

# Improving students' problem-solving skills through quick on the draw model assisted by the optical learning book integrated the Pancasila

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**Abstract.** This study aimed to determine the effect of the Quick on The Draw learning model assisted by the optical instrument learning book integrated the values of Pancasila on problem-solving skills. This research is a pre-experimental with one-group pretest-posttest design. The research sample is 27 students of class XI MIA 2 MAN 1 Yogyakarta. The test technique with an essay sheet is used to obtain data on problem-solving skills. Data of problem-solving skills were analyzed by quantitative methods using N-gain. The results showed that there was influence the Quick on The Draw learning model assisted by the optical instrument learning book integrated the values of Pancasila on problem-solving skills. The N-gain value for each step, namely: understanding the problem of 0.87 (high), devising a plan of 0.92 (high), carrying out the plan of 0.75 (high), and looking back of 0.32 (medium).

**Keywords:** *quick on the draw, Pancasila, problem-solving skills*

## 1. Introduction

The Industrial Revolution 4.0 of the 21<sup>st</sup> Century triggered physics learning to develop students' thinking skills. Studying physics wasn't only about master the concepts but also apply them in problem-solving [1], [2]. This is because the purpose of the physics learning process is students have knowledge and skills to solve the problems [3]. There are four steps to solve problems properly according to Polya, namely: understanding the problem, devising a plan, carrying out the plan, and looking back [4].

But the problem-solving skills of students are still weak, both solving problems given by the teacher and those related to the real world in daily life [5]. One part of physics that is close to everyday life is optics. The problem-solving skills of students in optical learning material is still relatively low [6]. That is because students solve problems without using the right steps.

The basic requirement for problem-solving is to observe symptoms that exist in real life [7]. Therefore, studying physics must be linked to everyday life. Studying physics related to daily life can provide real examples. In addition, students also more easily construct their knowledge. Learning observation results show that students have difficulty in choosing equations that must be used in solving problems. Difficulty solving problems due to poor understanding of physics principles and rules, lack of understanding of problems and lack of motivation [8].

Learning needs to be designed so that problem-solving skills can be empowered, one of which is the Quick on The Draw learning model. Quick on The Draw is a cooperative learning model with small groups that aims to be the first group (the winner) in completing a set of questions. This learning model



focuses on solving the problems given by the teacher. Students can explore new knowledge that may have never been found before through the problem-solving process [9]. Optical learning material in the human eyes allows for learning activities that can lead students to the process of solving problems [10]. The Quick on The Draw steps are: (1) Prepare a set of question cards; (2) Create groups; (3) Sharing learning resources, (4) Starting a competition; (5) Taking questions; (6) Solving the problems; (7) Give answers to the teacher; (8) The teacher corrects the answers; and (9) Discuss all questions [11].

Learning resource is the optical instrument learning book integrated the values of Pancasila. Pancasila is the five principles of the Indonesian state's philosophical foundation [12]. The values of Pancasila are guidance in the life of society, nation, and state of Indonesia [13]. The values of Pancasila are used as a guide in presenting daily life stories related to optical instruments. There are many values of five principles of Pancasila. For example, the value of "Likes to do humanitarian activities" can be packaged into a story about a student who helps people with eye disabilities and an explanation of those eye disabilities.

## 2. Research method

This research is a pre-experimental with one-group pretest-posttest design. Table 1 is a research design, where:  $O_1$  is a pre-test,  $X$  is treatment, and  $O_2$  is a post-test. The variables in this study include the independent variable namely the Quick on The Draw learning model assisted by the optical instrument learning book integrated the values of Pancasila and the dependent variable namely problem-solving skills. The values of Pancasila that used in this research are: (1) Trust and piety to God Almighty in accordance with the religion and beliefs of each base according to a just and civilized humanity; (2) Mutual respect and cooperation between different religion and adherents, so fostered harmony life; (3) Likes to do humanitarian activities; (4) Promote association for the unity and integrity of the nation unity in diversity; (5) Respect the rights of others; (6) Deliberations to reach consenses pervaded by a spirit of brotherhood; and (7) Likes to give help to others [13]. The sample in this study were 27 students XI MIA 2 MAN 1 Yogyakarta. The sampling technique used is the Cluster Random Sampling technique.

