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Students' perceptions of electronic's module in physics practicum

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ABSTRACT

This study aims to determine the views of students majoring in mathematics education and natural science faculty of teacher training and education science at Universitas Jambi to use electronic's module in physics practicum which is based on science process skills. The study involved 117 students majoring in mathematics education and science which consists of 59 students of physical education and 58 students of mathematics education. This research is descriptive quantitative research in order to obtain information mean (M), median (Me), mode (Mo), percentage, the range of the maximum value and the minimum value. Data was collected by using questionnaires and interviews. Based on the research results from students' perceptions of physical education in good category at 64.4% while the student's perception of mathematics education in good category amounting to 55.2%.

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1. INTRODUCTION

The truth of the principles and laws of physics demonstrated by the success of the experiment the scientists. The result of experiments used by theoretical physicists to refine reviews their ideas and at the same time suggest new experiments [1]. Physics practicum is an activity that aims to explain the principles and laws of physics by experimenting in the laboratory. Practicum physics is an important thing to do because physics is an experimental science [2]. Physics practicum, including the activities of a scientific nature. The concept of physics becomes difficult to understand when a person has a poor ability to remember vocabulary, obtain basic ideas or not have good communication [3]. Scientific activity is done in an effort to understand the concepts in the physics practicum. Reflection on a flat mirror is a physics concept that is studied in physics practicum. One of the most obvious traits of light is a reflection [1]. In learning the basic principles of reflecting events, a flat mirror is used.

Reflection on a flat mirror in physics practicum to help students acquire knowledge about the concept's of reflection independently so that trains students' critical thinking skills. Critical thinking skills will train students to have creative thinking which then leads to analytical thinking that enables students to make better decisions [4]. Communication skills, collaboration skills, global awareness (global awareness), technology skills are some of the skills that are required. In life and career skills, learning ability, and innovation are some of the skills that can be built through good critical thinking skills [5]. However, it is not enough with thinking skills, a person who performed experiments require in psychomotor and affective skills. It means, studying Science has a scientific process, the scientific result (product), and scientific developed manner [6]. This capability can be seen through the science process skills of students.

Science process skills students should possess mathematics education and science to support the success of the experiment in the laboratory. Observation, hypothesis formulation, prediction, investigation,

the data interpretation, inference and result communication included by scientific process' activities [7]. Someone who is said to have a good science process skills, can be seen from some of the skills shown individual and refer to the basics of science process skills. Basic science process skills are divided into two, namely: (a) the basic skills (basic skills) and (b) processing skills/process (process skill). To support the practicum, students need a guidebook which should be based on aspects of science process skills.

The guide book based science process skills are learning media skills that aim to train students in practical activities. However, this practical guide book is still difficult to be disseminated to the students because of the file size (soft copy) is quite large. One type of teaching material that is presented systematically is a module (print) that helps users to learn with or without a facilitator [8]. Attempts to overcome this problem is by printing a practical guide book (hard copy) for each title experimental material. The use of guide books in print in the paper considered not practical in today's digital era. New challenges both for organization Arise and leaders due to the 4th of technological revolution and structural crises characterized by rapid and unpredictable changes in life and the business environment that have an impact on changes in the paradigm of education and human resource management [9]. 4.0 industrial revolution not only pave the way for economic activity but also provide opportunities for education through learning technology. Learning technologies to grow with the times. Learning's technologies starting from the use of print media learning, computer-based learning and then mobile media learning. Technology helps students learn self-extracting information skills, while Actively using cognitive structures from memory, thought, imagination and can be designed for the development of an intensive personality in terms of organizing student processes [10].

