtual laboratories [10]. According to [11] that Virtual Laboratories meet the eligibility criteria and can practice process science skills in terms of validity, practicality, and effectiveness. Therefore, researchers wanted to know how students perceive the use of virtual labs in their schools. According to [12] in [13] perception is a method of cognition that is felt by everyone in interpreting knowledge about the environment through hearing, sight, smell, gratitude, and feelings.

According to [14] perception is the process of giving stimulation received by the five senses to become an understanding. In this study we will see how students perceive virtual laboratories. A virtual laboratory is a medium for simulating computer-based chemical practicum activities with the aim of providing an overview of chemical reactions that cannot be seen in real situations [15] in [16]. Virtual laboratories will enable effective performance in terms of location and time, can also develop education that is limited only in class, with the use of simulation-based applications, learning will also be more dynamic [17]. Based on the description above, the researcher has conducted a study entitled "Student Perceptions of the Utilization of VR-Based Virtual Laboratories to Increase Interest in Learning Chemistry at SMAN 3 Mataram".

METHOD

This study used descriptive quantitative methods. The population in this study was all grade 10 students of SMAN 3 Mataram totaling 51 students. The sampling technique is carried out using the saturated sample method, where the entire population is sampled [18]. The materials used in this study are distillation material and reaction rate material. The study was conducted on August 3, 2023. Data was collected by distributing online questionnaires to 51 respondents who were sampled. Respondents consisted of class X students who did practicum using VR-based Virtual Laboratories.

Data analysis uses descriptive quantitative methods, to answer questions related to the status of the subject of the study [19]. Data was collected using questionnaire instruments in order to get responses from respondents [20]. Before the questionnaire instrument is distributed, the instrument is first tested with a validity test and then distributed to respondents.

The research instrument used by researchers consists of 3 categories developed into 15 statements. This instrument category is made referring to [21], the details of the instruments used include:

1. Usefulness of VR-based Virtual Laboratories in practicum. This category is divided into 2 statements, namely:
 - Using a VR-based Virtual Laboratory makes it easier to understand chemistry.
 - Using a VR-based Virtual Laboratory makes it easier to understand chemistry.
2. Use of VR-based Virtual Laboratory This category is divided into 9 statements, namely:
 - Learning Chemistry becomes fun by using a VR-based Virtual Laboratory.
 - The time needed to conduct experiments with VR-based Virtual Laboratories is small.
 - Operate a VR-based Virtual Laboratory without being limited by distance.
 - Chemistry practicum using VR-based Virtual Laboratory is easy to operate.
 - VR-based Virtual Laboratory is more effective because the process is fast.
 - Chemistry practicum using a VR-based Virtual Laboratory is simpler.
 - Chemistry practicum using VR-based Virtual Laboratory.
 - I understand Chemistry Practicum by using a VR-based Virtual Laboratory.
 - Virtual lab to conduct experiments is more interesting than the reality laboratory.
3. Student responses to VR-based Virtual Laboratories.
 - What do you think about the socialization of VR-Based Virtual Lab?
 - What do you think about VR-Based Virtual Lab?
 - What are your suggestions for the development of this VR-Based Virtual Lab?

4. Weaknesses and Strengths of VR-based virtual laboratories according to students. This category is divided into 8 statements, namely:

- In your opinion, what are the advantages of VR-Based Virtual Lab.
- In your opinion, what are the weaknesses of VR-Based Virtual Lab.

RESULT AND DISCUSSION

The implementation of online learning in our country has had a major impact on educators and students. Educators must be able to take advantage of technological developments, such as online learning media so that learning can take place properly. Students can also study independently with flexible time [22]. This also applies to practicum-based online learning.

In practicum-based learning, the use of virtual-based laboratories is very helpful and attracts attention [23]. Understanding for students related to practicum-based learning materials continues to run well and does not float. To see students' perceptions of using a VR-based virtual laboratory, the researchers conducted a survey of 51 students. Researchers distributed a questionnaire consisting of four categories. The four categories are the usefulness category of VR-based virtual laboratories, the categories of using VR-based virtual laboratories, the categories of students' responses to VR-based virtual laboratories and the categories of weaknesses and strengths of VR-based virtual laboratories.

