

# Improved Concept Understanding through Media-based Learning

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**Abstract:** The purpose of this study is to determine the difference in the students' understanding of the concept through the use of a medium learning. The research method used was quasi experiment with pretest-posttest control group design. The population in this study is all students in Junior High School with sample of students of class VIII. The data collection tool uses multiple choice written tests derived from understanding aspect indicators on cognitive taxonomy. Hypothesis test is done by using t test by using SPSS program. The results showed that the control class (without using medium) there was no difference in the improvement of students' concept understanding between the pretest and posttest result. This was indicated by sig. 0.006 <sig. 0.05, while in the experiment class (by using Roberval *balance* as a medium) there is a difference in the improvement of students' understanding of understanding this is shown by sig. 0.355 > sig. 0.05.

## 1 INTRODUCTION

Understanding the concept for high school students is very important. It is very necessary for students to build problem solving skills and describe a phenomenon of physics or other natural phenomena. (Greca and Ataide, 2017). One of the obstacles in building student intuition to understand the concept of physics is that teachers often give detailed instructions on what to do or understand students. This causes the student does not have the freedom to develop his intuition in understanding a concept. (Hettmansperger et.al, 2015). According to Bruner and Olson (1973) the use of learning media such as simple practicum tool is one way that can support the awakening of students' understanding of a concept. Another way that can be taken is to build students' skills in understanding the symbols and communicate using the media. Teachers need to encourage students to understand a concept. Similarly, skills commonly developed through physics learning instruments such as data collection, interpreting information, expressing the concept of physics in the learning media to present the argument in the report of learning activities. The first thing students do in a practicum activity is to explore with teacher guidance. The exploration phase is expected to produce their own scientific hypothesis. Students are then given a practicum tool to conduct the

experiment. The experimental results are expected to answer the formulation of agreed issues or find other new things. (Zucker and Hug, 2008). One way to experiment with the influence of new physics practicum tools in building conceptual understanding is experimentation using N.E.T. Therefore, the focus of this project is to use Roberval balance as a practicum tool. Different preliminary examples of different topics in physics have been discussed previously (eg Bakhtibaeva et.al 2016; Malik et al., 2017; Schaal et al. 2010; Schwarz, 2013; Vogt, 2011; Kuhn & Vogt, 2015, Wang Et .al, 2017 & Barma and Daniel, 2017). But there is no research on the impact of learning using new media such as Roberval balance as a medium learning for developing conceptual learning.

The use of Roberval balance in this study aims to improve the understanding of students' concepts. There is a difference in the level of conceptual understanding between students who use the Roberval balance and those not given the tools.

## 2 METHODS

The research method used quasi experiment with pretest-posttest for control class and experiment class. The learning in the experimental class is done by guided inquiry practice method (Edelson et.al, 2001)

using the Roberval Balance practicum tool. While learning in the control class using lecture method, discussion and practice questions. Data processing result of research conducted by using SPSS software with indicator taken in the form of different value, table t and table of normality Kolmogorov-Smirnov and Shapiro Wilk (Kezer. 2012).

The population of the study was the junior high school students in the 7<sup>th</sup> grade. The number of poles in the control class were 32 people and the experimental class was 35 people. The selection of classes is done randomly.

The research instrument is a matter of multiple choice with indicator of concept based on Bloom’s Taxonomy revision up to level C5 (Evaluate). The material used is a static fluid about the density of the liquid. In addition to data from the pretest and posttest are also used Activity Sheet to see the participation of learners in the learning that is in the form of short stuff and some description of the work that has been done students.

Roberval balance is a simple practice tool. The principle of Roberval balance work is a firm system of equilibrium. Roberval balance is the mechanic system that introduced by Gilles Personne de Roberval (1602-1675). The election of Roberval balance based on the advantages of the system that allows us to set the charge anywhere along the sleeve side of the tool (Gumilar, 2016).

Fluid-type mass measurements are made by comparing one fluid with another known-weight fluid.

