Comparison of Perceptions of National SHS Students in the East Jakarta to Virtual Reality Laboratory

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Abstract

This research was carried out with the aim of knowing students perceptions of the use virtual reality laboratory as learning media in chemistry practicum activities. This research is a type of descriptive quantitative research which was carried out in several National Senior High Schools (SHS) in East Jakarta area which already has a real chemistry laboratory with good facilities beside a national standard. The research sample was selected using a proportional random sampling technique. This research sample consisted of 150 students from national SHS 100, national SHS 71, and national SHS 42 Jakarta. The research instrument used was a test instrument in the form of questionnaire consisting of 15 statements. Instrument were arranged using a likert scale with a range of 1-5. Before use it, the research instrument was first validated by an expert validator. Data analysis was carried out using the one-way anova test with a significance level of 5%. Based on the result of data analysis, it is known that there are significant differences in perceptions regarding the use of virtual laboratories as a media for carrying out practicums with a value of Fcount (8.215) > Ftable (3.697). It is further known that the percentage level of student perception at national SHS 100 is the most positive compared to national SHS 71 and national SHS 42.

Keywords: Chemistry, Practicum, SHS, Virtual Reality, VR laboratory.

1. Introduction

Perception is the result of the brain's work in interpreting what is happening and obtained through the sensory system from the surroundings (Waidi, 2006 & Jalaludin, 2007). Perception in the narrow sense is translated by Cliffort, Morgan (1971) as a person's perspective of seeing something. According to the Big Dictionary In Indonesian (KBBI), perception is a review or acceptance or a person's process of knowing several things through the five senses. Meanwhile, according to Irawati, et al. (2020) perception is a person's assessment or interpretation of a person's point of view, translating something that is perceived through the senses they have. According to Humrah (2017), the perceptual aspect consists of various components, namely: the cognitive component (composed on the basis of knowledge or information held about the object), the affective component (related to feelings of pleasure/ disappointment resulting in a belief), and the conative component (readiness of a person associated with the object).

Student's perceptions related to chemistry learning, especially in the implementation of practicums are different from one and another. According to Subagia, I. W (2014), students see that chemistry is a subject that is very much needed to continue their studies to continue their studies at the university level in sciences department or study program such as medicine, agriculture, environment, earth science, and science majors such as mathematics, physics, chemistry, and biology. The implementation of chemistry learning is a package that is inseparable from practicum activities in the laboratory. Practicum activities are very important, so that students can gain direct experience in proving various chemical concepts (Tatli, 2010). According to Subiantoro, A. W (2020), understanding and ability of science skill a through practicum activities that can build empirical observation and logical abilities are thing that students must understand when learning science. The ability of science skills is very necessary because science learning activities will be more complete if the theory can be proven through a practicum (Schmidt et all, 2019).

The essence of the practicum learning process is activity in the laboratory, where students are trained to develop skills as an application of the theory they have acquired in class. Carrying out practicum activities in laboratories has traditionally been considered an integral part of a chemistry degree (Reeves et all, 2021; Ferrell et all, 2019).

In science learning, especially practicum activities, the laboratory has a very important role. Hofstein, A (2007) confirm that practicum activities in science learning play a major role in acquiring scientific literacy. However, limited laboratory facilities and infrastructure are often an obstacle in carrying out practicum activities (Agbonifo, et all, 2020). Another thing that is seen as a problem in the implementation of practicum is laboratory management which includes: [1] laboratory resources (practicum equipment, laboratory technicians, supervisors, practicum assistants, practicum places); [2] laboratory management; [3] practicum fees (Dunnagan, 2019).

In this case, technological developments are things that can be utilized in overcoming limitations in terms of the availability of real laboratories. One concrete example is the use of technology in carrying out practicum activities from a real laboratory to a virtual laboratory. This is an adaptive way of providing access to students in the midst of limited cost to provide practicum tools and materials for a large number of students in a smaller space. (Vasiliadou, 2020, Reeves et al, 2021). Even though currently learning activities have been carried out face to face again, practicum in a real laboratory and virtual laboratory can be collaborated together (Yates, 2011). Based on a literature review and observations by Tuysuz (2010), and Oloruntegbe (2010), the use of virtual laboratories has a positive impact and can motivate students to better understand various theoretical concepts in chemistry learning. In addition, according to Agbonifo et al (2020), virtual laboratories were developed to overcome some of the difficulties encountered in carrying out learning in real laboratories, especially in carrying out practicums with hazardous chemicals. Nevertheless, the use of the virtual reality laboratory also had a weakness related to direct learning/ experience involving sensory which cannot be accommodated through virtual reality. (Franco Valdez & Valdez Cervantes, 2018). Therefore, in this research conducted an analysis of student's perceptions (especially national senior high school (SHS) students in the East Jakarta region) on the use of virtual reality laboratories as a media in the implementation of chemistry practicum activities.