In the first picture, we can see the percentage of statements in the first category. The figure shows the percentage of each answer given by each respondent. The picture proves that most of the respondents strongly agree that VR-based virtual laboratories can be used for practicum-based learning. And this is in line with the results of [24] which said that the use of virtual laboratories is very helpful for students and has a positive impact on students.

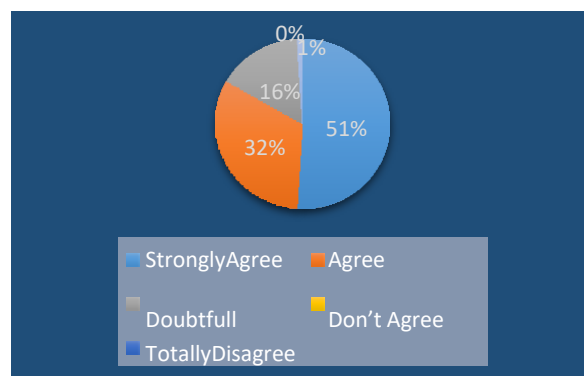
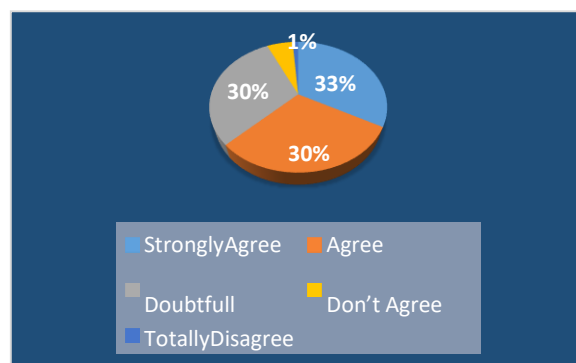


Figure 1. The benefits of a VR-based virtual laboratory

In the second figure, 63% of respondents said they agreed with the use of a VR-based virtual laboratory, while 37% said they still doubted or even disagreed with the use of this VR-based virtual laboratory. The reason is due to several factors, including: not yet familiar with



the use of VR-based virtual laboratories, the availability of facilities and quotas used during online practicum to environmental conditions that are less supportive when online practicum is carried out. This is in line with [25] research that limitations and not optimal use of infrastructure facilities are factors.

Figure 2. Use of a VR-based virtual laboratory

In the third category consisting of three statements, students gave a positive response to the use of a VR-based virtual laboratory. This interesting, simple, practical and easy-to-understand VR-based virtual laboratory is what makes the VR-based virtual laboratory get a positive response. The positive impact obtained also has an influence on student perceptions that are getting better about the use of VR-based virtual laboratories. Students also hope that in the future the use of VR-based virtual laboratories can further develop. Students also hope that in the future VR-based virtual laboratories can be accessed even though the network speed is weak

because not all environments in the area have fast network access.

In the fourth category which consists of 2 statements relating to the weaknesses and strengths of VR-based virtual laboratories. According to students, the advantages of VR-based virtual laboratories are:

- More practical, simple, flexible and effective to use anywhere.
- Reducing accidents in the laboratory.
- Save money on materials and practicum tools.
- Provide a new experience.
- Shorten time and easier to use in doing practicum.

Meanwhile, according to students, the weaknesses of using a VR-based virtual laboratory are:

- Requires a fast and large network connection.
- During practicum, time is very limited.
- Using a VR-based virtual laboratory for too long can have a negative impact on the eyes.
- Decent development costs drain the bag.

Requires adequate IT resources.

The explanation of these four categories, starting from the usefulness, use, responses as well as the weaknesses and strengths of this VR-based virtual laboratory shows that this VR-based virtual laboratory can be used as a practicum-based learning medium. In addition, the use of VR-based virtual laboratories still requires special attention from the government and related parties so that in the future it will be better and more comfortable to use.

