

# THE INFLUENCE OF MULTIMEDIA BASED INQUIRY TRAINING LEARNING MODEL ON STUDENT'S ACHIEVEMENT ON MOMENTUM AND IMPULSE IN CLASS XI SMA N 1 PERBAUNGAN YEAR 2013/2014

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## ABSTRACT

Physics is one of the core curriculum of high school in Indonesia. It studies about natural phenomena. However student's achievement on high school physics in Indonesia is still relatively low. This is possibility due to the lack of learning and teaching approaches. The objective of research is to know the influence multimedia based inquiry training learning model on student's achievement on momentum and impulse in class XI, SMA N 1 Perbaungan, year 2013/2014". Based on the research find from the analysis of result it can conclude that it has the effect of inquiry training learning model on student's achievement on momentum and impulse in class XI SMA N 1 Perbaungan, year 2013/2014. It means inquiry training learning model better than conventional model to increase of student achievement.

**Key Word:** *influence of multimedia based inquiry training learning model, student achievement, activity.*

## INTRODUCTION

New technologies, especially multimedia has an increasingly important role in the learning process. Many people believe that multimedia will be bring us to a situation where learning with learning effort will be replaced by learning with fun. So the learning process a fun, creative, not boring would be the right choice for teachers.

Learning system that has made the conventional learning system (teaching faculty), thick with atmosphere instructional and felt less in accordance with the dynamics of the development of science and technology so rapidly. More than that

required for the educational obligations also include moral values, noble character, creativity, independence and leadership, which is very difficult in the conventional learning system. Conventional learning systems are less flexible in accommodating the development of materials for teacher competence should be intensified to adjust course material with the latest technological developments.

It is possible due to the low value of student competence by learning delivery strategy is less appropriate. In this case, the teacher may have little or no use of learning resources optimally. Among teachers in delivering instruction often ignore the use of media, but the media is working to increase student learning

motivation and in turn will improve the quality of education students.

The role of media in teaching and learning by Gerlac and Ely (1971:285) stated that there are three special treatment held teaching media, namely: (1) The media has the ability to capture, store and display the return of an object or event, (2) The media has the ability to bring back objects or events in various ways adapted to the needs, and (3) The media has the ability to display something object or event that has meaning.

Similarly, Ibrahim (1982:12) suggests the function or role of media in teaching and learning include: (1) to avoid the occurrence of verbal, (2) Generating interest or motivation, (3) Attractive the attention, (4) Overcoming the limitations of space, time and size, (5) Enable students to learn and (6) Making provision stimulus for learning.

Along with the times then the development of science and technology plays a very large. Physics as one of the branches natural sciences (IPA) is the fundamental science that form the backbone for the development of science and technology. Physics is also the science that studies the parts of nature and interactions in it, and can be explained with simple concepts.

Based on the experience of researchers at the Integrated Field Experience Program (PPLT) in SMA N 1 Perbaungan, physics teachers generally prefer the reduction formulas and calculations or discuss the questions, so that students think that physics is difficult, tedious and less enjoyable.

This happens due to the lack of varied learning model of the material to be delivered, teachers are less involved and require students to engage in problem-solving lessons, so students are less creative thinking using logic, it is also less eager to follow the teaching and learning activities, resulting in the subject matter presented the teacher can not be accepted by most students.

From interviews with a physics teacher at SMAN 1 Perbaungan, said that there are many students who are less interested in studying physics because students are less active in learning activities, in addition to the models used by teachers are less varied and still use the traditional learning model. It also makes learning not fun and does not create a vacuum in the students' learning process and only receive lessons without any real understanding of physics.

In order to realize the physics learning interesting and fun, the students develop thinking skills especially critical thinking skills, active and creative indispensable. Students who master the concepts are not only able to memorize a number of concepts that have been learned, but students should be able to apply it to other aspects to develop the concept of thinking. One model that is able to invigorate teaching students to think actively, creative and able to think critically in the process of learning is inquiry training learning model. Inquiry training learning model not only developing intellectual abilities but all this potential, including the emotional development and skills development. In the inquiry learning model, students are exposed to a problem who accidentally created by the

teacher or the results of "engineering", so students must put all thoughts and skills to get the findings in the problem through the research process.