Computers, audio-visual learning media, are considered to have the advantage of learning rather than using print media (visual). The benefits of educational technology are also used the teacher to conduct a formative assessment in schools. The use of computer-based education technology and has concluded that the use of computers can help teachers in the development of tests in materials science [11]. This is also done [12] which develops applications of computer-based evaluation of faculty performance content validity of the instrument that is 0.73 point and the Alpha reliability index of 0.844. Six dimensions included in the study, learning engagement (behavioral engagement, emotional engagement, and cognitive engagement), presence learning (teaching presence, social presence, and cognitive presence), video perception, perception platform, design perception, and learning satisfaction [13]. These dimensions are the reason the computer as a medium of learning excellence rather than studying print media.

Along with the development of technology, turns the computer as a medium of learning has a drawback that is affecting students in using it. This is spelled out by [14], who said that mobile Internet usage in 2015 Increased by 28% in Indonesia, the which meant A relatively large shift from the use of laptops to mobile devices. Computers, laptops even though, less practical as modern learning media that needs to be revisited to obtain the appropriate modern learning media. E-learning experientialism uses an approach supported by functionalism, progressive, constructionism, existentialism, cooperative learning (educational theories) that can improve student performance capabilities [15]. Therefore, emerging breakthrough using mobile learning technology called mobile learning or M-Learning. Technology and mobile devices must be seen as part of the trajectory of the development of learning. The best learning Achieved status by students using mobile learning models [16]. The [17] agree that mobile applications with simple but adequate features for good learning so students are more challenged to use smartphones better.

It aims to facilitate students to use practical guide books anytime and anywhere. Information technology that is developing in the field of education has placed students at the center of the educational process with all Reviews their specificities and possibilities [18]. If this is achieved, then created a learning medium that is innovative, effective, and efficient. It can overcome the difficulties faced by students both as a practitioner and observer during practicum physics manual with the addition of digital concept will provide a new learning experience for students. Therefore, it is not surprising that people around the world will begin to embrace mobile learning as an important part of the educational process because reviews their mobile learning in higher education is still far-reaching.

There are several reasons explained by the teacher in using mobile learning in schools namely 1) the need for time-learning flexibility; 2) giving students the opportunity to repeat the material indefinitely; 3) learning resources that are side by side for students [14]. The results reveal that learning habits and continuous learning are influenced by the perceptions of students' mobile learning, where good perceptions will help students understand the usefulness of mobile learning so that more students are accustomed to using mobile learning, fewer doubts about using it in the that a sustainable future learning will be improved [19]. This study aims to determine the views of students majoring in mathematics education and natural science faculty of teacher training and education science at Universitas Jambi on the use of e- module in physics practicum which is based on science process skills-based mobile learning.

2. RESEARCH METHOD

This research is descriptive quantitative variables reviewing students' perceptions of mathematics education and science to the physics practicum guidebook based mobile learning in teacher training and education science faculty at Universitas Jambi. A quantitative research method is based on the philosophy studies positivism used to conduct a study of a population or a particular sample, data collection instruments, research and quantitative data analysis/statistics [20].

The study involved 117 students majoring in mathematics education and science which consists of 59 students of physical education and 58 students of mathematics education. The data collection students' perceptions of mathematics education and science to guide physics practicum based mobile learning using perception questionnaire with five answer choices based on the Likert scale with the categories of strongly agree, agree, undecided, disagree, and strongly disagree. This questionnaire was made through technology google form who then disseminated by utilizing social media. The use of an online questionnaire which he developed from other relevant research [21]. Electronic data collection Provides a form of a data collection that is easy and fast and how to fill out the questionnaire Easily with steps 1) Accessing the Internet using a computer or mobile device, 2) filling out the questionnaire, 3) sending a questionnaire that has been refilled to Researchers [22]. Data collection methods used are questionnaires and interviews. Management of a small group of surveys or questionnaires (called samples) to identify trends in attitudes, opinions, behaviors, or characteristics of a large group of people (called Populations) is a procedure in quantitative research [22]. Survey questionnaires are used to collect the data [23].