2. Methodology

2.1. Population and Sampling

This research was conducted to find out whether there are differences in student's perceptions of the use of virtual laboratories as learning media in practicum activities. The population of this study were national senior high school students in the East Jakarta region, namely national SHS 100, national SHS 71, and national SHS 42. The selection of this school was made on the basic that the school already has good real laboratory facilities. In addition, these three schools are included in the driving schools that have implemented the independent curriculum (MBKM). The total research sample from the three schools was 150 people who were selected using a proportional random sampling technique. Each school is represented by a total of 50 students.

2.2. Questionnaire Instrument

The research instrument used was a questionnaire to determine student's perceptions of the use of virtual laboratories. The preparation of the instrument is based on the notion of perception in the complete psychology dictionary which explains that perception is: a) the process of knowing or understanding objective objects and events with the help of the senses; b) awareness/ view of the processes received, and; c) intuitive interest in direct truth or an immediate belief about something (Chaplin, 2005). On the understanding indicator, it is stated that perception is formed from obtaining information directly from the environment (Solso et. Al., 2007; dan Zul Fajri & Ratu Aprilia Senja, 2008). View of something refers to the early detection of our stimulation and interpretation (Solso et al., 2007). Meanwhile, attention is defined as an increase in mental activity towards a certain stimulus.

Based on this description, the instrument was organized into 15 statements using a likert scale in the range 1-5 (Joshi et al, 2015), namely: strongly disagree, disagree, undecided, agree, and strongly agree. Most of the statements used in the instrument are arranged in the form of positive sentences.

a. Process of knowing/ Understanding

For indicators of process of knowing/ understanding, there are five questions, among others:

1. I have heard about Virtual Reality (VR) Laboratory
2. I have seen a Virtual Reality (VR) Laboratory in person
3. I have seen a Virtual Reality (VR) Laboratory through social media
4. I have used a virtual reality (VR) laboratory at school.
5. I have used a Virtual Reality (VR) Laboratory

b. Awareness/ View of the processes received

For indicators of awareness/ views of the processes received, there are five questions, among others.

1. Virtual Reality (VR) Labs are exciting.
2. Using the Virtual Reality (VR) Laboratory can increase my interest in learning.
3. Virtual Reality (VR) Laboratory can add insight and knowledge to me.
4. Virtual Reality (VR) Laboratory is a learning medium that is easy to use.
5. The Learning Model of the Virtual Reality (VR) Laboratory can make it easier for me to understand the concept of learning at school

c. Intuitive interest

For indicators of intuitive interest, there are five questions, among others.

1. I often looser formation about Virtual Reality (VR) Laboratories.
2. I have a high curiosity about Virtual Reality (VR) Laboratories.
3. I am more focused on carrying out practicums and can take advantage of the Virtual Reality (VR) Laboratory
4. I don't want any distractions when doing practicum using the Virtual Reality (VR) Laboratory.
5. I am very serious when about practicums using the Virtual Reality (VR) Laboratory.

2.3. Data Processing

Data processing was carried out using a statistical test, used one-way anova with the help of SPSS which then looked at the results of the acquisition of significance, where if the sig value > 0.05 (Silaban, 2017). It can be concluded that there is a significant difference between student's perceptions of using virtual reality laboratories at national SHS 100, national SHS 71, and national SHS 42. The following shows the google form which is distributed and contains 15 closed questions from 3 indicators.

3. Result and Discussion

3.1. Data Analysis

From the student's responses, a tabulation was then carried out, then proceed with statistical data processing to see tests of different perceptions of students of national SHS in east Jakarta regarding the use of virtual reality laboratories as a media for carrying out practicum activities. The description of the results of the data analysis is shown in table 1. It shows that the average score on the level of student's perception of the use of the virtual reality laboratory has a difference between national SHS 100, national SHS 71, and national SHS 42 in East Jakarta.

Table 1. Data Description

Descriptives

Perception

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
NSHS 100	50	52.28	8.953	1.266	49.74	54.82	16	69
NSHS 71	50	49.72	10.713	1.515	46.68	52.76	15	71
NSHS 42	50	46.90	9.943	1.406	44.07	49.73	16	71
Total	150	49.63	10.074	.823	48.01	51.26	15	71

From table 1, we can see that the average score obtained using the test instrument at national SHS 100 (52.28) is higher than national SHS 71 (49.72) is higher than national SHS 42 (46.90).

In addition to obtaining descriptive data, analysis prerequisite test were also carried out. The results of the research data analysis prerequisite test, namely the homogeneity test are presented in table 3 below:

Table 2. Homogeneity Test

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Perception	Based on Mean	.471	2	147	.625
	Based on Median	.505	2	147	.605
	Based on Median and with adjusted df	.505	2	143.309	.605
	Based on trimmed mean	.493	2	147	.612

Based on table 2 above, it can be concluded that the variance is homogeneously distribution (sig > 0.05), namely 0.347. Furthermore, statistical analysis was carried out with parametric test.

