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The effect of colloids practicum e-module to improve students' interest on virtual lab during the covid-19 pandemic

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Abstract: Practical learning which is generally carried out in the laboratory is one of the important lessons in the science learning process, especially chemistry. The Covid-19 pandemic has caused practical learning activities to not be accommodated in real laboratories. This situation encourages the creation of practical learning innovations, namely the use of virtual labs. In this study, students' learning interest in the use of virtual labs is described which is integrated with the use of e-modules on colloidal material. Based on the results of data analysis, 74.55% of students were interested in using the virtual lab, 10.90% very interested, 12.73% quite interested, and 1.82% lack of interested. These data indicate that the majority of students can make good use of the virtual lab and are able to optimally elaborate on the learning process. However, virtual labs are not intended to replace real laboratories but can be used as supplements and media to support learning in real laboratories.

Keywords: Colloids, Practicum, e-module, Virtual Lab

1. Introduction

The Covid-19 pandemic has had a significant impact on the learning process, both in terms of theoretical learning and practical learning. Especially in the chemistry learning process, chemistry materials which generally consist of theoretical and practical learning methods which are one unit are one of the materials affected by the Covid-19 pandemic. Especially in practical learning, efforts to overcome the Covid-19 pandemic require that practical learning that should take place in the laboratory must be modified considering that

the learning process cannot be carried out face-to-face. This condition encourages teachers to be creative in finding solutions so that the practical learning process can be accommodated even though it does not take place in a real laboratory.

A realistic solution that can be applied is by optimizing the use of virtual applications and the application of electronic modules. In addition, the use of digital platforms can help stimulate the achievement of learning objectives. These platforms can support and assist the learning process even though the learning is in the form of practice. Platforms such as quizizz (Harefa et al. 2020) and google classroom (Novira et al. 2021; Harefa & Sumiyati, 2020), as well as other digital platforms are able to increase students' interest in learning chemistry and their learning outcomes. In addition to stimulus through the use of digital platforms, the use of digital integrated modules is one solution in helping students to learn during the Covid-19 pandemic (Harefa & Silalahi, 2020;).

In an effort to accommodate practical activities that are not possible to carry out in a real laboratory, one of the efforts that can be made is by elaborating and developing a virtual lab (Kumala et al. 2021; Arifin et al. 2020; Revenchuk et al. 2020; Erlina, 2018; Yeni, 2015). The elaboration and development are both in the context of learning media (Muhajarah & Shulton, 2020) and in the context of development as laboratory media (Zhang et al. 2016; Luo & Chhabda, 2015; Liem et al. 2010). Apart from development, the virtual lab has been widely integrated and collaborated with other online media such as STIFI (Panggabean et al. 2019), LabView & myDAQ (Prakash et al. 2017), SVM classification (Hristova et al. 2021), and based on VirtualBox (Anam et al. 2020) and through integration with science e-learning (Liu et al. 2015) in an effort to optimize its implementation.

Virtual lab implementation has actually been done a lot, either through integration through the curriculum (Alkhedher et al. 2021; Buchori & Pramasdyahsari, 2021), as well as supporting media in schools (Hidayat & Utomo, 2015). Apart from being a learning support media (Rahmiati, 2019), virtual labs have actually been used as one of the main media in the learning process, especially science learning (Rohim, 2020; Anshary et al. 2019; Suarja, 2015). In its implementation, the virtual lab is able to become an accommodative medium for the stimulus aspects of students' cognitive, affective, psychomotor, and science skills. Virtual labs are actually able to stimulate the improvement of students' scientific literacy skills (Alneyadi, 2019; Ismail et al. 2016). In addition, the use of virtual labs is able to stimulate the improvement of students' chemical scientific behavior (Koehler, 2021).

However, the use of virtual labs is not really a substitute for real laboratories. In essence, virtual labs only act as supporting media and complementary media for the learning process in real laboratories, as well as providing solutions to obstacles that hinder the learning process in real laboratories such as the unavailability of laboratories (Mirdayanti, 2017). Real laboratories actually cannot be replaced by virtual labs, especially on the stimulus of science process skills (Purnama et al. 2021; Sulistiowati et al. 2013).

