

## **Learning Model of Discovery to Improve The Student's Creativity in Class XI**

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### **ABSTRAK**

Penelitian Tindakan Kelas ini menggunakan Model Pembelajaran Discovery untuk meningkatkan kreativitas siswa dalam memahami Elastisitas dan Hukum Hooke. Penelitian ini mengikuti metodologi penelitian tindakan kelas. Temuan mengungkapkan adanya peningkatan progresif dalam kreativitas siswa pada siklus pertama, dan siklus kedua. Pada siklus I jumlah siswa yang tidak kreatif berkurang menjadi 2,8%, siswa yang cukup kreatif sebesar 57,2%, siswa yang kreatif sebesar 14,3%, dan siswa yang sangat kreatif sebesar 25,7%. Pada siklus II siswa yang tidak kreatif tetap sebesar 2,8%, kreativitas siswa sedang meningkat menjadi 74,2%, siswa kreatif sebesar 20%, dan siswa sangat kreatif sebesar 2,8%. Selain itu, penelitian ini menunjukkan adanya peningkatan kreativitas siswa, dengan N-gain sebesar 0,54 yang dikategorikan sebagai Sedang.

**Kata Kunci:** Discovery Learning, Kreativitas Siswa, Penelitian Tindakan Kelas

### **ABSTRACT**

*This Classroom Action Research employs the Learning Model of Discovery to enhance students' creativity in understanding Elasticity and Hooke's Law. The research follows a classroom action research methodology. The findings reveal a progressive improvement in students' creativity across the first cycle, and second cycle. In the first cycle, non-creative students reduced to 2.8%, moderately creative students were 57.2%, creative students were 14.3%, and very creative students were 25.7%. In cycle II, non-creative students remained at 2.8%, moderately student's creativity improved to 74.2%, creative students were 20%, and very creative students were 2.8%. Additionally, this study showed an improvement in student's creativity, with a 0.54 N-gain, categorizing it as Average.*

**Keywords:** *Discovery Learning, Student's Creativity, Classroom Action Research*

## INTRODUCTION

Previous studies have shown that teachers as coordinators tend to dominate learning activities in the classroom, so there is no reciprocal action between teachers and students, which affects the quality of learning (Aslamiyah, 2022). So the creativity of students and teacher is a must.

Oemar Hamalik (2015), it states that discovery learning is a learning process that focuses on students' intellectual thinking to solve various problems that they face (Oemar, 2015). Meanwhile, according to Trianto (2007) the open learning teaching model is a way to develop students' active learning through self-discovery, self-exploration, and the results obtained will then be remembered for a long time (Trianto, 2007).

Therefore, a learning model of discovery is a learning model that requires active learners to search or find their own concepts and principles that they are learning in order to generate new ones that make learning more meaningful we can conclude that there is (Endah, 2018). Based on the above description, the learning model of discovery was used to conduct classroom action research on the subject of elasticity and Hooke's law to improve student creativity.

Discovery training models are used to develop active educational methods through self-knowledge and self-examination (Kristin, 2016). Open learning is an educational method that requires students to be more creative in creating a situation where students learn their knowledge and actively discover them (Nichen, 2018). According to Hosnan, discovery learning is characterized by investigation and problem-solving learner-centered activities for creating, combining, synthesizing knowledge, and integrating new and existing knowledge (Hosnan, 2014). According to (Syah, 2010) When applying the discovery teaching model to the classroom, several steps must be implemented in general teaching and learning activities: 1) Stimulus, 2) Problem formulation, 3) Data collection, 4) Data processing, 5) Verification, 6) Generalization (Syah, 2014).

According to Rachmawati and Kurniati (2010) creativity is an individual's thought process that generates new ideas, processes, methods, or products that are creative, aesthetic, flexible, integrated, continuous, discontinuous, and differentiating, and is a problem-solving process. It is useful in various fields to solve problems (Rachmawati, 2010). Suggest that creativity can be interpreted in terms of four dimensions: First, creativity is interpreted as a force or energy that exists within a person (De Silva, 2013). Second, creativity is interpreted as a process. Creativity is focused not only on products, processes and energy, but also on individuals.

Indicators of creativity are fluency, flexibility, novelty and elaboration (Munandar, 2004).