Item student perceptions questionnaire mathematics education and science to the physics practicum guidebook based mobile learning, e-module, as much as 20 statements (consisting of 10 statements positive and 10 negative statements) with five possible answers. Response education students of mathematics and natural sciences to expect from the questionnaire in the form of answers to agree or disapproval by giving a score to each item a positive statement as follows: strongly agree (SS) = 5, agree (S) = 4, hesitation (R) = 3, do not agree (TS) = 2, and strongly disagree (STS) = 1. Scoring for each Negative item as follows: strongly agree (SS) = 1, agree (S) = 2, hesitation (R) = 3, disagree (TS) = 4, and strongly disagree (STS) = 5. For categorization of student perceptions questionnaire listed in Table 1.

Table 1. Level student perceptions

Interval	Category
20.0 - 36.0	Very No Good
36.1- 52.0	Not good
52.1 - 68.0	Enough
68.1 - 84.0	Well
84.1 – 100.0	Very good

As for the interviews were conducted with 22 respondents composed of 13 physical education students and 9 students of mathematics education. Interviews were used in the form of a structured interview with the type of open-ended questions. Researchers ask some open-ended questions to clarify or learn more about the response of the respondent and the researcher must be an active listener to understand the clarification of the statement of the respondent [15]. Respondents, students are led to give their views on mobile learning and want to see their response to the idea of mobile learning when applied in a physics practicum. Item interview student perceptions of education in mathematics and natural science of mobile learning as much as 20 questions. The results of the interview are expected to strengthen the results of students' perceptions collected through questionnaires. Interviews conducted for almost 8 minutes for each student to dig deeper into their perceptions of mobile learning. Data were analyzed using the mean value (M), median (Me), the mode (Mo), the percentage, the range of the maximum value and the minimum value on the perception questionnaire. Next to the interview data were analyzed by recording and classifying listen back every opinion has a similar meaning. Investigating further information, elaboration, and clarification of responses are some of the things Obtained from interviews [22].

3. RESULTS AND ANALYSIS

3.1. Results

Mobile learning is something that is familiar to students of mathematics education and science. The novelty in this research is to find out students' perceptions of practical learning media that can be obtained through e-modules based on science process skills. This media provides a variety of features that help users get teaching material quickly and easily because it can be accessed by anyone, anytime and anywhere but still

pay attention to aspects of science process skills. E-module based science process skills provide new experiences for students of mathematics education and science education. According to the opinion of [21] the use of m-learning can improve communication between students and instructors, students can obtain multimedia learning resources and materials on their mobile phones and provide new learning experiences. Modules based on science process skills provide opportunities to train students in their ability to do scientific work. The results of media validation by experts on physics practicum modules based on science process skills can be seen in Table 2.

Based on Table 2, it can be seen from the results of media validity by experts that the module of physics practicum based on science process skills have a good category. This shows that this module is good for use in practicing science process skills both in physics education students and mathematics education students. The electronic module is a new thing for physics education students and mathematics education students at Universitas Jambi. Therefore a student's view is needed regarding the use of e-modules based on science process skills. Description of student perceptions of education in mathematics and natural sciences to e-module in physics practicum can be seen in Table 3.

Table 2. Description of media validation by experts on physics practicum modules based on science process skills.

No.	Aspect	Item	Score	Category Scores
1	Fill suitability practical guide	Completeness of the content practical guide	3	Good
		Repetition of material	3	Good
2	Presentation	Presentation of preliminary matter	3	Good
		Presentation picture	3	Good
		Presentation of working procedures	3	Good
3	Organization	Organizing the material	3	Good
4	Format	The emphasis on the important stuff	3	Good
		Correct use of punctuation	3	Good
5	Consistency	The consistency of the type and size of letters	3	Good
		Consistency typing	3	Good
		Consistency spacing	3	Good
6	The shape of the font size	Letters	3	Good
7	Linguistic	The suitability of the use of language by the development of learners	3	Good
		The linkage between sentences and paragraphs	3	Good
		Ease understand the message in writing	3	Good
		The use of colloquial style	3	Good
8	Free design lab	The attractiveness of the manual design lab	3	Good
		The attractiveness of the guide cover design lab	3	Good
		Average	3	Good

Table 3. Description of student perceptions of education in mathematics and natural sciences to e-module in physics practicum with reflecting material on flat mirrors.