2. Methods

This research was conducted at SMA Abdi Siswa Bintaro, Tangerang in August – December 2020. The research population was all students of class XI who took chemistry subjects, and the research sample was students of class XI IPA 1 and class XI IPA 2 totaling 55 students. The research material is colloidal system material that is focused on practicum

activities by utilizing a virtual laboratory, which begins with the preparation of a practicum guide to its use. The practicum guide used is a practicum guide that has been developed using exe-learning media that can be accessed online (practicum e-module) by students.

In this study, the impact of using the e-module practicum on students' interest in learning in virtual practicum activities will be analyzed. The research procedure is as shown in Fig 1.

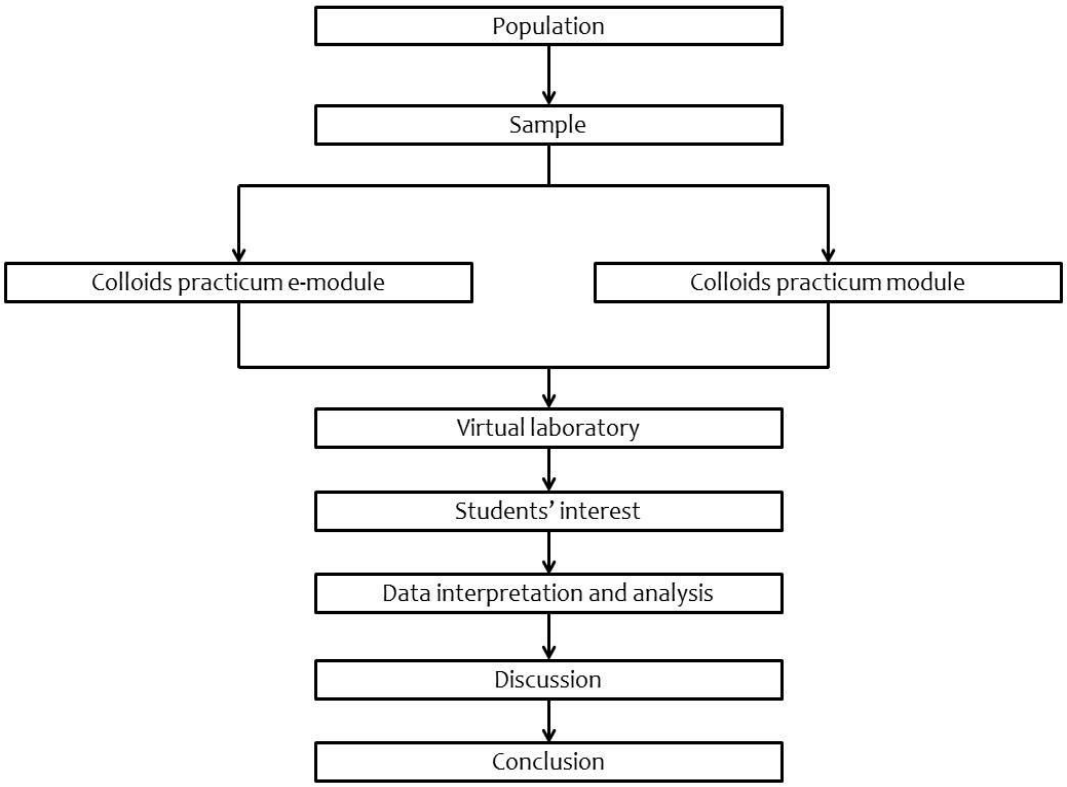

Fig 1. Research Procedure

The research data was collected by giving students an interest in learning questionnaire after the e-module practicum was used in the virtual laboratory. The questionnaire consists of 20 statements based on the Linkert scale, where each statement consists of 5 options, with a minimum score of 20 and a maximum value of 100. The data obtained are interpreted according to the provisions in Table 1.

Table 1
Interest in Learning Category (Harefa et al. 2020)

Score	Interpretation of Learning Interests
20 ≤ × ≤ 36	Not interested
37 ≤ × ≤ 52	Lack of interest
53 ≤ × ≤ 68	Enough Interest
69 ≤ × ≤ 84	Interested
85 ≤ × ≤ 100	Very interest

Students' learning interests are interpreted and grouped based on the values obtained by processing and developing them with quantitative descriptive methods. Based on the

cumulative value and interpretation, students' learning interest in virtual practicum can be concluded on the use of e-module.