Hooke's Law is an empirical rule that states that the force (F) required to stretch or compress a spring a certain distance (x) varies linearly with that distance, i.e.,  $F_s = -kx$ , where k is a constant coefficient. The spring's properties (i.e., stiffness), -x, are small compared to the total possible deformation of the spring with the opposite direction (Raymond, 2018). An elastic body or material that satisfies this formula is called linear or elastic hook.

## RESEARCH METHODS

Using a classroom action research method (qualitative research) designed based on Kemmis and MacTagras' model cycle, this study is conducted in two cycles, as indicators of student creativity emerge in Cycle II. Each cycle includes his four stages: Planning phase, execution phase, observation phase, reflection phase (Kemmis, 2010).

The subjects of this research were 35 students of class XI at Public High School 109 Jakarta and the object was student's creativity. This study was conducted in the unique semester 2022/2023 of the school year. As for the categories, we can use the interpretation of the Normalized Gain index (g) according to the modified Hake's method:

**Table 1.** N-gain Category

Normalize N-gain Score	Category
$-1.00 < g < 0.00$	Decrease
$g = 0.00$	Stable
$0.00 < g < 0.30$	Low
$0.30 < g < 0.70$	Average
$0.70 < g < 1.00$	High

### Cycle I Learning Stage

#### Planning

At this stage a lesson plan is carried out in the form of a teaching module designed for elasticity and Hooke's law. Lesson plans are prepared by taking into account: (a) learning objectives; (b) learning indicators; (c) learning steps/activities; (d) learning materials, media, and resources; (e) assessment/evaluation of learning (summative/formative); (f) Targets and achievement criteria.

#### Implementation

Then the next stage is the implementation stage. At this stage the implementation of cycle I begins by inviting students to pray and check attendance. Furthermore, the teacher first explains the objectives and learning indicators related to elasticity and Hooke's law. Students are then invited to form groups according to a learning

process carried out using a learning model of discovery, namely:

1) Stimulation

In this process the teacher displays a picture of an object related to the material and provides a number of trigger questions to provoke discussion so that students can explore the material.



Figure 1. Teacher provides stimulus

2) Statement of the problem

In this process, the teacher provides students with the opportunity to identify problems and respond to answers to discussion questions.

3) Data collection

In this process, the teacher gives the pupils the chance to discuss and work together to collect as much information as possible with their respective groups.



Figure 2. Students discussing in groups

4) Data processing

In this process, the teacher provides opportunities for students to process data from information sources and discussions that have been carried out.

5) Verification

In this process, after giving pupils a chance to thoroughly review their responses, the teacher presents the findings of the discussion.



Figure 3. Presentation of group discussion results

6) Generalization

In this process, the teacher and students conclude the material they have studied.

**Observation**

Next is the observation stage. Observations were conducted to ascertain whether employing a discovery-based learning methodology will effectively foster student creativity. Following the first learning cycle's conclusion, there follows a reflection phase. After implementing Cycle I learning, it is expected that students' creativity will significantly improved and they will be able to apply physics concepts to real life.

**Reflection**

After that, the results obtained with the loop failed to achieve the goal described in the discussion above. Therefore, a second cycle must be performed. In Cycle II, like Cycle I, the learning plan is based on Cycle I's reflection results. After that, the teacher conducts learning based on the learning plan caused by Cycle I's reflection. Then, thirdly, the teacher observes learning activities about elasticity and Hooke's law. And in the final stage, the teacher thinks about implementing Cycle II.

**Cycle II Learning Stage**

**Planning**

At the planning stage, a lesson plan is prepared in the form of a teaching module designed for elasticity and Hooke's law. Lesson plans are prepared by taking into account: Learning objectives, learning indicators, learning stages and activities, materials, media, and learning resources, and assessment and evaluation of learning (summative and formative) are the first five items on the list of lesson plan then targets and criteria for achieving them. In addition, it is also necessary to prepare learning tools and student work sheets.

**Implementation**

Then the next stage is the implementation stage. At this stage, the implementation of cycle II begins by inviting students to pray and check attendance. Next, the teacher first explains the learning objectives and indicators related to elasticity and Hooke's law. Then students are directed to form groups according to the process of learning that will be carried out through the application of the learning model of discovery, namely:

1) Stimulation

In this process the teacher displays a picture of an object related to the material and provides a number of trigger questions to provoke discussion so that students can explore the material.



