

# Implementation of Experiential Learning Model to Improve the Understanding of the Special Ray Concepts and Formation of Images

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**Abstract.** This study aims to improve the understanding of concepts in science subjects about special rays and image formation by applying manipulative assisted experiential learning. This research is a classroom action research conducted 2 cycles. This research was carried out at 8th Grade Muhammadiyah 8 Junior High School of Batu with total of 24 students. The results showed that learning was done with the stages of Concrete Experience (CE): working on tasks, Reflective Observation (RO): observing/reviewing, Abstract Conceptualization (AC): providing explanations, Active Experimentation (AE): testing, can improve understanding of concepts. Cycle 1 with an average value of 75.5 increased to 85. The completeness of 62% of the first cycle became 82% of the second cycle.

**Keywords:** *experiential learning model, media manipulative, concept understanding*

## INTRODUCTION

Efforts to improve the quality of education in Indonesia up to now lead to theoretical applications of practical matters in everyday life. Thus the design of learning must be designed in such a way that it becomes learning that is meaningful and can give meaning to students' daily lives.

Article 1 Republic of Indonesia Law Number 20 of 2003 states that educators are qualified education personnel as teachers, lecturers, counselors. Therefore, teachers are said to be educators who must be able to educate their students well. Many things that teachers can do, one of which is to improve the quality of teaching, teachers must be professional, able to make changes in their classrooms. Teachers as educators listed in Article 39 of Act Number 20 of 2003 are professionals who are tasked with planning and implementing the learning process, assessing the results of learning values, providing learning, and conducting research and community service, especially for educators in universities [1].

Also in Republic of Indonesia Law Number 14 of 2005, article 1, it was explained that teachers are professional educators who educate, teach, guide, direct,

train, assess, and evaluate students in early childhood education on the path of formal education, basic education, and secondary education [2].

In order for the teacher to be professional, the teacher must try to develop his abilities in learning. One of his efforts is to improve skills in teaching techniques including mastering the theory of experiential learning. Experiential learning theory defines learning as the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience [3]. In experiential learning, students to be directly involved in a case so they visually know what will be done to solve the problem.

Webb (Mary McCarthy:2016) identified some main methods to apply in an active learning environment. They include syndicate work; case studies; practical exercises; management and soft skills activities; and, role plays [4].

One main factor that brings reflective and experiential learning together in a significant way for the management of education is that are forms of learning that are relatively independent of mediation. In this way, this learning extends beyond formal education and becomes very important in self-managed continuing professional development [?]

The importance of involving students in cooperative learning conducted by S. Nurhasanah [5]. According to S. Nurhasanah that results of research during three meetings showed increased activity of teachers and students every encounter with an average 92.15% excellent category. The results indicate that there is an increase in students' critical thinking skills by using a model of experiential learning in a static fluid material.

Experiential learning model is a model that is very suitable to be used in science learning energy material and its changes because the model uses the experience of students which ultimately can facilitate understanding the material and activate students in learning [6].

## METHOD

This study describes experiential learning as the subject of special rays and the formation of images on the lens assisted by manipulative media that can improve students' conceptual understanding, therefore this study

belongs to qualitative research. The type of research used is classroom action research with stages of action planning, action, observation and reflection. The planning stage is done by compiling a learning plan that refers to the syntax of experiential learning and is continued by developing manipulative media in the form of simple optical KIT to help students construct special ray material and image formation. The implementation phase of learning was carried out in class VIII F of Muhammadiyah 8 Junior High School in Batu City with 24 students, consisting of 14 men and 10 women from February to March 2017. In the implementation of learning at the same time observations were assisted by colleagues.

This classroom action research was carried out in two cycles, each cycle consisting of 3 meetings (2 lessons each x 40 minutes). The first cycle is conducted on February 20 to March 11, 2017 and the second cycle is conducted on March 20 to 31, 2017. Reflections are conducted at the end of each cycle, to evaluate the implementation of learning and improve it for the next cycle. The flow of classroom action research uses a spiral model from Kemmis & Taggart [7] which is presented in Figure 1.