Learning inquiry will train students to express opinions and discover their own knowledge useful for solving the problems. The use of models in an efficient and effective inquiry will reduce the dominance of the teacher during the learning process, and the boredom of students receive lessons will be reduced. Inquiry learning has an important role in improving the quality of education in schools, including physical education, for inquiry learning not only developing intellectual abilities but all potential students include emotional development and skills development. Thus, efforts to be made to actively involve students in learning so as to improve the skills, understanding, interest and learning outcomes of students in physics, one using inquiry training learning model.

The research has been carried out by Ridwan Abdullah Sani and M. Zainul Abidin (2010), entitled Influence Inquiry Training Learning Model for Mastering of Physic Concept In Class X SMA N 1 Tanjung Beringin. From the research the conclude is there is the influence of inquiry training learning model for mastering physic concept in class X SMA N 1 Tanjung Beringin where the obtained value of posttest experimental class is 6,69 and obtained value control class posttest results 4,64.

The research has been carried out by Nurhaida Lubis (2010), entitled influence inquiry learning model for student learning outcomes in the material substance and its form

of class VII semester 1 MTS N 3 Terrain academic year 2009/2010. From the research that is done then there is the influence of inquiry learning model for student learning outcomes in the material substance and its form of class VII semester 1 MTS N 3 Terrain academic year 2009/2010 where the obtained value of posttest experimental class is 68.70 and obtained value control class posttest results 59.20. The constraints faced by previous researchers, among others: (1) students are not familiar with the inquiry training learning model before so it took an adjustment period with the students during the learning process takes place. (2) in the group discussions there were some students who are silent or actively participate less and less in group discussions. (3) the limitations of the tools and materials in the lab because of the number of groups is too much.

How to overcome the above weaknesses researchers will now apply the inquiry training learning model and trying to overcome the constraints faced by previous researchers by providing guidance and clarification in advance stages of inquiry training learning model at the start of the meeting at the time of teaching and learning activities will be started if the students still do not get it researchers explain the stages of inquiry training learning model at the next meeting. First, researchers gave LKS (student worksheet) put more emphasis on students' understanding of concepts when teaching and learning take place as well as providing some animation related to the material that will be taught to identify the level of student understanding. Second, the presence

of a clear LKS, will allow students to understand what will be done in a group discussion so that students will actively participate in groups and researchers will give more attention and guidance to students who are noisy and disturb the current discussion.

Based on the description above, researchers interested in conducting research entitled. The Influence of Multimedia Based Inquiry Training Learning Model on Student's Achievement on Momentum and Impulse in Class XI, SMA N 1 Perbaungan, Year 2013/2014.

The problem statement of this research are (1)Is the students achievement in the momentum and impulse subject using multimedia based inquiry training learning model has influence than conventional learning? (2) How does student learning activities during the inquiry training learning model in the subject matter in momentum and impulse of SMA N 1 Perbaungan, year 2013/2014?

The objective of this research is (1)To know the influence multimedia based inquiry learning model on students achievement in the subject matter momentum and impulse in class XI SMA N 1 Perbaungan, year 2014. (2) To know the student learning activities using inquiry training learning model on student achievement in the subject matter momentum and impulse in class XI SMA N 1 Perbaungan year 2013/2014 (3) To know the student learning achievement by using multimedia based inquiry training learning model and conventional learning on momentum and impulse in class XI SMA N 1 Perbaungan, year 2013/2014.

The research significance this research is for students (1) Improving student learning outcomes in the subjects physics, especially the material momentum and impulse. (2) Motivating students to engage in learning through inquiry training learning model for teachers (3) Opening think conception of teachers in developing teaching and learning model one uses inquiry training learning model (4) Feedback for teachers to measure the success of the implementation of the teaching and learning activities in the classroom. For schools (5) Improving the quality of the school through learning outcomes student learning and teacher performance (6) As feedback to improve the effectiveness and efficiency of the learning activities.

