
Motivation of Physics Student in Learning with Experiment Toolkit of Mechanics Wave

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ABSTRACT

Experiment important in Physics learning, it provide benefits for student learning outcomes. The aim of the research is to know the change of student motivation in learning physics at subject vibration and wave with experiment toolkit of wave mechanics. Subject of this research is student at class VIII-1 SMP Muhammadiyah, Kuok. The instrument used are device learning and experiment toolkit of mechanics wave. Research data instrument is motivation questionnaire ARCS (attention, relevance, confidence and satisfaction) model design by Keller and motivation observation sheet. Data were analyzed using descriptive analysis techniques and analysis Sign test. The increase of average motivation this research is 27,72%. It is concluded that the experiment toolkit of mechanics wave is effective to improve motivation student in learning physics at subjects Vibration and Wave.

Key Word: *Motivation, Experiment Toolkit of wave mechanics, Vibration and wave.*

Introduction

Sardiman, (2001:27) states that motivation is a feeling or encouragement that emerges from ourselves or environment for certain performance in our lives. Motivation is as a set of someone's inductor attitude to reach certain goal (Banet, 2017:1)

Motivation in the process of learning is related to the quality of education either teachers' motivation in teaching or students' motivation in learning as the participants that are being taught Praetoriusa (2017:1). Learning motivation with academic achievement, student shows a positive and significant correlation, it means that a good feeling of motivation will cause a good academic achievement as well. Students should have a motivation attitude in accomplish their tasks, efforts, competition and social awareness in learning process in

order to make a good academic achievement (Amrai, 2011: 1).

Renata (2012:1) states that physics learning needs comfortable and fun facilities to raise motivation and the thinking capability of students. Student' motivation in learning generally and leaning physics specifically is related to activity and efectivity in leaning, so students should get involved in the leaning process of physics (Kolb, 1999:1). One of ways to make students become getting involved in the learning process is that through experiment or trial, so in this case, learning process will be more fun and student will feel more motivated in the leaning process.

Experiment or trial (Physics demonstration) is the important sources in Physics teaching. Sets of Physics experiment of simple trial is aimed to observe the physical phenomenon

that related to the theory or problem solving happened in the nature (Rica, 2016;1)

One of the experiment toolkit that is important in the school is vibration generator / stable mechanics (osilator) wave (experiment toolkit of mechanics wave). Because of the learning about wave material is usually without practicum so the students feel less motivated in learning process. This condition is apprehensive because without practicum, the knowledge of students is only as conceptual so there will be misconception and students will be less motivated to study wave material, so the learning outcomes of wave material is less satisfied.

Because of the existence of “experiment toolkit of mechanics wave” so this research is aimed to find the motivation level of students before learning using the experiment toolkit before and after it.

Methodolgy

This research was carried out for 30 students class VIII-1 SMP Muhammadiyah Kuok, consists of 10 boys and 20 girls in Vibration and Wave Material. Before the learning in vibration and wave material using experiment toolkit, teacher teaches about energy and its changing material without the experiment toolkit.

This research is aimed to compare the motivation level between using experiment toolkit and without using it. It is used two instruments of data collecting, that are learning motivation observation sheet (Sardiman 2001), and study motivation questionnaire ARCS model who is developed by Keller and Kopp. These two instruments is aimed to measure the imbalance or accord of learning motivation level by students themselves either using questionnaire or using observation sheet.

This research involves some stages described in Figure 1:

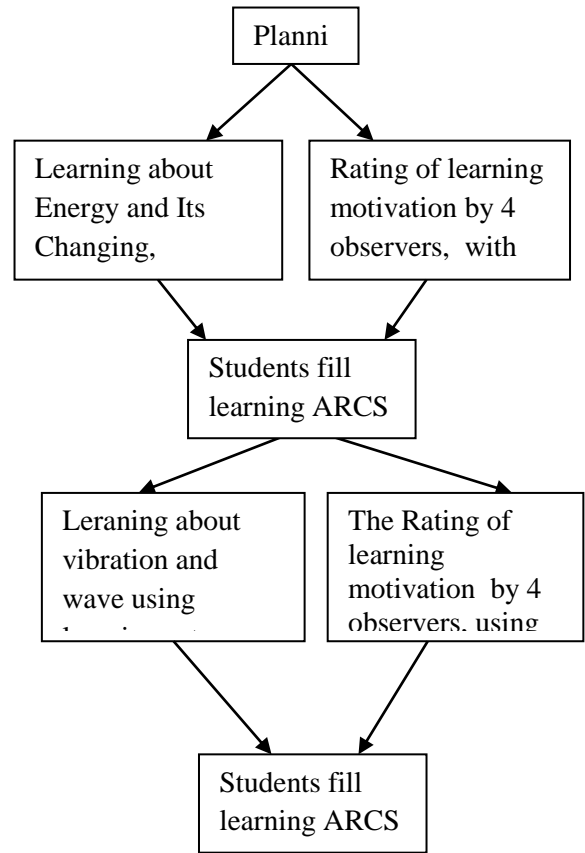


Figure 1. Reasearch Stages

Learning Planning is the preparing learning set in the first stage did in Energy and Its Changing Material without using experiment toolkit, teacher only uses learning sets; syllabus, Learning planning (RPP) and Students’ Work Sheet (LKS). During learning process, it involved 4 observers to fill the students’ observation sheet suitable with students motivation level that emerges during learning. After learning, each student filled the ARCS motivation questionnaire.

Next stage, learning about vibration and wave, beside syllabus, learning planning, and worksheet, teacher also uses experiment toolkit of wave mechanics

The way to analyze this research is by describing the result of students’ learning motivation before and after using

experiment toolkit. It was used two data collecting instruments; ARCS questionnaire motivation observation sheet.

For ARCS questionnaire, the learning motivation score was given based on the likert scale (Suha dinet, 2008), arranged in Table 1.

Table 1. The Weight of Students' Motivation

Statement	Score			
	VA	A	LA	NA
Positive	4	3	2	1
Negative	1	2	3	4

Description, VA = Very Agree, A = Agree, LA = Less Agree, NA = Not Agree, Then, the statements were modified with the way of statement identification items suitable with students' learning motivation instrument in Wave Material with the component for each indicator as in Table 2 below:

Table 2. Identification of Students' Learning Motivation

No	Indicator	Statements items number	Total
1	Attention	2 8 9 11 12 15 17 20 22 23 24 28 29	13
2	Relevance	4 6 16 18 26 30 31 33	8
3	Confident	1 3 7 13 19 25 35	7
4	Satisfaction	5 10 14 21 27 32 34 36	8

(Suhadinet, 2008).

For giving motivation score on observation sheet using scale, the description as follows: VH = Very High (4), H = High (3), L = Low (2), VL = Very Low (1).

After carrying out the descriptive analysis, so for grouping the average score of students

into motivation level, it is used the description in Table 3 as follows:

Table 3. Motivation Level of Students Categories (Suhadi, 2008)

Average score of motivation	Score categories
1,0 - < 1,75	Very Low (VL)
≥ 1,75 - < 2,5	Low (L)
≥ 2,5 - < 3,25	High (H)
≥ 3,25 - 4,0	Very High (VH)

Result and Discussion

A. Students Motivation Level with Using Motivation Questionnaire

Based on the descriptive result using ARCS questionnaire so it was described the students' motivation level as in Table 4.

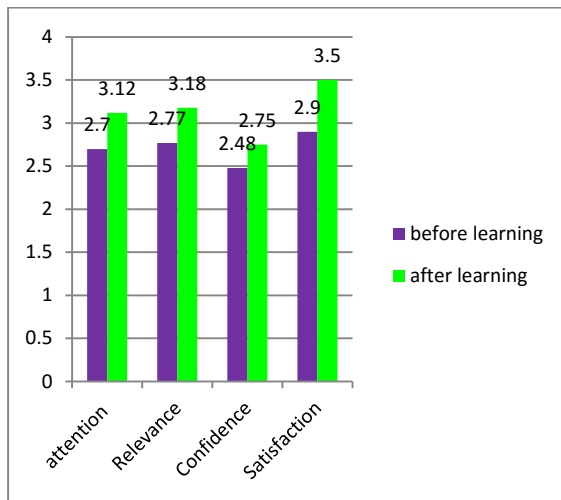
Table 4. students' learning motivation score before and after treatment

Students code	Total of students learning motivation score		Symbol
	Before	After	
1	94	110	+
2	115	137	+
3	98	110	+
4	89	96	+
5	100	108	+
6	86	104	+
7	111	139	+
8	100	109	+
9	88	115	+
10	98	110	+

Based on the Table above, it shows that the learning motivation of students are increasing, especially for student 7 who got increased 28 point or 25,22% and student 8 who got increased 27 point or 30,68%.