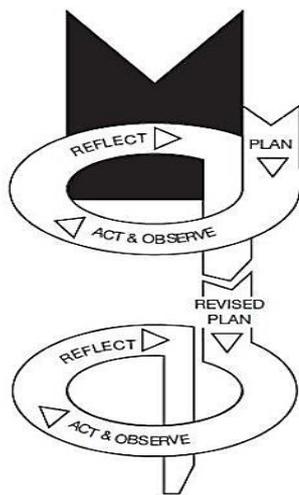


Figure 1. Flow of Classroom Action Research

In cycle 1, the activities carried out include (1) planning: conducting an initial survey by interviewing several students in the class as an initial description of the problems faced by students. (2) compiling learning tools including learning implementation plans (RPP), in preparing lesson plans prioritized in the learning steps need to be detailed more step by step. (3) creating instruments to measure learning outcomes, and (4) designing simple media and utilizing Optical KIT. After the structured learning device is then carried out learning in accordance with the schedule. During learning, observations were conducted to examine the strengths and weaknesses. The observation data is used for further reflection as a basis for improving learning in cycle II.

Cycle 2, the activities carried out are the same as in cycle 1, starting from the planning stage with the addition of activities to prepare the media, observation and reflection. In cycle 2 this is more emphasized on

learning activities and student learning activities in proving the concept of the relationship between focal length, object distance and image distance.

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## RESULT

The results of the study were presented in the Experiential Learning stage with two cycles. Each cycle explains from planning to reflection. Where the results of reflection for improvement or subsequent follow-up.

### Cycle I

In the first cycle consists of 3 meetings, in which the third meeting is used for the test. The learning implementation is described as follows:

#### Meeting 1

It starts with planning that consists of making RPP, activity sheet (LK) and preparing simple media to observe the focus length of a concave lens. The learning duration is 2 x 40 minutes, which consists of introduction, learning activities and closing. At the beginning of the activity, students are given a beautiful connection to this nature by showing leaves of "pucuk merah" flower before being inserted into the dwarf and after entering the dwarf. Students observe the color, shape of the leaves of "pucuk merah" flower. Then it is associated with the nature of light in these objects. Without light, flowers that have colors and shapes turn dark/black and have no shape. Next, the students carry out activities to observe and determine focal lengths and special rays in the concave lens.

Students carry out activities to determine the focal length, using a laser beam or pointer worn on a concave lens. After determining the focal length, the next determines the special rays on the concave lens. The following is a picture of the results of the activities at meeting 1.

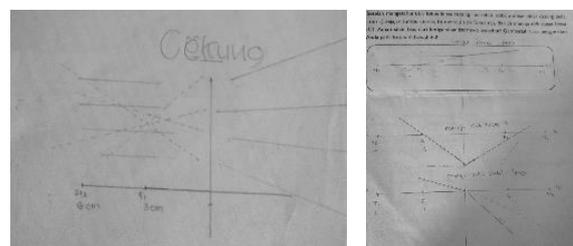


Figure 2. Results determine focus length and special rays on concave lens

Based on photos of activities and results obtained in the activity sheet, 62% are still incomplete. Visible images of activities that have not been perfect. So there needs to be reinforcement in this 1st meeting.

### Meeting 2

Planning in the second meeting of cycle 1, Learning Implementation Plan (RPP), Worksheet (LK) and media are still used. It's just that in meeting 2 it determines and observes the special rays and formation on a convex lens. The activity is the same as in meeting 1, students write their observations on the activity sheet. The following is a photo of the second meeting activity:

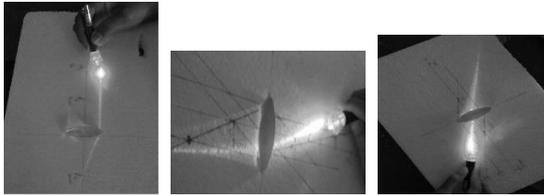


Figure 3. Special light on a convex lens

From the observations of these special rays, students can draw images in each space by utilizing the three special convex rays of the lens. The work of students from observations:

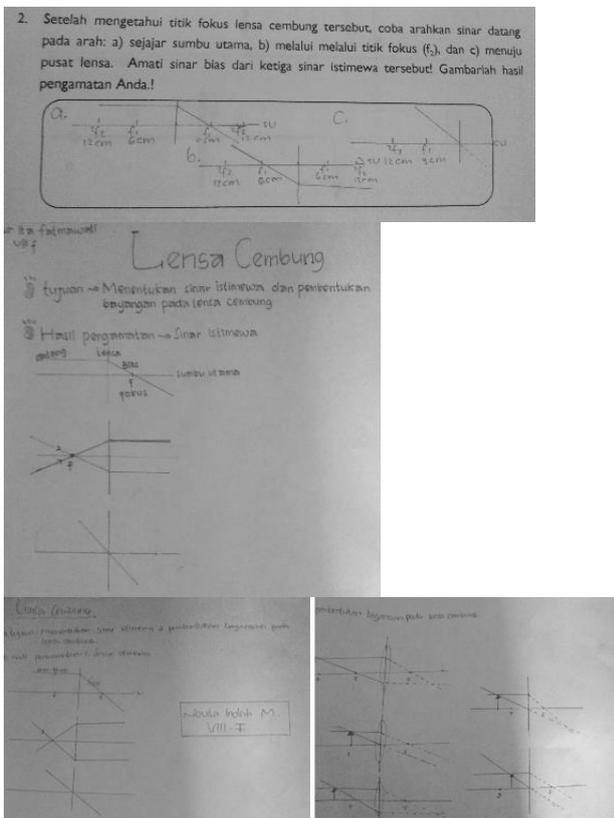


Figure 4. Student work on special rays and the formation of convex lens images

Based on the results above, around 42% have not yet finished drawing image formation. On the results of reflection of cycle 1, it was found that 42% of students were still not precise in drawing images on convex lenses and 62% in concave lenses. So that the average student who completes in cycle 1 is 62% and 38% not yet finished. Thus in cycle 2, there is re-establishment of image formation. So it needs to be clarified again in cycle 2 with the addition of material about the

relationship of object distance, image distance, focus length, and image formation by utilizing Optical KIT.

### Cycle 2

In cycle 2, the meeting was designed 3 times, with the third meeting making the report on lab results as the final task.

### Meeting 1

Planning at each meeting is almost the same, namely preparing RPP, LK and media. In the application, students design an optical KIT tool to determine the object distance, image distance, focus distance and image properties as shown in the following pictures:



Figure 5. Formation of images on convex lenses with Optical KIT

From the results of the lab, students calculate the distance of objects, the distance of the image and the length of focus and the formation of images on a convex lens. The results of the practicum are stated in the report. Here are some of the results of reports that have been done by students.

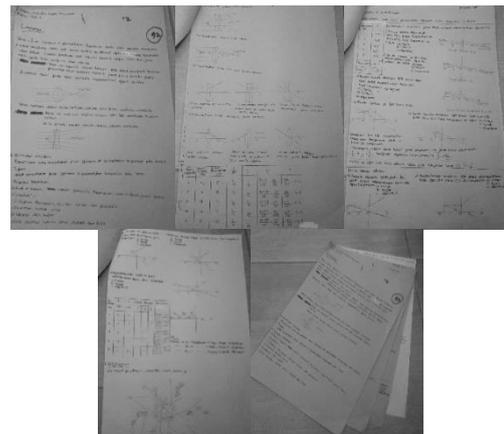


Figure 6. Report on lab results

Based on the stages of the experiential learning model, namely Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), Active Experimentation (AE), students are given the task of determining special rays and image formation. The task is to observe, actively experiment to determine the special rays and the formation of images on lenses with

simple media using lenses and lasers as in Figure 3. When observing, with the skills they have, students discuss, respond to the results of their observations. Next from the results of the discussion, explain between the theory and the results of observations about the relationship of object distance, image distance and focal length as shown in Figure 5. So that the results of observations of cycle I and cycle II are made as a final project, which includes the overall lens subject matter. Students will get experience from the results of observations and set out in the form of reports. Learning outcomes obtained in cycles I and II are as follows:

Table 1. Student learning outcomes in cycle I and cycle II

Siklus	Percentage of students who complete	Percentage of students who do not complete	Average Value
Cycle I	62 %	38 %	75,5
Cycle II	83 %	17 %	85

In the first cycle the percentage of student completeness was only 62% with an average score of 75.5. In this cycle students are still awkward with the tools used, this appears from students' doubts when conducting experiments. In addition, students also do not understand the problems to be solved, this is evident from the many who make mistakes in the results of tests conducted to evaluate the learning process. In this first cycle there were still many students who did not dare to ask about the lessons given by the teacher. This results in the results of the test only 62% of students successfully pass.

In cycle II, the teacher gives a lot of motivation and encourages students to ask more questions if there are lessons that have not been understood. As a result, the more students ask, the more students can understand the lessons given by the teacher, so that in the test in cycle II many students are complete, reaching 83% with an average score of 85.

Based on the results in cycle I and cycle II, there is an increase of completeness by 21% with an increase in the average value of 12.58%. The increase in the percentage of student completeness and the increase in the average learning outcomes shows that learning with the experiential learning method that has been done is quite effective.

## CONCLUSION

Based on the results of this study experiential learning methods improve student learning outcomes, namely in the first cycle the percentage of students who graduated was 62% with an average score of 75.5 increased in the second cycle with the percentage of students graduating 83% with an average value of 85. Learning with experiential learning methods can increase the average value of students by 12.58%. In addition, student motivation also plays a role in increasing the average value of students.

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