### **Model of Inquiry Training Learning**

Learning is a process of interaction between teachers and students. In the process, the teacher gives guidance and provides many opportunities to encourage students to learn and to gain experience in accordance with the learning objectives, the achievement of learning objectives showed by the level of mastery of skills and personality formation.

The learning process involves a variety of activities and actions that need to be done by students to obtain good learning results. Opportunities for doing activities and acquisition learning outcomes determined by approach used by the teacher-student in the learning process.

Two important aspects in the learning activities are:

1. Aspects of the learning outcomes of behavior change on students.
2. Aspects of the learning process that quantity of experience intellectually, emotionally and physically on students.

According Gulo, in Trianto (2007; 135), inquiry learning model is a series of learning activities that involve the maximum throughout a student's ability to find and investigate the systematic, critical, logical, analytical, so that they can formulate their own findings with confidence.

The main targets of inquiry learning model are (1) the maximum student involvement in the learning process, (2) the directionality of activities in a logical and systematic learning objectives, (3) develop a confident attitude of students about what was found in the inquiry process.

General condition that requisite for emergence of inquiry training learning model for students are:

1. Social aspects in the classroom and open atmosphere that invites students to discuss.
2. Inquiry training learning model focuses on the hypothesis.
3. Use facts as evident (information, facts).

To create such conditions, the role of the teacher is follows :

1. Motivator, which give stimulus to be active and enthusiastic student thinking .
2. The facilitator, who showed the way out if there are obstacles in the process of student thinking.
3. Asker, to sensitize students mistake the meaning of their actions and give confidence in yourself.

4. Administrator, who responsibility to whole student in the classroom.
5. Influence, which led the current set of students think the purpose of which is expected.
6. Manager, which manage learning resources, time and class organization.
7. Rewarder, that rewards the achievement of students in order to increase morale.

To stimulate the thinking of learners, it is necessary to know what they know and how students think. Only then can develop students'ability to think in the process of inquiry. Often teachers expect their students to follow their own way of thinking, and not teachers follow the students thinking. So that teacher can be as role effectively, the introduction of student ability is indispensable, especially the way he thinks, the way they respond to it.

Inquiry training learning model is designed to engage students directly into the scientific process in a relatively short time. The results Schlenker, in the Joyce and Weil (1992, 198), suggesting that the inquiry training learning model can improve the understanding of science, productive creative thinking, and students become skilled in obtaining and analyzing information.

Achievement of learning objectives that have been formulated containing cognitive, affective, and psychomotor. Gagne, as has been cited by Dahar (1988:163), in Trianto (2007:129), that the learning outcomes achieved, include five capabilities:

1. Intellectual ability, the ability shown by the students about intellectual operation that can be

done, for instance traffic discrimination, concrete concept and definition concept.

2. Verbal information (declarative knowledge) knowledge presented as proportions (the idea) and are static, such as facts, events personally, and generalizations.
3. The attitude is a trait that could be learned and can affect a person's behavior toward objects, events or other living
4. Motoric skills, including the ability of physical activity, motor merging with intellectual skills, such as using microscopes and tools biuret.
5. Cognitive strategies, is a process of control, which is an internal process used by students to select and pay attention, learn, remember and think.

Affective traits are related to the development of attitudes and feelings, motivation and encouragement from within to do something such as curiosity, interest on multiple tasks which students perceived as a challenge, willing to take risks to make mistaking or critical by other students, not easily broken hope, respect themselves and others.