3. Results and Discussion

This research is a descriptive qualitative research, where the research sample consists of 55 students. Each sample was analyzed for interest in the use of a virtual laboratory which was stimulated through the use of e-modules on colloidal materials. Student interest data was collected using an instrument in the form of a questionnaire consisting of 20 statements with 5 choice options. Interest in learning data as shown in Table 2.

Table 2

Description of Research Data

No	Students Score	Total
1.	37 – 52	1
2.	53 – 68	7
3.	69 – 84	41
4.	85 – 100	6
f		55

The data is then interpreted according to the level of student interest in the virtual laboratory which is stimulated by using the e-module on colloidal material. Interpretation of research data as in Table 3.

Table 3

Interpretation of Research Data

No	Students Score	Total	Learning Interest's Interpretation
1.	37 – 52	1	Lack of interest
2.	53 – 68	7	Quite interest
3.	69 – 84	41	Interested
4.	85 – 100	6	Very interest

Based on Table 3, the research data were analyzed to determine the percentage of student interest in the virtual laboratory which was stimulated by using the e-module on colloidal material. Analysis of research data as shown in Fig 2.

Based on Fig 2, most of the students (74.55%) are interested in virtual laboratory which is stimulated by using e-module on colloidal material. The data shows that students who are the research samples are able to adapt to the use of virtual laboratories during the Covid-19 pandemic, where conventional practicums cannot be accommodated. However, there are a small number of students (1.82%) who are not interested in using the virtual laboratory. Based on follow-up interviews given in private, these students have not been able to fully adapt to the transition from conventional practicums to virtual laboratories.

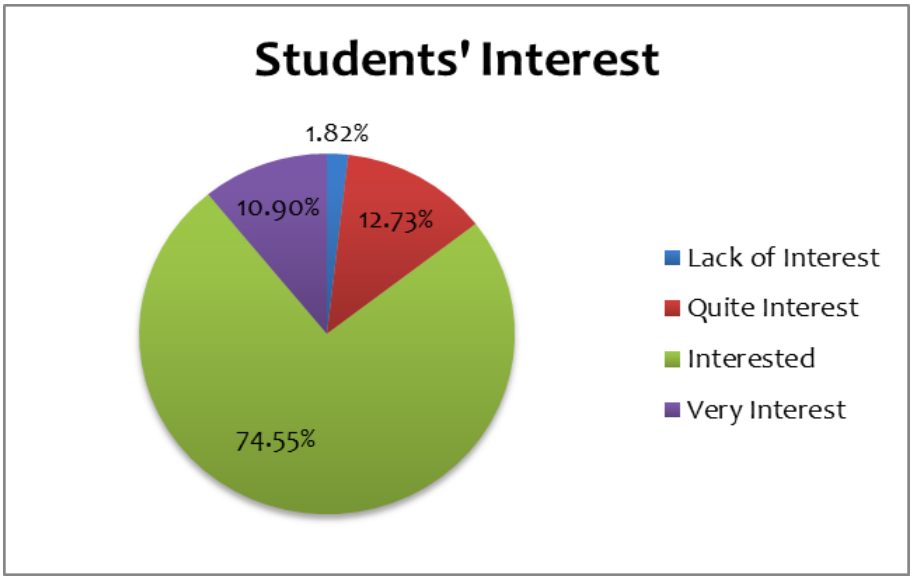

Fig 2. Percentage of Student Interest in Virtual Lab

4. Conclusion

The use of virtual labs is one solution to accommodate practical learning during the Covid-19 pandemic. Through the use of virtual labs, students have an idea of the material that should be practiced in a real laboratory. Thus, practical material can be accommodated even though it cannot take place in a real laboratory. In general, students can understand the causes of not holding practicals in real laboratories and the use of virtual labs can be well received. Based on the results of the study, 74.55% of students were interested in using virtual. These data indicate that the existence of a virtual lab can be well received by students and can be elaborated according to theoretical concepts. However, the use of virtual labs does not necessarily replace the learning process in a real laboratory. In essence, the use of virtual labs can be optimized as supporting media and supplements for practical learning in real laboratories. Students still have to carry out the learning process in real laboratories, especially in an effort to improve psychomotor and affective aspects as well as science process skills.

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