Figure 4. The teacher provides a stimulus

2) Statement of the problem

In this process, the teacher gives students the opportunity to identify problems and respond to answers to discussion questions in student work sheets.

3) Data collection

Throughout this process, the teacher gives the students the chance to collaborate and have discussions in order to gather as much data as they can for their respective groups.



Figure 5. Students discussing in groups

4) Data processing

In this process the teacher provides opportunities for students to process data from information sources and discussions that have been carried out.

5) Verification

During this procedure, the instructor allows pupils to thoroughly review their responses before presenting the outcomes of the conversation.



Figure 6. Presentation of group discussion results

6) Generalization

The teacher and students draw conclusions from the stuff they have studied during this process.

**Observation**

Next is the observation stage. To ascertain the efficacy of applying a learning model of discovery, observations were made to improve student's creativity by observing their level of understanding of physics concepts, their performance in collaboration and discussion, and their enthusiasm for research and problem solving.

**Reflection**

After the second learning cycle is completed, a reflection phase takes place. Reflection is done to improve the learning process with a view to subsequent application. It is expected that after the implementation of Cycle II training, the students' creativity will be significantly improved and they will be able to apply physics concepts to real life.

The goal and success criterion for this study is whether 75% of all students in the class meet the success criterion of increasing creativity. On the other hand, applying the learning model of discovery can improve student's creativity and participation in the process of learning. The data collected in this study were instructional observations and student worksheets. There are two categories for this study's data analysis: quantitative data using frequency distribution and observation using qualitative data (Sri, 2020).

1) Validity Test (using Point Biserial)

When r-count exceeds r-table, the query is legitimate. It is not a legitimate question if r-count < r-table. R-table with n = 35 is 0.334 with a significance of 5%. There are 12 questions with the validity result, 11 question is valid, and 1 question is not valid.

2) Reliability Test (using KR 20/KR 21)

If the number of Valid questions is odd, then use KR20. If the number of Valid questions is even, then use KR21.

Table 2. Realiability Coefficient Interpretation

No	Realiability	Interpretation
1	0.80 < r <sub>11</sub> < 1.00	Very High Reliability Degree
2	0.60 < r <sub>11</sub> < 0.80	High Reliability degree
3	0.40 < r <sub>11</sub> < 0.60	Fair reliability degree
4	0.20 < r <sub>11</sub> < 0.40	Low reliability degree
5	0.00 < r <sub>11</sub> < 0.20	Very low reliability degree

Table 3. Reliability Statistics

Cronbach Alpha	Cronbach Alpha Based on Standarized Items	Interpretation
0.696	0.731	11

Cronbach's Alpha value based on the Reliability Statistics table (0.696) is the KR20 value. Based on the Reliability Coefficient Interpretation table, the question packages tested fall into the category of having a high degree of reliability.

## RESEARCH RESULT

Observations show that after continuous implementation of the learning model of discovery based on elasticity and Hooke's law, the creativity aspects of students improved from the first cycle to second Cycle. The improvement of student's creativity from the first cycle to second cycle is shown in Table 5 N-gain result. The comparison of Distribution of Creativity in Learning Material on Elasticity and Hooke's Law in the first cycle, and second cycle of Class XI Physics Students can be seen in table 4.

**Table 4.** Comparison of the Distribution of Creativity in Learning Material on Elasticity and Hooke's Law in the first cycle, and second cycle of Class XI Physics Students

Learning creativity category	Cycle I		Cycle II	
	The number of students	Percent (%)	The number of students	Percent (%)
Very creative	9	25.7	1	2.8
Creative	5	14.3	7	20
Quite creative	20	57.2	26	74.2
Not creative	1	2.8	1	2.8
Very uncreative	1	2.8	1	2.8
Amount	35	100	35	100
Overall category from direct observation	Quite Creative		Creative	

**Table 5.** N-gain Result

Metric	Value
N-gain	0.54
N-gain Percentage	53.77%

According to Table 1. N-gain category, the enhancement of student's creativity in this study registers at 0.54, falling into the Average category.

## CONCLUSION

The study's findings indicates that the implementation of the learning model of discovery on elasticity and hooke's law can improve the student's creativity in class XI in Physics at Public High School 109 Jakarta. Student's creativity improved from the first cycle, to second cycle. It can be proven in this study showed an improvement in student's creativity, with a 0.54 N-gain, categorizing it as Average.

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