### **Inquiry Training Design**

Inquiry training designed to bring student directly into the scientific process through exercise that compress the scientific process into small period of time. Schlenker ( 1978 ) reported that inquiry training resulted in increased understanding of science, productivity in creative thinking, and skill for obtaining and analyzing information. He reported that it was not more effective than conventional method of teaching in the acquisition of information, but

that it was as efficient as recitation or lectures accompanied by laboratory experiences. Ivany (1969 ) and Collins (1969) reported that the method works best when the confrontations are strong, arousing genuine puzzlement, and when the materials the students used to explore the topics under consideration are especially instructional. Both element and secondary students can profit from the model (Voss, 1982). In an intriguing study. Elefant (1980) success carried out the model with deaf children, which suggest that the method can be powerful with student who have severe sensory handicaps.

### **Syntax**

Inquiry training has five phase . the phase is :

No	Phase	Teacher Activities
1	Phase one : Confrontation with the problem.	Teacher explain inquiry procedures and present discrepant even
2	Phase two : Data gathering- verification.	Teacher verify the nature of object and conditions, and then verify the occurrence of the problem situation.
3	Phase three : Data gathering- experimentation.	Teacher isolate relevant variables and hypothesize and test causal relationships.
4	Phase four : Organizing, formulating and explanation.	Teacher formulate rules or explanations

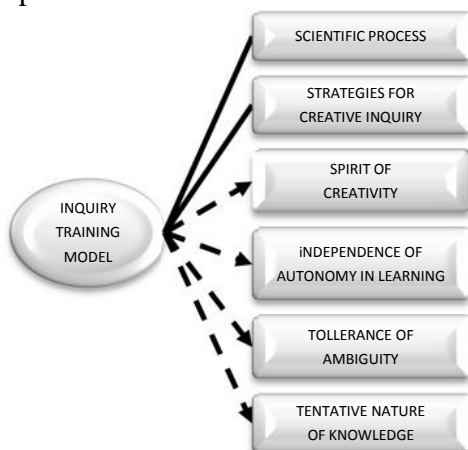
5	Phase five : Analysis of the inquiry process.	Teacher analyze inquiry strategy and develop more effective ones
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### Instructional and Nurturant Effect

This model promotes strategies of inquiry and the values and attitudes that are essential to an inquiring mind including:

1. Process skill ( observing, collecting, and organizing data; identifying and controlling variables; formulating and testing hypothesis and eplanations ; inferring).
2. Active, autonomous learning.
3. Verbal expressiveness.
4. Tolerance of ambiguity; persistence
5. Logical thinking.
6. Attitude that all knowledge is tentative.

The chief learning outcomes of inquiry training are the processes involved observing, collecting and organizing data, identifying and controlling variables, making and testing hypotheses, formulating explanation, and drawing inferences. The model splendidly integrates these several process skill into a single, meaningful unit of experience.



Note :

\_\_\_\_\_ Instructional Effect  
----- Nurturant effect

The format of the model promotes active, autonomous learning as the student formulate question and test ideas. It take courage to ask question, but it is hoped that this type of risk will become second nature to the students. They will also become more proficient in verbal expression as well as in listening to others and remembering what has been said. Although its emphasis is on process, inquiry training result, too, in the learning of content in any curricullum area from which problems are selected.

### RESEARCH METHOD

The research is conducted in Senior High School (SMA N) 1 Perbaungan that were active in the Academic Year 2013/2014. The time of this research is 20 until 30 September 2013. With two class, selected by cluster random sampling. One class as experiment class using *Inquiry Training Learning Model* and another class as control class using Conventional Model.

#### Research Design

Tabel Two Group Pretest-Postest Design (Arikunto 2010 : 125)

Group	Pre Test	Treatment	Post Test
E		X	
C		Y	

Note: E= Experimental Group

C = Control Group

X= Applying Multimedia Based Inquiry Training Model

Y= Applying conventional learning

For hypotesis test using t test one part as follows (Sudjana, 2005: 239):

$$t_{\text{count}} = \frac{\bar{X}_1 - \bar{X}_2}{s \sqrt{\left(\frac{1}{n_1}\right) + \left(\frac{1}{n_2}\right)}}$$

With S is Total varians

$$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

Note:

$\bar{X}_1$  = Average value of experiment class

$\bar{X}_2$  = Average value of control class

$n_1$  = total of student in experiment class

$n_2$  = total of student in control class

$S_1^2$  = Varians for experiment class

$S_2^2$  = Varians for control class

Pre-test data of both classes are shown in Table.

