Practicality Test Experimental Device of Twisting Modulus As a Medium of Learning Physics

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Abstract: This study aims to determine the practicality of a twisting modulus of elasticity experimental device along with student worksheets as a medium of learning physics. The method used as a Research and Development (R & D) with Borg and Gall's development model at the stage of preliminary test called a test of practicality. Descriptive analysis of the data obtained by filling the questionnaire score an average yield of every aspect the practicality of using a Likert scale ratings. The results showed that the assessment teachersof experimental device about the shear modulus obtained 3.67 is very high category and 3,77 is high by student. The Results of research on student worksheet as an experimental using obtained 3.77 and 3.30 with very high category by teachers and students. So it can be concluded that the experimental device and student worksheet is practical as a medium of learning physics

Keywords: shear modulus experimental device, practicality

1. Introduction

Learning physics is not just to remember and understand the concept, but the most important is the habituation behavior and scientific attitude in finding concepts of physics through experiments (Yova, 2012). But in fact, the use of media through experimental activities has not been optimal. Based on Mifran's research (2015) there are several causes of laboratory practicum rarely used. First, slow down the learning process. Through the media the teacher must show the material delivered to students slowly so that the concept can be understood well. Second, the development of the media requires a long process so that the teacher considers the effectiveness of conventional learning methods better than the experimental media. Conventional method learning based on Beni's et al observations (2009) has its own impact in the learning process including lack of class mastery, students not interested in the material, and less obvious depiction resulting in students being confused in analyzing concepts. In addition, according to Meizuven et.al, (2012) that learning difficulties are also influenced by less variation in learning methods using teaching aids.

The main requirement in developing an experimental tool according to Adlia and Elbert (2017) it easy to use by teachers and students and is able to influence learning outcomes. So,before actually being used in the learning process, it must first be known how the level of usage of the experimental device is high or low.High level of convenience, learning interest and attention becomes interesting, fun, useful for students' lives, and can improve their creativity in learning (Azhararsyad, 2013). Concept recognition is really needed for work and learning, but to develop students' creativity, a better method is to work with an experimental tool that allows their

curiosity to be greater along with learning activities, so that concepts can be gained in meaningfulness.

Efran, et al (2012), stated that learning using experimental tools can help and increase interest in student learning motivation, which is due to a change in variable variation tests that increase students' understanding through physical real. The high use of the use of experimental devices helps students to absorb information optimally by combining human sensory tools. As stated by Amri&Ahmadi (2010) that humans absorb a message is 70% done, 50% heard and seen, 30% seen, 20% heard and 10% read

The elasticity of shear modulus is the main material of sub elasticity material. Applications of twisted modulus material have been studied at school such as moment of force and modulus of elasticity. As an application of the material, a practicum tool is created along with student worksheets to support and prove theories related to the material.

Experimental devices suitable for use in the learning process are seen from the level of usage of experimental devices. In this study, the level of practicality or ease of twisting modulus experiment equipment is conducted in schools, whether appropriate or not as a medium. By looking at the level of usage, it is expected to provide convenience in conveying and receiving learning material elasticity of twisting modulus through the values of practical media benefits on experimental devices. In addition, being able to understand the concept of twisting modulus through experimental activities makes students observe the symptoms of twisting modulus significantly. The high level of practicality is not only oriented towards learning goals but also in the process of achieving learning objectives and able to increase the level of mastery of physics.

2. Methodology

This research uses Research and Development with Borg and Gall development model. This model is used to design, develop, test, and evaluate the product so as to comply the criteria of effectiveness, quality, and standards (Sugiyono, 2015).