CONCLUSION

Based on the description of the results obtained from the respondents' answers indicate that:

1. VR-based virtual laboratory is very useful for online practicum.
2. As many as 63% of respondents agreed to use VR-based virtual labs during online practicum. Maximizing and educating the use of VR-based virtual laboratories can influence 37% of respondents who do not agree to consider the use of VR-based virtual laboratories in the future.
3. An interesting and simple VR-based virtual laboratory gets positive responses and perceptions from students.
4. The advantages of a VR-based virtual laboratory have a major influence on online practicum.
5. Weaknesses of VR-based virtual laboratories impede online practicum.

ACKNOWLEDGEMENT

We thank all the academic community at SMAN 3 Mataram who have participated in this research. Hopefully in the future we can cooperate again. We also thank all the researchers who have collaborated in this study.

REFERENCE

- [1] Hensijon, Y. (2021). Dampak Pandemi Covid 19 Terhadap Dunia Pendidikan Khususnya Di SDN Nggalak.
- [2] Siahaan, M. (2020). Dampak pandemic Covid 19 terhadap dunia pendidikan. Dampak Pandemi Covid-19 Terhadap Dunia Pendidikan,20(2).
- [3] Nuriansyah, F. (2020). Efektifitas Penggunaan Media *Online* Dalam Meningkatkan Hasil Belajar Pada Mahasiswa Pendidikan Ekonomi Saat Awal Pandemi Covid-19. Jurnal pendidikan Ekonomi Indonesia, 1(2).
- [4] Arnesti, N., &c Hamid, A. (2015). Penggunaan Media pembelajaran *Online* offline dan Komunikasi interpersonal terhadap Hasil belajar Bahasa Inggris. *Jurnal Teknologi Informasi & Komunikasi Dalam Pendidikan*,2(1).
- [5] Salsabila, U.H., Utami, S. N., Zahra, A., Haikal, F., & Cahyono, A. (2021). Pengaruh Penggunaan Media Belajar *Online* Selama Pandemi. Jurnal Ilmiah Wahana Pendidikan,7(1),1-9.
- [6] Halawa, M. V. B. (2021). Efektivitas Pemanfaatan Platform Media Sosial Dalam Pembelajaran Praktikum Secara Daring. *Attractive: Innovative Education Journal*, 3(1),52-64.
- [7] Saputri, R.K., &AlBari, A. (2020). Persepsi Mahasiswa Terhadap Praktikum Daring Mata Kuliah Kimia Analisis. *Jurnal Educatio FKIP UNMA*, 6(2), 676-683.
- [8] Junaidi, E., Hadisaputra, S., & Al Idrus, S. W. (2018). *Kajian Pelaksanaan*

