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PROCESS SKILLS PRACTICUM DEVELOPMENT SCIENCE STUDENTS IN MECHANICAL PRACTICE ON UNITS BASIC PHYSICS

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Abstract:
This study aims to develop a module of science process skills practicum for students in mechanical practice. This research was conducted at the Physics Laboratory of the Faculty of Mathematics and Natural Sciences, Gorontalo State University. This study uses a 4-D development model by Thiagarajan, Semmel and Semmel which consists of 4 stages, namely defining, designing, developing and dissemination. In the development of this practice module only 3 stages were implemented, namely defining, designing, and developing. The object in this study was S1 Physics Education Study Undergraduate Program 3rd Semester 2017 Academic Year 2018/2019 Physics Education class with 21 people. Data collection techniques using practicum modules developed, expert validation sheets, response questionnaires, tests, and documentation. Data analysis techniques are used through validity, practicality, and effectiveness of practical modules. The results obtained showed that the validity of the module was 79.8% with a decent category, the practicality of the module from the module readability questionnaire was 87.15% with a very good category and from the student response questionnaire 87.54% with a very good category. The effectiveness of the module from the results of the science process skills test results of the test is 55.63% with sufficient categories, so it can be concluded that the module of science process skills practicum students have fulfilled 3 aspects, namely validity aspects, practicality aspects, and effectiveness aspects.

Keywords: Practicum module, Science process skills, Mechanics

A. INTRODUCTION

One form of national education in Indonesia is education at the secondary level College. Education in higher education is called the curriculum. Based on law number 20 of 2003 article 1 paragraph (19), it states that Curriculum is a set of plans and arrangements regarding objectives, content, and materials lessons and methods used as guidelines for organizing activities learning to achieve certain educational goals.

Curriculum in universities in 1994 by ministerial decree education and culture of the republic of Indonesia number 056/U/1994 regarding guidelines preparation of college curricula and assessment of student learning outcomes where curriculum that prioritizes the achievement of mastery of science and technology, because it is called as a content-based curriculum. This curriculum model is set as a national compulsory subject in existing study programs. In 2000, on the mandate of UNESCO through the concept of "the four" pillars of educatoin, namely: learning to know, learning to do, learning to be, and learning to live together". Indonesia reconstructs its curriculum concept from content-based to curriculum competency-based (KBK). The 2000 and 2002 era curriculum prioritizes achievement of competence, as a form of effort to bring education closer to the position of job market and industry. Competency-based curriculum occurs over the core curriculum and institutional. Implementing the KBK, determined the main competencies by agreement between universities, the professional community, and graduate users. Supporting and other competencies determined by the university itself. Global developments that currently require recognition of achievements internationally equivalent learning, and the development of the IQF, the curriculum since 2012 has experienced a slight shift in size equalizing learning achievement. This curriculum is still based on achievement equalized ability to maintain the quality of its graduates. (Santoso, 2014:37-40)

The curriculum of the physics education study program provides expertise courses study program but in terms of the number of credits and the names of the courses are different. Study Program Physics Education finds that there are two types of practicum implementation, namely practicum as a separate course (separate from theoretical

lectures). This course is empowered by two teaching lecturers with a load of 4 credits, 3 credits for theory courses and 1 credit for practicum. Lecturers in this course are responsible for providing

Lectures in classrooms that are theoretical in nature only powerful lecturers are assisted by laboratory staff (Laboratory Assistant) to carry out practicum in the laboratory as part of a physics course itself.