The location of the research was conducted in SMA Negeri 5 Pekanbaru in November 2016 with sample of 20 students of science class XI and 3 physics teachers. Sampling was done randomly and data collection was done by dispersion of questionnaire instrument. The flow of this research can be seen in Figure 1

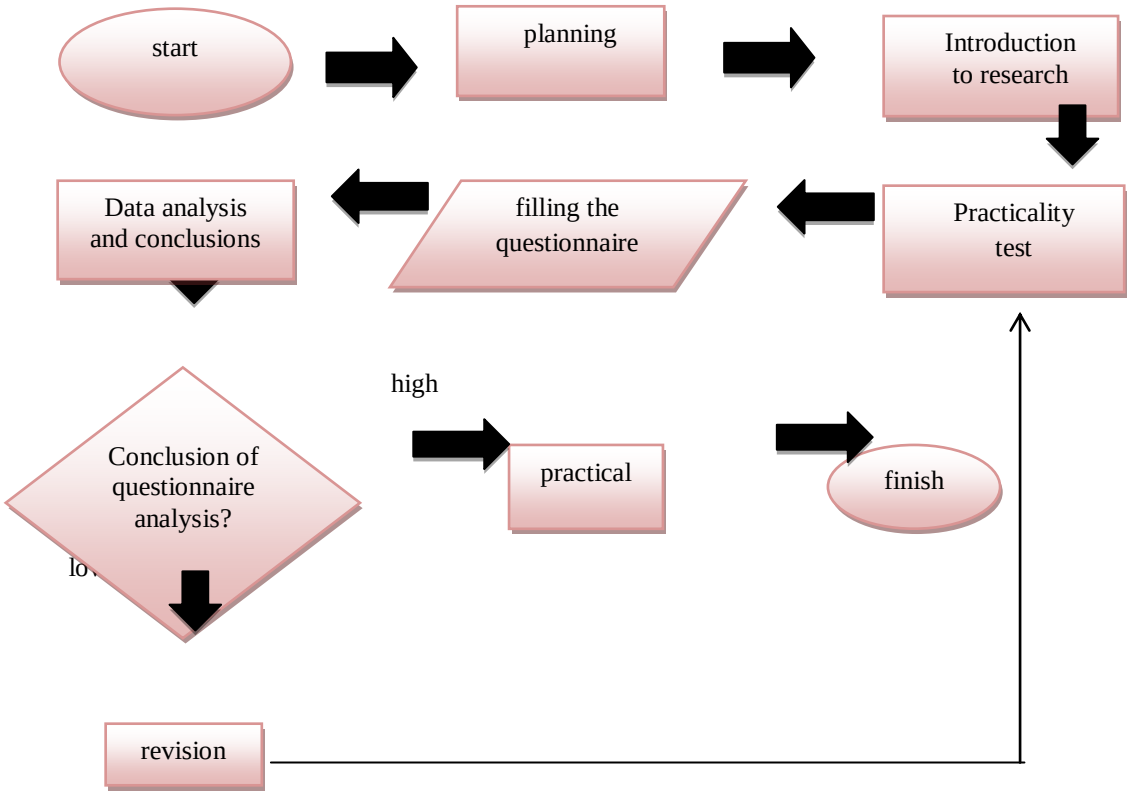

Figure1. The Research Process

Assessment of this practicality test is qualitative by looking at attitudes, perceptions, and opinions of a person about the easy or difficult function of experimental devices. Based on figure 1 the first time the experimental device and its twisting modulus assessment questionnaires have been declared invalid. It means that the instrument is in accordance with the truth and ready to be tested its practicality in school. The next step the experimental device is introduced and described how to use it to the practitioner, the goal is to understand well in using the shear modulus experimental tool. After that, students and teachers conduct experimental activities that are guided by the student worksheet and provide an assessment. Assessment is done by answering the statements in the questionnaire and affixing the check marks according to his judgment. The practical values of experimental devices involve quality in using them.