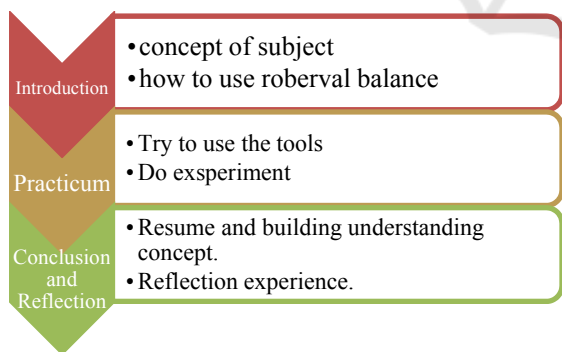


Figure 1: process in class control.

In the experimental class the student is given an introduction to the static fluid material and the tool to be used before practicum. Once students understand the learning objectives, students are given the opportunity to understand how the Roberval balance works. Students start practicum after they have been through the preparation stage well, during practice they are asked to write the findings in a worksheet.

Teachers act as facilitators and consultants in learning.

### 3 RESULTS AND DISCUSSION

Data obtained from this study of value pretest and post-test at each control class and the experimental class. This data is presented in table 1 and table 2. Then T test is done on the data with the result shown in table 3.

Table 1: Paired Samples Test.

	t	df	Sig. (2-tailed)
pre-control - pre-experiments	-2.95	34	.006
Understanding- experiments understanding	-4.83	34	.000
pre-control- understanding	-14.73	34	.000
pre-control- experiments understanding	-19.03	34	.000

Table 2: Tests of Normality.

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Stat	df	Sig.	Stat	df	Sig.
Understanding	.376	35	.000	.716	35	.000
experiments understanding	.390	35	.000	.623	35	.000
pre-control	.304	35	.000	.745	35	.000
pre-experiments	.276	35	.000	.802	35	.000

Table 3: Paired Samples Test.

	Paired Differences				
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference	
				Lower	Upper
pre-control - pre-experiments	-7.86	15.78	2.67	-13.28	-2.44
Understanding experiments understanding	-12.57	15.40	2.60	-17.86	-7.28
pre-control understanding	-39.71	15.95	2.70	-45.19	-34.24
pre-experiments experiments understanding	-44.43	13.81	2.34	-49.17	-39.68

From the table above can be seen that the value of concept understanding in the class that uses Roberval balance as a learning medium has a relatively higher increase compared with the control class. In the control class, the students' concept comprehension value improvement between pre test and post test is shown by sig. 0.006 < sig. 0.05. The value of concept understanding in the classroom that utilizes the learning media seems to experience a relatively better increase. In the experimental class the pretest and posttest values go up with the sig value 0.355 > sig. 0.05. The results of Zacharia (2003), Carey et.al (2007), and Kautz et.al (2005). Students' responsibility in working on the worksheet reaches 94%. This can show students' enthusiasm in learning when learning is based on practicum tools (Machemer 2007). The worksheet will condition the students to focus more on the lesson because there is always a bill that they must meet at each stage. This is very motivating students to follow the whole learning process. So it can strengthen the process of conclusion that the use of learning media well in assisting students in improving their understanding of the concept of teaching materials provided by teachers.

#### 4 CONCLUSIONS

Learning by using practical media is quite effective in improving students' motivation in learning. At first they were encouraged to know what kind of media was used in the lesson. This becomes an important point at the beginning of learning. As for the process of students guided by bill in the form of worksheets that they must finish in accordance with the use of learning media used.

The teacher's role in this case really becomes the facilitator and motivator only. And the crucial direct role that media-based learning can provide to enhance conceptual understanding is the delivery of the material itself. Media can be a tool to enable students to concretize concepts that are relatively abstract to them. Or help them in doing simulai thinking.

Learning using Roberval balance media has been proven to improve students' concept comprehension better than in conventional learning class. This can be the reason why the development of appropriate learning media in accordance with teaching materials, learning conditions and conditions should be improved.

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