	Classification			Mean	median	Mode	Min	Max	%
Study program	Interval score	Category	Total						
Physics	20.0-36.0	Very No Good	0	71.1695	74.0000	72.00a	49.00	91.00	0
	36.1-52.0	Not good	3						5.1
	52.1-68.0	Enough	15						25.4
	68.1-84.0	Good	38						64.4
	84.1-100.0	Very good	3						5.1
Total			59						100
Mathematics	20.0-36.0	Very No Good	0	70.2414	70.5000	76.00a	42.00	93.00	0
	36.1-52.0	Not good	1						1.7
	52.1-68.0	Enough	22						37.9
	68.1-84.0	Good	32						55.2
	84.1-100.0	Very good	3						5.2
Total			58						100

In Table 3 it can be seen that the mathematics education courses have a mean low of 70.24 while the physical education courses have a mean of 71.17. Median education courses for physics and mathematics education courses respectively are 74.0 and 70.5. Mode value, the minimum and maximum values for physical education courses in a row are 72.0, 49.0 and 91.0. While the mode value, minimum value, and a maximum value for mathematics education courses respectively are 76.0, 42.0, and 93.0.

If this data is made level education students' perceptions of mathematics and natural sciences to a physics-based practical guide to mobile learning can be seen in Table 3 for physical education courses with 59 respondents. While Table 5 for mathematics education courses with 58 respondents

Table 4 explains that 64.4% of education students' perceptions of physics to e-module is located in good category. However, 25.4% of education students' perceptions of physics to e-module in enough category. Table 5 shows the student's perception of mathematics education courses to guide physics practicum based mobile learning in the lab with reflecting material on flat mirrors. Student perception tends in good category that can be seen from the 55.2% of the students are in the interval of 68.1-84.0. While 37.9% students were in the category enough. This indicates that students agree with the use of physics practicum's e-module based science process skills in reflecting material on flat mirrors.

Table 4. Perceived level physics education study program

Interval	Category	Frequency	
		Number	(%)
20.0 - 36.0	Very No Good	0	0
36.1- 52.0	Not good	3	5.1
52.1 - 68.0	Enough	15	25.4
68.1 - 84.0	Good	38	64.4
84.1 – 100	Very good	3	5.1

Table 5. Level perception of mathematics education program

Interval	Category	Frequency	
		Number	(%)
20.0 - 36.0	Very No Good	0	0
36.1- 52.0	Not good	1	1.7
52.1 - 68.0	Enough	22	37.9
68.1 - 84.0	Well	32	55.2
84.1 - 100	Very good	3	5.2

3.2. Analysis

Smartphones become the primary needs of students. It can be seen from the results of interviews explaining that all students physical education and mathematics education have a smartphone/tablet pc. Students realize that as a student, they need the latest information to support the lecture. Students also explained that the smartphone with android type into their favorite smartphone because it is easier to use and affordable.

Perception demonstrated by physical education students classified as good, but at 5.1% in the category is not good. Similarly, the perception shown by the students of mathematics education is quite good but 1.7% in the category is not good. Although physical education has better than its perception of mathematics education, in fact, physical education also has a perception that belongs to no good with a larger percentage. Based on the interview, physical education students tend to be difficult to focus only on learning when using their smartphones. They told that learning is done through their smartphones sometimes uncontrolled and unsystematic. When they want to dig up information about students tend to stray from the main topic for the curiosity of students. Not only that, but some students also recognize that they can not ignore the incoming message from their social media so that the use of smartphones in learning more sometimes confiscate their time on social media is not the lesson. While the mathematics education student forcefully argued that they could divide their time to stay focused on the topic of their lesson and resolve the problems they face by looking for information together with their peers. They realize that the use of smartphones actually gives them ease in acquiring knowledge for smartphones equipped with various advanced features (applications). They realize that the applications are in use simultaneously (collaborated).