Based on the results of initial observations, the mechanics practicum has not been equipped with practicum module. Students are required to do practicum independently without practical module assistance. This policy was taken so that students learn to make their own both in terms of material and work procedures. Students are only provided with practical topics, the rest of the students work to find out for themselves what is addressed in the topic. The module is a guide for the course of the practicum which contains the title to the procedure work. The existence of the module is very important to determine the goals to be achieved. Mechanics course is a Physics course that can equip students with science process knowledge and skills of students. Expected results after the implementation of the Mechanics practicum is that students are expected to improve their skills in assembling tools related to practical topics and correlate its relationship with the theory being studied. So to be able to train the extent to which science process skills must be possessed by students as candidates teacher. The practicum module that can be used is in the form of a process skills practicum module science. This is in line with research by Rohman & Lusiana (2017:47-56), concluding that the module developed is very feasible to be used in the lecture process. The results of science process skills obtained by students when doing practicum using the practicum module is generally categorized as good. Based on problem Therefore, the researcher intends to conduct a study with the title "Development" Student Science Process Skills Practicum Module in Practicum Mechanics"

B. RESEARCH METHOD

1. Location and research design

This research was conducted at the Physics Laboratory of the State University of Gorontalo as a test site. This research was conducted in the odd semester in the year Academic 2018/2019 for approximately 6 months with stages outline as follows: drafting, expert validation, trial execution legibility, and drafting of the thesis writing report.

The subject of this research is the Practicum module as the object of the experiment S1 students majoring in Physics, State University Physics education study program Gorontalo who is currently programming the Mechanics course in the academic year 20182019.

2. Data collection techniques

To obtain research information data, the techniques used, there are four types: includes: 1) direct observation and assessment of the practicum module design by validator, 2) direct use of practicum modules by students, 3) giving questionnaires on respondents (students) and 4) science process skills test, 5) documentation. The instruments used in this study are described based on the type of implemented data.

a. Developed practicum module

The practicum module developed in this research is the practicum module science process skills. This instrument is used to obtain skill results science process owned by students.

b. Validation Sheet

Before being used to retrieve data, developed products and instruments research is validated first to determine its feasibility. Validation done

to determine the feasibility and suitability of the content in the product or research instrument which is validated with criteria that have been previously set by the researcher. the scale used for the validation sheet in this study, namely the Likert scale. Activity validation is done by asking for the assessment and input of experts who act as validator.

c. Response Questionnaire

The user response questionnaire was compiled using a Likert scale consisting of 17 statements. This questionnaire requires observers to state their responses in the form of Very Agree (SS), Agree (S), Disagree (KS), Disagree (TS), and Strongly Disagree (STS). The product assessment questionnaire is submitted to the observer with the aim of knowing the practicality of the assessment instrument.

d. Test

The test used is a science process skills test that is used to measure science process skills that students have after doing practicum.

3. Data analysis techniques

a. Research Instrument Validation Data Analysis

The validity of the science process skills practicum module in this study was obtained through the validation sheet for the practicum module.

$$\text{Calculate the total mean value} = \frac{\text{Total score of all Validators}}{\text{Number of Respondents x number if questions}}$$

$$\text{Percentage of eligibility} = \frac{\text{Tot max scoral average score}}{\text{skor maxsimal}}\ x\ 100\%$$

Calculation results are used to determine conclusions or categories the feasibility of the module according to the aspects studied, following the feasibility classification divided equally according to 5 categories on a Likert scale.

Table 1. Eligibility criteria

Category Percentage	
Very Eligible	>80 % - 100 %
Eligible >6	0 % - 80 %
Fairly decent	>40 % - 60 %
Not eligible >	20% - 40%
Very not worthy	0% - 20%

(Arikunto, 2010:161)

b. Practical Analysis of Practicum Module

Practicality of the science process skills practicum module in In this study, it was obtained through a module readability questionnaire and a response questionnaire students to the science process skills practicum module. The results of the questionnaire were analyzed using a Likert scale rule which consisting of answer choices (1) = strongly disagree, (2) = disagree, (3) = undecided, (4) = agree and (5) strongly agree. The percentage of each item in the questionnaire is obtained by the formula:

$$\text{Percentage (\%)} = \frac{Total\ Score\ of\ Respondent\ Answer}{\text{Skor Ideal}}\ x\ 100\%$$

The percentage category is calculated as follows:

Table 2. Category Percentage Practicality

Category Percentage	
Very Good 80	% - 100%
Good 60%	- < 80%
Enough 40	% - < 60%
Less 20% -	< 40%
Very Poor 0% -	< 20%