- Praktikum Kimia Di Sekolah Menengah Atas Di Kabupaten Lombok Barat Indonesia. *Jurnal Pijar Mipa*, 13(1), 24-31.
- [9] Dewa, E., Mukin, M. U. J., & Pandango, O. (2020). Pengaruh pembelajaran daring berbantuan laboratorium virtual terhadap minat dan hasil belajar Kognitif fisika. *Jurnal Riset Teknologi dan Inovasi Pendidikan (JARTIKA)*, 3(2), 351-359.
- [10] Rizal, A., Adam, R.I., & Susilawati, S. (2018). Pengembangan Laboratorium Virtual Fisika Osilasi. *Jurnal Online Informatika*, 3(1), 55-60.
- [11] Selviana, E., Devasyah, M. D., Sari, H. F., & Novita, D. (2023). Development of Virtual Laboratory as Multimedia Innovation for Interactive Learning on Reaction Rate Materials to Improve Students' Science Process Skills. *JCER (Journal of Chemistry Education Research)*, 7(2), 237-242.
- [12] Thoha, M. (2007). *Perilaku Organisasi: Konsep Dasar dan Aplikasinya*. Jakarta: PT. Raja Grafindo Persada.
- [13] Arshandhy, A. P. *Persepsi Siswa Terhadap Laboratorium Virtual Sebagai Pembelajaran Eksperimental Kimia* (Bachelor's thesis, Jakarta: FITK UIN Syarif Hidayatullah Jakarta).
- [14] Saragih, O., Sebayang, F. A. A., Sinaga, A. B., & Ridlo, M. R. (2020). Persepsi Mahasiswa terhadap pembelajaran Daring selama pandemi COVID 19. *Tarbiyah WaTa'lim: Jurnal Penelitian Pendidikan dan Pembelajaran*, 178-191
- [15] Totiana, F., Susanti, E., & Redjeki, T. (2012). Efektivitas model pembelajaran creative problem solving (CPS) yang dilengkapi media pembelajaran laboratorium virtual terhadap prestasi belajar siswa pada materi pokok koloid kelas XI IPA semester genap SMA negeri 1 karanganyar tahun pelajaran 2011/2012. *Jurnal Pendidikan Kimia*, (1)1, 74-79.
- [16] Hikmah, N., Saridewi, N., & Agung, S. (2017). Penerapan laboratorium virtual Untuk meningkatkan pemahaman konsep siswa. *Edu Chemia (Jurnal Kimia dan Pendidikan)*, 2(2), 186-195.
- [17] Hauriyah, I., Muhab, S., & Hadi nugraha ningsih, T. (2019). Pengaruh Laboratorium Virtual dalam Kegiatan Praktikum Terhadap Keterampilan Laboratorium Siswa pada Materi Titrasi Asam Basa. *Jurnal Riset Pendidikan Kimia (JRPK)*, 9(2), 72-79.
- [18] Jati, W., & Yuliansyah, H. (2017). Pengaruh Strategi Pemasaran Online (Online marketing Strategi) Terhadap Minat Beli Konsumen. *Jurnal Pemasaran Kompetitif*, 125.
- [19] Jalinus, N., & Risfendra, R. (2020). Analisis Kemampuan Pedagogi Guru SMK Yang Sedang Mengambil Pendidikan Profesi Guru Dengan Metode Deskriptif Kuantitatif Dan Metode Kualitatif. *INVOTEK: Jurnal Inovasi Vokasional Dan Teknologi*, 20(1), 37-44.
- [20] Suneni, S. (2019). Pengaruh Kualitas Pelayanan, Harga Dan Citra Merek Terhadap Kepuasan Konsumen Pengguna Transportasi Ojek Online Grab (Studi Pada Mahasiswa FE universitas negeri jakarta).
- [21] Wahyuni, S., Lesmono, A. D., & Fitriya, S. (2021). Pengembangan petunjuk praktikum fisika berbasis laboratorium virtual (virtual laboratory) pada pembelajaran fisika di SMP/MTs. *Jurnal Pembelajaran Fisika*, 1(3), 272-277.
- [22] Huda, I. A. (2020). Perkembangan teknologi Informasi dan komunikasi (TIK) Terhadap kualitas pembelajaran di Sekolah dasar. *Jurnal Pendidikan dan Konseling*, 2(1), 121-125.
- [23] Nugroho, A. (2021). Efektifitas laboratorium Virtual dalam pembelajaran praktikum analisis farmasi pada mahasiswa farmasi saat pandemic covid19. *Refleksi Pembelajaran Inovatif*.
- [24] Muthiarani, T. E. (2021). Studi Komparasi Keefektifan Pelaksanaan Praktikum Menggunakan Laboratorium Virtual dan Laboratorium Riil dalam Pembelajaran Kimia. In *Proceedings of International Education Conference (Vol.1, No.1, pp.161-168)*.
- [25] Kisdiono, T. F., Erwinsyah, E., & Virgana, V. (2023). ANALISIS PROFIL LABORATORIUM KIMIA SEKOLAH DAN AKTIVITAS PRAKTIKUM KIMIA DI SEKOLAH MENENGAH ATAS NEGERI KABUPATEN LEBAK. *Dalton: Jurnal Pendidikan Kimia dan Ilmu Kimia*, 6(1), 56-66.