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The Use of Virtual Laboratories in the Pandemic Era at Bina Dharma High School

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ABSTRACT

The Indonesian learning system in the pandemic era where students must be able to use interactive media to support teaching and learning activities in the realm of assessment for students requires several indicators such as cognitive assessments in the form of knowledge and understanding of learners of teaching material, then psychomotor assessments used to assess activeness and skills of students and affective assessment that is used to assess the attitudes of students in the learning process. Students need to be encouraged to be actively involved in the pandemic era where significant changes occur in every learning process. Teachers must also actively participate in developing children's abilities in the psychomotor field where assessment is not only cognitive and affective. E-Laboraotium is the best choice to measure how much psychomotor abilities students have. E-laboratories or virtual laboratories have not been developed in many countries in Indonesia because of the uneven technology mastery problem for both teachers and or students. Simple use of the laboratory itself is possible in this pandemic era. The virtual laboratory will assist students' understanding in conducting research and direct proof of cognitive abilities so that it can create a generation of intelligent students with broad technological insights. E-laboratories or virtual laboratories have not been developed in many countries in Indonesia itself due to the problem of mastery of technology that has not been evenly distributed for both teachers and or students. Simple use of the laboratory itself is possible in this pandemic era. The virtual laboratory will assist students' understanding in conducting research and direct proof of cognitive abilities so that it can create a generation of intelligent students with broad technological insights. E-laboratories or virtual laboratories have not been developed in many countries in Indonesia because of the uneven technology mastery problem for both teachers and or students. Simple use of the laboratory itself is possible in this pandemic era. The virtual laboratory will assist students' understanding in conducting research and direct proof of cognitive abilities so that it can create a generation of intelligent students with broad technological insights.

Keywords: Virtual Laboratory, Psychomotor Domain, Learning in the pandemic era

INTRODUCTION

Quality and quality education can uphold the dignity and dignity of a nation and state, so a strategy is needed so that education becomes a means to open the mindset of students who are able to change attitudes, knowledge and skills for the better. Efforts to improve the quality of educational resources are by increasing the quality of learning through learning models. Various new concepts and insights about the teaching and learning process in schools have emerged and developed along with the rapid development of science and technology.

Learning activities have parameters that we need to pay attention to from students, starting from knowledge, skills, development, and also environmental factors. The ability of educators to read the dominant characters possessed by students really helps educators to be able to direct students to achieve maximum results. One of the things that need to be considered is the learning style because each student has a different learning style[1].

One of the subjects that plays an important role in the effort to increase insight, skills and produce quality and competent human resources in facing the times is Science. Natural Science has become one of the sciences that

plays an important role in today's technological developments.

IPA is essentially a product, process and application. As a science product, it is a collection of knowledge and a collection of concepts and concept charts. As a process, science is a process that is used to study objects of study, discover and build scientific products, and as an application, science theories will give birth to technology that can make life easier.[2].

Natural science education is an effort or process to teach students to understand the nature of science that encompasses: products, processes, and developing scientific attitudes and being aware of the values that exist in society for the development of attitudes and actions in the form of positive science applications. The objectives of science / science education include: Knowledge and understanding, exploration and discovery, imagination and creativity, attitude and science, and application[3]. The learning success achieved by students can be measured through the assessment of learning outcomes. The success in the science learning process is influenced by several factors, including the preparation of learning devices, the design of learning activities and the preparation of materials to be taught to students, a conducive environment and good facilities and infrastructure.[4].

The development of information technology which is increasingly rapid in the current era of globalization cannot be avoided anymore its impact on the world of education. Global demands require the world of education to always and constantly adapt technological developments to efforts to improve the quality of education, especially adjusting its use for the world of education, especially in the learning process. Information technology is the development of information systems by combining computer technology with telecommunications[5]. Technology is the result of the development of science, which occurs in the world of education. Therefore, education itself should also take advantage of technology to assist the implementation of learning. Digital technology has now begun to be used in educational institutions as a means to support learning, either as an information tool or as a learning tool (i.e. as a means of supporting learning activities and assignments)[6].

Educational technology can change the conventional way of learning to become unconventional. Educational technology is often assumed in the perception that it leads to electronic problems or technical equipment only, even though educational technology in it has a very broad meaning.[7]. However, the use of this technology requires mental readiness of the user not to use technology products for purposes that have an adverse impact on people or society. Physics is a branch of science that underlies current technological developments and creates a harmonious life with the natural surroundings.

The laboratory has a central role in physics lessons. Laboratory activities will run well if they are supported by laboratory facilities and infrastructure[8]. A school laboratory is actually an academic support unit used as a place for testing, calibration and production based on certain scientific methods in the context of carrying out education. This laboratory is divided into a real laboratory and a virtual laboratory. Virtual Laboratory is a laboratory where simulations are used here to display the experimental process. It can be concluded that learning using a Virtual Laboratory has several advantages, namely (a) Increasing students' mastery of concepts; (b) Improve creative thinking skills and scientific problem solving; (c) Develop skills in the field of ICT without neglecting knowledge of laboratories[9].