Table Post Test score in Experiment and Control class

Experiment Class				Control Class			
Score	F <sub>1</sub>	$\frac{\sum X_1}{n_1}$	S <sub>1</sub>	Score	F <sub>2</sub>	$\frac{\sum X_2}{n_2}$	S <sub>2</sub>
1,5	0	4,89	1,28	1,5	1	3,86	1,24
2,5	1						
3	1						
3,5	2						
4	7						
4,5	3						
5	4						
6	4						
6,5	3						
7	1						
7,5	1	TOTAL	23	TOTAL	27		

Table Pre test score in Experiment and Control class

Experiment class				Control class			
Score	F <sub>1</sub>	$\frac{\sum X_1}{n_1}$	S	Score	F <sub>1</sub>	$\frac{\sum X_2}{n_2}$	S
1,5	4	2,72	0,81	2	4	3,36	1,11
2	4						
2,5	7						
3	6						
3,5	2						
4	3						
5	1						
<b>Total</b>	<b>27</b>			<b>Total</b>	<b>23</b>		

### Normality and Homogeneity Test

The result of normality test in experiment and control class described below :

Table Normality test of pre-test data in Experiment class and Control class

Class	Pre-Test Data		Conclusion
	L <sub>count</sub>	L <sub>table</sub>	
Experiment	<b>0.1543</b>	<b>0.1682</b>	Normal
Control	<b>0.1510</b>	<b>0.1798</b>	Normal

Base on table, get the results of hypothesis testing two parties in  $\alpha = 0.05$  obtained price  $t_{\text{count}} = -0.29$  and  $t_{\text{table}} = 1.99$ . Because  $-t_{\text{table}} < t_{\text{count}} < t_{\text{table}}$  it is  $-2,01 < -1.31 < 2,01$  so  $H_0$  accepted so can be concluded the initial student ability in experiment class and control class is same.



Table Normality Test of Post-Test Data in Experiment and Control Class

Class	Post-Test Data		Conclusion
	L <sub>count</sub>	L <sub>table</sub>	
Experiment	0.1623	0.1682	Normal
Control	0.156	0.1798	Normal

Table Homogeneity Test of Pre-Test

Data	S	F <sub>count</sub>	F <sub>table</sub>	Conclusion
Experiment Class	0,776	1.76	1.89	Homogen
Control Class	1,232			

In table,  $F_{count} < F_{table}$  it's mean of sample in this research have homogeneity or can be represented all population.

Table Homogeneity Test of Post Test

Data	S	F <sub>count</sub>	F <sub>table</sub>	Conclusion
Experiment Class	1,660	1.03	1.891	Homogen
Control Class	1,550			

Based on table, get  $F_{count} < F_{table}$  it's mean of sample in this research have homogeneity or cab be represented all population.

### Hypothesis Test

Table Hypothesis Test of Pre-Test

Data	Average	t <sub>count</sub>	t <sub>table</sub>	Conclusion
Experiment Class	2,72	-1,31	2.01	Initial student ability is same
Control Class	3,36			

Base on table, get the results of hypothesis testing two parties in  $\alpha = 0.05$  obtained price  $t_{count} = -0.29$  and  $t_{table} = 1.99$ . Because  $-t_{table} < t_{count} < t_{table}$  it is  $-2,01 < -1.31 < 2,01$  so  $H_0$  accepted so can be concluded the initial student ability in experiment class and control class is same.