The parametric test used in this study is the one-way anova test. One-way anova test is a ane-way analysis of variances, which is a parametric statistical technique used to test the differences in several groups on average, where there is only one independent variable divided into several groups and one dependent variable. (Widiyanto, 2013)

The results of the ANOVA test are presented in table 3 below:

Table 3. One Way ANOVA Test

ANOVA					
Perception					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	724.173	2	362.087	3.697	.027
Within Groups	14396.660	147	97.936		
Total	15120.833	149			

Based on the results of the one-way ANOVA test above, it can be concluded that there is a significant difference between the perceptions of students in national SHS 100, national SHS 71, and national SHS 42 with (Sig < 0.05). Besides paying attention to the sig value, the difference in student's perception of the use of virtual reality laboratory as a practicum media are known from a value of Fcount (8.215) > Ftable (3.697). Difference in student's perceptions of the use of the VR laboratory are likely to occur because much information regarding the use of the VR laboratory has been informed to high school students even though it is mostly used in the form of games (Suherdi et al, 2019).

3.2. Summary of student responses

The comparison of the percentage level of student's perceptions of the use of the virtual reality laboratory as a practicum media based on each perception indicator is depicted in figure 1.

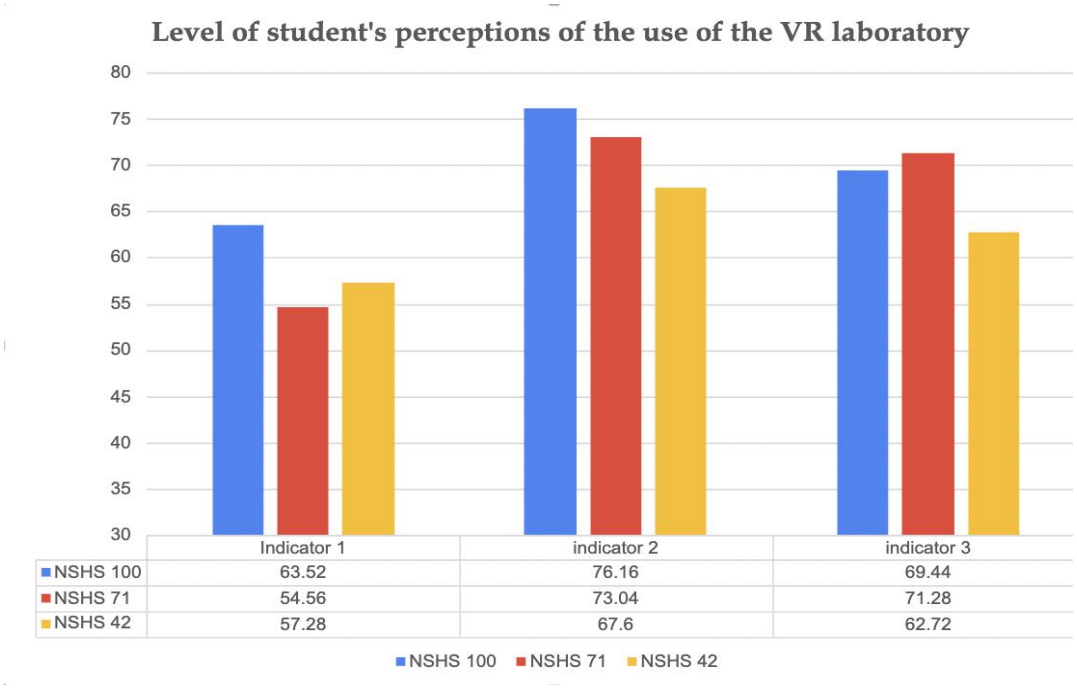

Fig 1. Level of students perception in each school

In line with the opinion of Chaplin (2005), through fig.1 it can be seen that the level of students understanding, awareness/ view of the processed, and intuitive interest using the virtual reality laboratory as a practicum media for students at national SHS 100, national SHS 71, and national SHS 42 is different. These perceptions can be categorized as positive or negative. Perceptions that are positive or negative will always influence a person in carrying out an action. And the emergence of a positive perception all depends on how the individual describes all his knowledge about an object that is perceived (Irwanto, 2019). In this case, for each indicator there is a different in the level of student perception. On the process of knowing/ understanding indicator, the order of the level of student perception from the most positive is national SHS 100 > national SHS 42 > national SHS 71. On the awareness/ view of the processes received indicator, the order of the level of student perception from the most positive is national SHS 100 > national SHS 71 > national SHS 42. Meanwhile, on the intuitive interest indicator, the order of the level of student perception from the most positive is national SHS 71 > national SHS 100 > national SHS 42.

In general, the level of student's perception of the use of the virtual reality laboratory as a practicum media at national SHS 100 is the most positive compared to national SHS 71 and national SHS 42.

4. Conclusion

From the results of research on the analysis of the use of the virtual reality laboratory as a practicum media it can be concluded that:

1. These are significant difference regarding the perceptions of students at national SHS 100, national SHS 71, and national SHS 42 regarding the use of the virtual reality laboratory as a learning media in practicum activities.
2. Based on the percentage levels of the three indicators used in the instrument, the level of student perception at national SHS 100 is more positive than students at national SHS 71 and national SHS 42.

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