Therefore, it can be concluded that in wave material with using experiment toolkit of mechanics wave for students at SMP Muhammadiyah Kuok Class VIII-1 can increase the learning motivation of students.

According to the questionnaire used in this research, it has 36 statement items, and it is divided into 4 indicators; relevance, attention, confidence, and satisfaction. Thus, those four indicators can be seen the increasing of it in the histogram below.

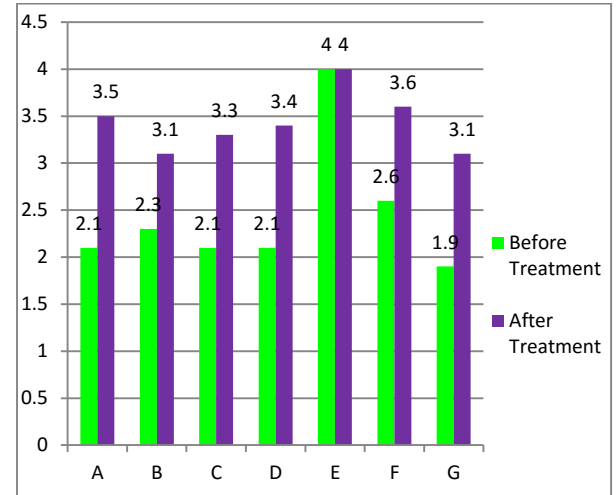


Histogram 1. The Average of Students' Motivation for Each Indicator on Motivation Questionnaire

Based on the graph above, it shows that the average score for each indicator is increasing. Firstly, attention indicator is increasing 15,5%. Secondly, Relevance is increasing 14,8%. Thirdly, confidence is increasing 10,8%. Last, for satisfaction indicator has the highest increasing that is 20,6%. Generally, it can be concluded that the average score for each indicator on motivation questionnaire is increasing before and after learning.

B. Students Motivation Level with Using Observation Sheet

Based on the observation sheet, it shows the changing of students' learning motivation level for each indicator before and after learning using experiment toolkit of wave mechanics. It can be seen in histogram as follows.



Histogram 2. The Average of Students Motivation for Each Indicator on Observation Sheet

Description : A : Indicator 1, B : Indicator 2, C : Indicator 3, D : Indicator 4, E : Indicator 5, F : Indicator 6, G : Indicator 7

From the graph above, it can be concluded that the average score for each indicator has increased significantly, except for the fifth indicator that is boring easily toward the routine tasks. This indicator is decreasing either after or before learning.

Discussion

The learning using Experiment Toolkit of Wave Mechanics in Vibration and Wave material at SMP Muhammadiyah Kuok can be seen that the motivation of students in learning physics is increasing. It can be seen from learning motivation questionnaire before and after treatment then it is analyzed descriptively.

The descriptive result will be explained as follows:

1. Motivation Level Using Questionnaire

Based on the graph 1, it can be seen the increase of students learning motivation per indicator. First indicator, attention indicator is similar to concentration, it can be also referred to '*momentain*' interest which is interested feeling on problem learned (Winkel, 100). It is caused by this Experiment Toolkit of Mechanics Wave make the students interested in following learning process.

The relevance is increasing 14,8%, it is caused by students feel directly the relevance of wave material in real daily life. Confidence is increasing 10,8% because of this experiment toolkit causes the confidence of students, it means that students can see directly about the concept of wave so they will accomplish the tasks easily and confidently. Satisfaction indicator is increasing 20,6%. Satisfaction indicator is the glad feeling, this feeling is positive effect of people who get appreciation for themselves (Butio Walgito, 1981 ; 140). Thus, students are satisfied when they studied using this Experiment Toolkit of Mechanics Wave.

2. Motivation Level using Observation Sheet.

By using motivation sheet, the average score is increasing fo each indicator, except for the the fifth indicator which is boring easily in accomplishing the routine tasks. The average score of this indicator is decreasing. However, it is in the range 4 (Very High) either after or before the learning process. This is might because of less valid of scoring coloumn for this indicator. For further recommendation, the experiment toolkit of mechhanics wave should be included in physics learning process.

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