**Table 1.** Research design.

$O_1$	$X$	$O_2$
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The research instrument was an essay item sheet that had been validated based on expert judgment. Essay item sheets are used to obtain data about students' problem-solving skills. Data of problem-solving skills were analyzed by quantitative methods using N-gain. The N-gain values are then categorized according to the following table 2 [14]:

**Table 2.** The categories of N-gain.

The value of gain	Category
$g \geq 0.7$	High
$0.7 > g \geq 0.3$	Medium
$g < 0.3$	Low

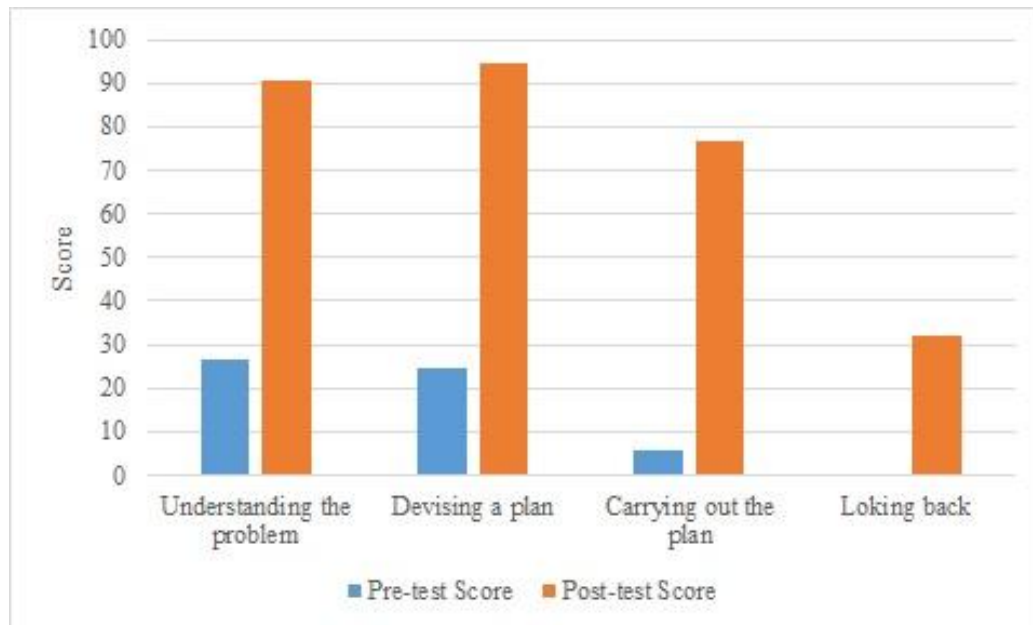
## 3. Results and Discussion

Figure 1 shows the problem-solving skills of students has increased in medium category with N-gain of 0.69. This shows that the Quick on The Draw learning model assisted by the optical instrument learning book integrated the values of Pancasila influences students' problem-solving skills. Students begin to get used to solving problems using systematic steps.

### 3.1. Understanding the problem

The step of understanding the problem has increased in high category with N-gain of 0.87. Students understand the problem if they can write information from the problem correctly. Based on the pre-test results, the score on the step of understanding the problem is still low. Hedge and Meera also stated that

students had difficulty describing problems physically [15]. This is due to students having difficulty understanding information in a problem and relating it to physics symbols. The way to encourage students to understand information about problems is to apply learning that is close to everyday life, such as the Quick on The Draw model. That's because students are trained to relate information to the phenomena and life experiences of students.



**Figure 1.** Pretest and posttest scores of students' problem-solving skills.

The Quick on The Draw learning model is implemented with the optical instrument learning book integrated values of Pancasila. The optical learning material in the book is packaged with stories and experiences of daily life. The story was made based on the values of Pancasila. Figure 2 shows the eye disability learning material integrated with the value of "Likes to do humanitarian activities".