The analysis technique was carried out through a Likert scale can be seen in table 1

Table 1. The score of practicality

Average score	Category
4	strongly agrees
3	Agree
2	does not agree
1	strongly disagrees

(reference: Sugiyono, 2015)

Data were analyzed descriptively and then obtained an overview of qualitative object conditions. The final assessment of the practical test can be seen in table 2. The final conclusion gets a low value or is impractical then the device is revised again.Score average yield valuation high and very high categories stated practical and fit for use on wide scale usage

Table 2.The category of practicality

Average score	Category	Decision
$3,25 \leq \bar{x} < 4,0$	Very high	Practical
$2,50 \leq \bar{x} < 3,25$	High	Practical
$1,75 \leq \bar{x} < 2,50$	low	not practical
$1,00 \leq \bar{x} < 1,75$	Very low	not practical

3. Result and Discussions

3.1 Shear Modulus Experiment tool

Assessment of experimental tools based on indicators can be seen in the following table 3

Table 3. Assessment of experimental tools based on indicators

Indicator	The average teachers	categories of teachers	The average students	categories of students
the introduction of tools and materials	4	very high	3,3	very high
Easy to use	3,56	very high	3,05	high
time efficiency	3,0	high	2,7	high
experimental device resistance	3,3	very high	3,35	very high
efficiency concept	3,67	very high	-	-
packaging	3,6	very high	3,05	high
security is used	4	very high	3,55	very high
right on target	4	very high	-	-
more interactive learning	3,67	very high	-	-
delivery of information	-	-	3,25	very high
student attention	-	-	3,25	very high
help understand the concept regularly	-	-	3,45	very high
real experience	-	-	3,65	very high

Table 3 shows that the highest scoring scores are in the indicators of gaining real experience and the lowest scoring scores are at experimental time efficiency of 3.0 and 2.7. The twisted modulus experimental tool is easy to use with varying other metal rods so that it fits very high categories. In addition, the tool is able to demonstrate concrete physics concepts namely the concept of torsion, torque, and strain seen from the scale of acrylic pulley measurements on the metal with the main scale. Then the indicator of teaching efficiency concept gets very high category although in reading the measurement result takes a long time in reading it.

Inindicator is easily observed physical symptoms and the experimental devices can clarify the concept gained an average score of 3.25 to a very high category. Students said the experimental tool was easy to use by replacing the test metal and different mass loads. In addition, it is able to

show torsional shifts and calculate the twisting modulus with real activity. This is also supportedAhmad Rohani (2014) that the value of the quality of an experimental device is laying the groundwork concrete to think, providing a real experience, and foster a regular and continuous thought.

Practicality of media refers to the ease of use, meaningfulness and interest in concepts, and able to motivate students in understanding the concept of trim modulus through real activities. Therefore, the students 'and teachers' interest is more concentrated in the experimental activities so that the score is 3.25. The practical benefits of media by Y. Miarso (2007) stimulate thoughts, feelings, attention, progress and can encourage the learning process in students.

To place the right position on the acrylic pulley pointer scale requires high rigidity and patience. This is when the test metal is locked with a bolt, making the acrylic pulley scale easily shift. The test metal should be locked on the back with a strong lock while the test metal on the front is not locked so that the zeros of the main scale precisely coincide at the zero nonius scale. As a solution, there needs to be a friend's help to place the acrylic pulley scale correctly.

The tilting modulus elasticity experimental tool is considered practical with high and very high category scores. The experimental tool assists students in learning the twist modulus

3.2 Student worksheet

Assessment of student worksheet based on indicators can be seen in the following table 4

Table 4.PracticallityTest of Student Worksheets According to Teachers and Students

Indicator	The average teachers	Category of teachers	Category of students	The average students
experiment objective	4,0	very high	3,3	very high
tools and materials	3,67	very high	3,4	very high
procedure of activities	3,72	very high	3,41	very high
meaningfulness material	-	-	3,4	very high
time efficiency	3,33	very high	2,6	high
writing format	4,0	very high	3,2	high
Appearance of worksheet	4,0	very high	3,3	very high

Table 4 shows thatindicator of experimental activity procedure obtained the very highest category of 3,4 with the effectiveness of time of 2,6 belonging to high category. This indicator is lower because the measurement is a reduced decimal number which takes a long time to complete the calculation and is completed in 25 minutes.In this worksheet there are elements of tables, figures, and formulas that make it easy to retrieve data in the calculation so that the indicator procedure experimental activity is very high gain and high category. Accordance to AzharArsyad (2013 that learning is easier if the content and procedures of the activities are organized into meaningful sequences.