In this pandemic era, it is likely that it will be difficult to measure the skills of students because teachers' observations of students are very limited as well as the communication that is formed. The limitations of real experiments

can be overcome by other types of experiments that can be operated by each student, in the form of virtual experiments. Virtual experiments present virtual lab work which is operated by computer. The current development of educational technology can be used to improve the quality of learning in schools[10].

With this virtual laboratory, it is hoped that it can help students and teachers in carrying out practicum activities, where practicum activities are used to improve students' understanding of psychomotric concepts and abilities. so that the learning objectives in this pandemic era can run well and smoothly.

RESEARCH METHODS

Descriptive research is a study to find facts with proper interpretation, including studies that accurately describe the nature of several phenomena, groups or individuals[11]. where the goal is to find out the application of the virtual laboratory at Bina Dharma High School during this pandemic. This research is useful for knowing the psychomotical abilities of students.

The author focuses on interview data that has been obtained through interviews (interview) [12]. The interview was conducted not a technique that was additional / just complement the data, but was the main technique along with observation.

The data collection process carried out cannot be separated from the data analysis carried out. The data analysis includes data collection, data presentation, data reduction and drawing conclusions.

Data reduction is the first step in analyzing data. The aim is to facilitate understanding of the data that has been collected. Reducing data means summarizing, choosing the main things, focusing on the important things, looking for themes and patterns.

After the data is reduced, the next step is to present the data or display the data. Data presentation is the rewriting of categorized and organized data / information collections, making it possible to draw conclusions from the data.

Conclusions are drawn based on the analysis of the data collected, either through tests or interviews and field notes. then later the conclusions can determine the results of the research

RESULTS AND DISCUSSION

A virtual laboratory (Virtual Lab) is a learning medium used in the science learning process which is displayed in visual form in existing application programs on computers, but the use of virtual laboratories here is not a substitute for practicum but as an alternative.

The use of e-Laboratory or virtual laboratory is made to make it easier for teachers to measure students' psychomotor abilities amid the limitations of laboratory equipment.

Technological advances have changed a lot of the existing education system in Indonesia itself, technological advances will change the education system to be even better, so that education in Indonesia will not be left behind from the education of other countries.

Virtual laboratories are starting to feel useful in this pandemic era because assessment for the psychomotic realm for distance learning is very difficult to carry out, so for that virtual laboratories can help teachers temporarily replace practicums that are usually done in schools now possible to be done in their respective homes.

The virtual laboratory must have several criteria in order to be right on target, where the indicators must be in accordance with the relevant field lessons and other requirements are that the provision of tools and materials in carrying out the practicum itself must be easy to obtain.

Teachers must always be active in supervising practicum activities using virtual

laboratories so that there are no errors in carrying out directions such as mistakes in conducting trials, teachers must also be interactive so that the virtual laboratory development process can run optimally.

Figure 1. practicum using virtual laboratory

The use of virtual laboratories has very real advantages in this pandemic era because learning is done indirectly. Virtual laboratories can be done by providing directions in the form of steps where the teacher guides students in conducting experiments.

The steps for doing this in order to make it easier for first students, the teacher must provide worksheets and give time to prepare tools and practicum materials and students are given time to read the work width in order to understand the work steps.

The virtual laboratory indirectly makes it easier for teachers to measure students' psychomotor abilities even though indirectly, with a simple practicum students can also improve understanding of concepts and materials because practicums provide examples of implementation of teaching material and activity indirectly so that teachers can also assess attitudes of students.

Virtual laboratories also have their own negative impact, where excessive use of the internet can reduce the focus of students and besides that radiation generated by media such as laptops can damage the focus of the eye.

The shortcomings that arise from virtual laboratories are the access that is owned between teachers and students, this access is in the form of the internet which has limitations such as the use of internet quotas where separate barriers will arise.

Another drawback is the signal that is on the liaison media which will block access to the video so that it becomes unclear, and there will be a misunderstanding between the teacher and students.

CONCLUSION

The virtual laboratory provides its own opportunities for students where students can develop creative thinking skills, with the freedom of practicum with themes and work steps that have been determined by the teacher and under teacher supervision, students will be more courageous to do practicum.

Another opportunity that arises in virtual laboratory activities is that the ability in mastery of the field of technology for teachers will increase because previously it is necessary to know that not many teachers can use technology because of this pandemic teachers do not meet face to face and there is a need for psychomotor assessments that teachers will start learning about technology. so that practicum activities and psychomotor assessments continue.

Technological advances for laboratories will also have their own threats even though in a small scale, threats that may arise are hacking of sites and viruses that will interfere with learning activities themselves even though they have not been encountered during

implementation, previously it was known that virtual activities could be breastfed by existing virus applications.

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