Tabel Hypothesis Test of Pro-Test

Data	Average	t <sub>count</sub>	t <sub>table</sub>	Conclusion
Experiment Class	4,889	2.073	2.070	Have different significant
Control Class	3,869			

With test criteria is  $H_0$  accept if  $t_{calculate} < t_{(1-\Gamma)}$  where  $t_{(1-\Gamma)}$  get from distribution table t with independent degree  $(dk) = n_1 + n_2 - 2$  and the probability  $(1-\Gamma)$  with  $\Gamma = 0,05$  for another value of t  $H_0$  not accept, so multimedia based inquiry training learning model has influence in student learning achievement.

### DISCUSSION

The result of analysis research data showed that have the influence of multimedia based inquiry training model on student learning achievement on momentum & impulse in class XI SMA N 1 Perbaungan. At the beginning of the research are given a pretest to experiment and control class, obtained the average of pretest of experiment class is 2,722 with standard deviation 0,88 and the average of control class is 3,369 with standard deviation is 1,110. In the normality testing for pretest obtained in experiments with  $L_{calculate} = 0.0834$  and  $L_{table} = 0.156$ , so obtained  $L_{count} < L_{table}$ , then both of classes are normally distributed ( the calculation is attached in appendix). In the test homogeneity is obtained  $F_{count} = 1.76$  and  $F_{table} = 1.891$  so that  $F_{count} < F_{table}$  ( $1.76 < 1.89$ ), then both of sample come from homogeneous group calculation results attached in appendix). Then the result of initial ability test (pretest) between experiment class and control class with similarity test two parties is obtained  $-t_{table} < t_{count} < t_{table}$  ( $-2.012 < -1.315 < 2.012$ ) which means that the

initial ability both of sample groups are similar.

Having given a different treatment, then students is given the test again (posttest), the average value of posttest in experiment class using multimedia based inquiry training model is 4,889 with standard deviation 1,660, while the average value posttest in control class with conventional learning is 3,869 with standard deviation is 1.550. This research used the t test two parties to determine there were differences of samples' learning achievement when treated with multimedia based inquiry training learning model in experiment class and conventional learning in control class. The results of hypothesis testing from the data obtained  $t_{count} > t_{table}$  or  $2.073 > 2,070$ . At significant level  $\alpha = 0.05$

From above, we see aspects assessed during the process of learning is how students find the destination lab, equipment and materials, hypothesis, procedure, result and conclusion. During the process of inquiry learning takes place, the activity of the students seemed more excited and passionate because researchers are always motivating students. But still there are student activities that appear in the learning process but not observed by the observer because of limited aspects assessed in the observation sheet. In the learning process, there is a student activity like collect data, test hypothesis and drawing conclusions. Attempts to do is to complete the observation sheet in accordance with the learning process with inquiry training learning.

This indicates that the value of the results obtained by the students learn not only from activities conducted multimedia

based inquiry training model. Or in other words, the activity of inquiry training had no effect on the value of student learning outcomes in the two categories of activity. Therefore, to ensure that the good influence of inquiry training model for student learning outcomes are needed activity indicator that more complete observations. In this case the researchers only observed 4 aspects: the purpose of experiment, tools & materials, hypothesis, procedure, results, conclusions.

## CONCLUSION

Base on the research find from the analysis of result and hypothesis test, it can conclude that (1) Inquiry training learning model has the effect on student's achievement on momentum and impulse in class XI SMA N 1 Perbaungan, year 2013/2014. It means inquiry training learning model better than conventional model to increase of student achievement. (2) Student activity frequency in experiment class with inquiry training learning model after two times meeting concluded to good category. While the students activity in control class have conventional learning after two times meeting is concluded to less category. (3) Base on t test, find that has significant influence in student achievement using inquiry training learning model especially in material momentum & impulse class XI SMA N 1 Perbaungan T.P 2012/2013.

## SUGGESTION

Suggestion from the reserach is (1) for next research, it will be better to make the good plan in group organization, it should be the member of group each group only 2-

3 people. It can make them in active.  
(2) In the collection of data in research, find that student need a long time because they still not understand the step-step in worksheet. It will be better the next researcher want to continue this research, using the worksheet with good communicative and make student easy to understand.

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