The means of communication between readers are in the students easily understand the contents of the worksheetand cause meaningful clarity. Images and colors can generate student interest in the process. Both of these indicators are highly rated and very high. In terms of language,

student worksheets use clear Indonesian language rules, and are easily understood as a means of communication between readers. Here students easily understand the contents of student worksheets so that it creates clarity and understanding of meaning. Obtained value for this indicator can be seen in table 4 with the acquisition of high and very high category values. Besides that the sharpness of the image and color can generate interest in students in the process.

Suggestions from the student for the future is the writing of shear modulus material is shortened, the answer filling column is made big size and the referring questions are made more than 2 related to daily life. Then able to help a practioner in directing the concept of shear modulus.

It was concluded that the student worksheet as a guide to twistingmodulus experiments was able to show the work steps in using experimental tools. This is evidenced by high scores and very high score that meets the value of practicality.
Overall assessment scores include high and very high categories. Experimental devices are able to become learning media that show the concept of twisting modulus. In addition, student worksheets can be a guide in good experimental activities. Thus the experimental modulus of torsion can be used as a medium for learning physics

4. Conclusion

The shear modulus elasticity tool practical as to help students study the material through observation of actual physical symptoms. In addition, the student worksheet as a guide for the use of experimental tools practical in carrying out experiments. Thus the experimental device of tilt modulus elasticity its practicality can be used as a medium of physics learning

References

Adlia Alfitriani & Elbert Hutabri , 2017 Kepraktisan dan Keefektifan Modul, Jurnal Kependidikan, 1(1),15.

Ahmad Rohani, 2014. *Media InstruksionalEdukatif*.RinekaCipta. Jakarta.8-9

AzharArsyad, 2013. *Media Pembelajaran*.PT Raja GrafindoPersada. Jakarta.28 &83

BeniHarsono, Soesanto, danSamsudi, 2009.Perbedaan Hasil Belajar Antara Metode Ceramah Konvensional Dengan Ceramah Berbantuan Media Animasi Pada Pembelajaran Kompetensi Perakitan Dan Pemasangan Sistembeni Rem. Jurnal PTM 9(2),72

Efran Priyambodo, Antuni Wiyarsi, Lis Permanasari, 2012. Pengaruh Media Pembelajaran Interaktif Berbasis Web Terhadap Motivasi Belajar Mahasiswa, Jurnal Kependidikan.42(2),100.

MeizuvenKhoirulArief, Langlang Handayani, dan Pratiwi Dwijananti, 2012. Identifikasi Kesulitan Belajar Fisika Pada Siswa. Journal Unnes 1(2),8.

Mifran, 2015.Pengaruh Penggunaan Metode Eksperimen Terhadap Aktivitas, Motivasi dan Hasil Belajar Siswa Pada Pokok Bahasan Arus danTegangan Listrik Bolak-Balik.Jurnal IPI Fisika dan Pendidikan Fisika 1(1),32-35.

Sugiyono, 2015.Metode Penelitian dan Pengembangan Reserach and Development.Alfabeta.Bandung.28

Y. Miarso, 2007. Menyemai Benih Teknologi Pendidikan. Kencana Prenada Media. Jakarta.37
Yova Agustian Prahara, 2012. Model Quantum Learning Dengan Metode Eksperimen Pada Pembelajaran Fisika. Universitas Jember Digital Repository 1(3),209-210.