Additional information obtained from the interviews is the use of smartphones increases student knowledge. M-learning is supported by students to help them access different resources anytime and anywhere so that they gain knowledge and increase of flexibility in learning the which shows the positive attitude of students towards the benefits of using m-learning [23]. This shows that students realize that the use of smartphone a positive impact on students when used wisely. Mobile technologies are the most adequate means to create an effective and efficient learning environment and positive feedback and positive attitudes show that there are positive effects on the learning process of students [24].

In addition, 100% of the students agreed with the idea of the use of smartphones in learning the reasons tend to be given the ease of obtaining information and its use efficient. Students understand that smartphones are more useful when used in learning. Internet, video, television, electronic resources (non-print media) have replaced the print media in the digital era but the main thing to note is the training of young people who will be Able to think critically and reject negative influences from outside [25]. It is clear that students tend to gather information using their smartphones than finding information in libraries. With mobile technology, the solution is to overcome the obstacles in terms of distance in learning so that the time has come to move to a new path in educational pedagogy called m-learning.

Students tend to discussion through their social media. Student communication skills can be improved through the use of social media besides social media has a positive effect on students that enables

the democratization of the internet [26]. Students tend to create discussion groups via social media to share information such as physics practicum. Students realize that e-module provides a solution for the students to overcome obstacles by distance learning. Distance learning is the oldest form of learning that developed into e-learning that offers new methods of distance learning based on computers and new technologies such as mobile learning. Mobile learning or e-module provides an opportunity for students to learn anytime and anywhere because it is practical and flexible.

E-module is considered to be able to solve the problem of students who think it is difficult to use printed physics practicum modules.Learning media that utilize online technology which is able to accommodate needs whenever and wherever is realtime is the ideal learning media [27]. However, the results of interviews indicate that e-modules do not at all times fulfill practical and effective aspects. This is based on their perception that 100% of students prefer the use of their smartphones compared to computers to access e-modules. Apart from its size which tends to be smaller and lighter, e-modules are far more attractive on smartphones. Therefore, the e-module can fulfill indicators as a modern and sophisticated learning media when it can be accessed via smartphone and is able to facilitate training in student science process skills.

E-module to be one of learning media that can motivate student learning. Internal motivation can be built through the regularity and intensity of the use of technology as some independent activity, even this can affect motivation in acquiring knowledge is also the motivation to achieve certain things [10]. Students tend to be more independent information by using m-learning as a result of their motivation from within themselves to improve competence in the field of education. This is evident from the interview in which the student explains that they are interested in using the e-module so that they do not have difficulty carrying the guidebook in physics practicum tend to be thicker when used in the laboratory. Based on the results of the [28] study the ebook is a teaching material that is favored by students in microbiology ‘s practicum, while in this study reviewing the students’ perceptions on physics practicum using electronic modules as a practical learning media. The study by [27] who developed e-modules in physics subjects in static and dynamic electrical materials towards senior high school’s students, while this study reviewed students' perceptions of the use of e-modules in physics practicum with reflecting material on flat mirrors towards college students at Universitas Jambi. With the help of new technology, an explosion of learning and new information emerged, especially on mobile devices that were believed to be able to improve the skills and cognitive characteristics of students, the new generation, who were considered ready to work learning with technology.

Based on these results it can be seen that the perception of students on the e-module in both categories. Researchers realized that there are some major requirements that must be met by e-module physics practicum students through the perception that aspects of internet availability, ease of use, collaborative, and education.

4. CONCLUSION

Students' perceptions of the e-module in physics practicum with reflecting material on the flat mirror are positive’s perceptions. It is indicated through the perception of students who enter in either category or is in the interval 68.1-84.0. Students’ perceptions of physical education in good category at 64.4% while the student's perception of mathematics education in good category amounting to 55.2%. So the perception of physical education students better than students' perceptions of mathematics education.

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