(Riduwan, 2012:64)

c. Practicum Module Effectiveness Analysis

The effectiveness of the science process skills practicum module in research This can be seen from the results of the science process skills test. Percentage of test results based on students' science process skills are obtained by the formula:

$$\text{Percentage (\%)} = \frac{\text{Avarage Score}}{Maximal\ score}\ x\ 100$$

The percentage category is calculated as follows:

Table 3. Category of Effectiveness Percentage

, 2009:46)

Percentage Classification	
Very Good P	>80
Good 60 < p	80
Enough 40 <	p 60
Less 20 < p 4	0
Very less	20 (Widoyoko

C. RESULTS AND DISCUSSION

1. Validity

The results of the validation that have been carried out the percentage value of the practicum module 79.8% with a percentage of > 60%, it means that the practicum module includes in the Eligible category. The three validators concluded that the module practicum Appropriate and usable with minor revisions. The results of the validation the percentage value of the module readability questionnaire was 79.8% with the number of percentages > 60% means that the module's readability questionnaire is included in the

Eligible category. The three validators concluded that the readability questionnaire Decent and usable module with minor revisions. The results of the validation the percentage value of the student response questionnaire was 79.4% with the number of percentages > 60% means that the student response questionnaire is included in the Eligible category. The three validators concluded that the questionnaire response Eligible students and can be used

with minor revisions. Could concluded that the three instruments used in this study included in the Eligible category and can be used with minor revisions.

According to Hendryadi (2017:169-178) validity refers to aspects of the accuracy and precision of the measurement results. Self-measurement to find out how many aspects (in a quantitative sense) an aspect psychology is contained in a person, which is expressed by his score on the measuring instrument concerned. In the context of pure-score theory Classical, Azwar (2012:13) explains that the meaning of validity can be expressed as the extent to which the magnitude of the visible-score X is able to approach pure-score magnitude T. The closer the score-appears to the pure-score means the higher the validity and vice versa, the lower the validitythe measurement results mean the greater the difference in the visible-score of the pure. Furthermore, Sekaran (2006:284) states that the validity of is a function of how well the dimensions and elements of a concept are has been described.

According to Sugiyono (2012:14-16) that a valid instrument must be have internal and external validity. Instruments that have internal or rrational (theoretical) has reflected what is being measured. ational validity, if the criteria in the instrument areAs for the instrument which has external validity if the criteria in the instrument are compiled based on existing empirical facts.

Based on the opinion above and the results of the validation, the module that developed is feasible with research results that show conformity of the content with the indicators of practical achievement.

2. Practicality

The practicality of the practicum module is seen from the module readability questionnaire and student response questionnaire. The module readability questionnaire was used to see the understanding and ease of students in using the module developed practicum.

The results of the student readability questionnaire analysis on the module can be seen in the following diagram:

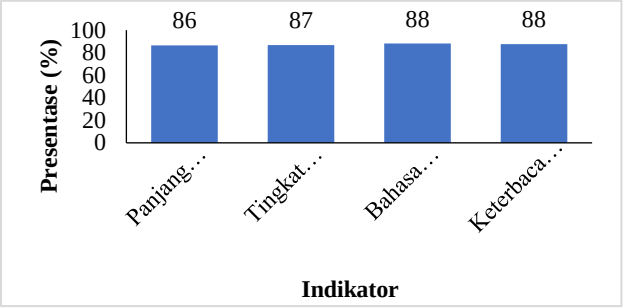

Figure 1. Module readability questionnaire

The results of the student response questionnaire analysis on the module can be seen in the following diagram:

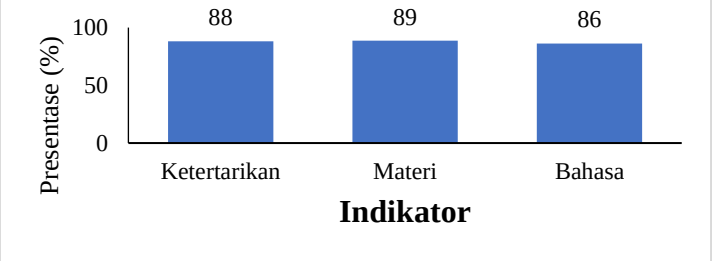

Figure 2. Student response questionnaire

Based on the results of research that has been carried out 4 indicators used to see the results of the readability of the practicum module used students consisting of 17 statements of the percentage value of the percentage of results the module readability questionnaire of all indicators is 87.15% and meets the Very Good criteria. Student response questionnaires are used to see student response to the practicum that has been carried out. Based on the results of research that has been carried out 3 indicators are used to see the results of student responses to the practicum that has been carried out consisting of 17 statements. The percentage value of the response questionnaire results students from all indicators 87.54% and meet the criteria Very Well. Practicality refers to the condition of the learning module that developed can be easily used by students so that

The practicals carried out are meaningful, interesting, fun, and useful for students' lives, and can increase their creativity in learning and have a degree of effectiveness on learning outcomes students (Alfriani & Hutabri, 2017:12-23)

3. Effectiveness

The effectiveness of the practicum module is seen through the quiz results (cognitive) and the results test (cognitive) science process skills of students The results of the analysis of the Science Process Skills-based Test Students can seen in the following diagram:

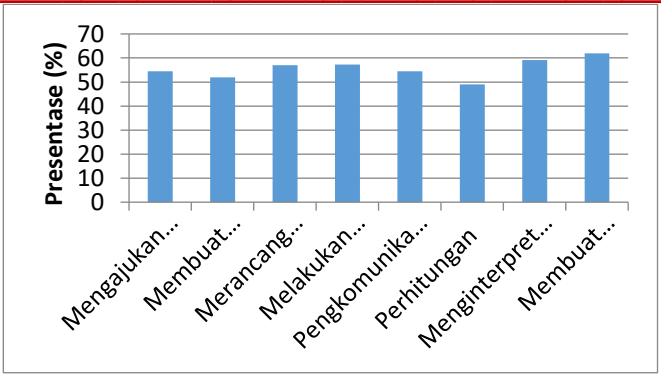

Figure 3. The results of the analysis of the science process skills test

Test results (cognitive) are also used to determine the effectiveness practicum module. Based on the test result diagram (cognitive) recapitulation value test results according to aspects of Science Process Skills on 7 practical topics namely: (1) Asking 54.42% questions (Enough), (2) Making a hypothesis 51.87 % (Enough), (3) Designing the experiment 56.97% (Enough), (4) Observing 57.31% (Enough), (5) Communicating 54.42% (Enough), (6) Calculation 48.97% (Enough), (7) Interpreting data 59.18% (Enough), (8) Conclusion 61.90% (Good). So percentage test results of all aspects of Science Process Skills 55.63 % (Appendix 3) and meet the criteria of Enough.

In accordance with the results and discussion above, the effectiveness of the module has been as expected, this is in line with the percentage that obtained in research. This statement is in accordance with Sadiman's opinion (2008:346) also states that effectiveness is the results obtained after the implementation of teaching and learning activities.

D. CONCLUSION

Based on the results and discussion of the research that has been done, it can be concluded that the practical science process skills modulePhysics students consist of 3 aspects, namely the validity aspect which is shown from the results of expert validation by three validators stated that the practicum module developed using a 4-D development model with a percentage value of 79.8 % are included in the Eligible criteria and can be used with minor revisions. Then the practicality aspect can be shown from the results of the readability questionnaire modules with a percentage value of 87.15% are included in the Very Good category and student response questionnaire with a percentage value of 87.54% is included in the Very Good category. As well as the third aspect, namely the effectiveness shown from the the results of the percentage of science process skills test with a percentage value of 55.63% included in the sufficient category. Based on the results of the module readability test practicum, the practicum module tested on students shows clear and easy to understand legibility. Developed modules use plain and clear language and according to capacity student knowledge so that it is very easy to understand

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