### C. Cacat Mata dan Kacamata

*(Gemar melakukan kegiatan kemanusiaan)*

Ilham sering membantu orang tuanya dalam melakukan aktivitas karena mata kedua orang tua sudah tidak berfungsi normal. Mata kedua orang tuanya tidak dapat melihat dengan jelas pada jarak yang jauh maupun jarak baca mata normal. Hal ini karena daya akomodasinya sudah lemah akibat bertambahnya usia atau biasa disebut cacat mata presbiopi (mata tua). Oleh karena itu, kedua orang tua Ilham menggunakan kacamata bifokal (kacamata berfokus dua, yaitu positif dan negatif) sebagai alat bantu penglihatan. Kacamata bifokal terdiri dari lensa cekung pada bagian atas untuk melihat benda jauh dan lensa cembung pada bagian bawah untuk melihat benda-benda dekat. Ilham juga memiliki teman sekolah bernama Thomas yang juga menggunakan kacamata. Dulu, Thomas mengeluh karena tidak bisa melihat dengan jelas pada jarak jauh. Oleh karena itu, Ilham selalu siap sedia membantu Thomas ketika dia kesulitan membaca tulisan di papan tulis.

**Figure 2.** Eye disability learning material integrates the values of Pancasila.

Learning material presented with the story of a student helping the activities of parents and friends because they suffer from eye disability. Such presentations make it easier for students to understand the learning material because it is related to their experiences. Therefore, students are trained to process information on questions and can write down what is known or what is asked.

### 3.2. *Devising a plan*

The step of devising a plan has increased in high category with N-gain of 0.92. Students can be devising a plan if they can choose the right physics equation. The pre-test results show that students still have difficulty in devising a plan. Students are weak in choosing the right problem-solving strategy [16], [17]. This is because students have difficulty connecting information and equations to solve a problem.

Problem-solving in groups becomes an effective way to practice students' problem-solving skills, especially in choosing problem-solving strategies. The Quick on The Draw learning model is implemented by dividing students into groups. This provides an opportunity for students in a group to discuss. Therefore, students can exchange ideas and give input to one another so they can choose equations to solve problems. The optical instrument learning book integrated the values of Pancasila as a source of reference when students conduct discussions.

### 3.3. *Carrying out the plan*

The step of carrying out the plan has increased in the high category with N-gain of 0.75. Carrying out the plan is carried out by entering the data in the problem into the equation and mathematical calculations. The Quick on The Draw model makes students better trained in carrying out plans. This is because there is a joint problem solving as well as the correction for answers by the teacher.

The correction for answers provides the opportunity for the teacher to check the results of student work. It provides feedback for students to find out their mistakes. Therefore, students can be more careful in doing problem-solving processes, such as mathematical calculations. Some students have difficulty carrying out the plan because they do not go through the steps of understanding the problem. Students do not write down the information in the questions, but students immediately try to solve problems with equations that they think are appropriate. Students who answer directly without writing down information about the problem have difficulty in operating mathematical equations [6].

### 3.4. *Looking back*

The step of looking back has increased in the medium category with N-gain of 0.32. Students write conclusions for looking back. The results of carrying out the plan are the basis for writing conclusions whether these results can be a solution to the problem [3]. The pre-test results showed no students write conclusions. Students are still having trouble checking back [18]. This is because students are not accustomed to writing conclusions after getting results. Students who do not associate the results with the problem cannot interpret the results [19].

After being given treatment, some students have been able to write conclusions correctly. For example, students can write a conclusion that is a recommendations for the use and type of eyeglass lenses for myopia. There is a problem-solving competition in the Quick on The Draw model. The teacher does not give the next question card if the student is still not right in solving on the previous question. This encourages students to do the best possible solving problem and try to looking back on the results of their work before being corrected by the teacher

## 4. Conclusion

Based on the results of the study, the Quick on The Draw learning model assisted by the optical instrument learning book integrated the value of Pancasila can improve students' problem-solving skills. The step of understanding the problem has increased with the high N-gain category. The step of devising a plan has increased with the high N-gain category. The step of carrying out the plan has increased with the high N-gain category. The step of looking back has increased with the medium N-gain category.

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