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THE EFFECT OF AN INSTRUCTION WORKSHEET WITH GUIDE INQUIRY DESIGN AND INTERVIEW CREATIVE THINKING TECHNIQUE ON CREATIVE THINKING SKILLS IN SENIOR HIGH SCHOOL STUDENT'S.

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Abstract. This study aims at examining the effects of use of Interview technique and worksheets together on the subject of matter geometric optics of senior high school 11th grade students on the creative thinking skills. Simple experimental method was used in the present study. Study group of the research comprises of 108 11th grade students studying in public school in Balongpanggang district of East Java province. The prepared Test for Creative Thinking Skills and Interview Technique (TCT-IT) was administered to the students as pre-test-post-test. Data obtained via pre-test-post-test were transferred to SPSS 15.00 program was applied on these data. Frequency and percentage table was constituted. Considering the analysis results, it was concluded that use of worksheets and interview technique together has positive effects on students' creative thinking skills.

Keywords: Creative Thinking, Interview, Guide Inquiry

INTRODUCTION

The entry of technology in almost all fields of life has led to its use in education to teach concepts, phenomena and theories. One of the promising developments seen in plain view is the development of learning media technology. Learning media is a medium used by teachers during learning to make it easier to convey messages or information, so students can understand learning material well and optimally.

Based on its characteristics, learning media can be classified into three types, namely audio, visual and audiovisual. Worksheets are sheets that contain tasks that must be completed by students. Worksheets usually contain instructions and steps to complete a task. The advantage of the worksheet for teachers is to facilitate teachers in applying learning, while for students it helps them learn independently and understands and complements the written assignments

Thus, worksheets are needed to support learning activities. Creativity comes from the interaction between disciplined and talented individuals, and others in the environment who will provide an assessment of quality and originality (Guildford, 1950). Creativity is actually owned by everyone, depending on the extent to which they explore potential. There are four different aspects of thinking in creative thinking: (1) fluency, (2) originality, (3) flexibility, and (4) elaboration [2]. The teacher can help students develop these skills by applying the learning model questions. In inquiry learning, teachers are no longer the only source of learning, and their role has shifted more towards becoming a facilitator. This shows that there is a shift from the teaching paradigm to paradigm learning.

In the learning paradigm, students become the center of the learning process. Model learning that is in line with the learning paradigm is inquiry. Investigation refers to the activity of students doing to develop knowledge and understanding of scientific ideas and understanding of scientists in studies of nature. The types of inquiry learning are guided inquiry, structured questions, and open questions. Students' creative thinking skills can improve by applying model inquiry learning (Bakke et al, 2013). Learning outcomes include students' knowledge, attitudes, skills, and creativity that can increase up to 15% or more using guided inquiry-based worksheets.

By using the interview confirmation of creative thinking skills, analysis of students' creative thinking skills can be known more deeply. In creative thinking, you cannot only see perspective in just one aspect. Creative thinking ability according to Torrance (1972) consists of aspects of fluency, flexibility, elaboration and originality and is a unity that cannot be separated.

Physics is a science that is easy to learn by doing your own experiments, thus, teaching physics in schools should be accompanied by experimental work. Physics has special terms and contains abstract concepts. Physics is still considered as a difficult lesson because some concepts are too dependent on memorization and lack of availability of learning media, one of them is student worksheets that only contain practice questions, so it does not emphasize experimental work that can require students to think creatively. This research is also supported by the suitability of the material that facilitates the creation of student worksheets that emphasize the experimental work that is the material of optical equipment for high school students.

Material of geometric optics if studied in Indonesia it writes on basic competencies 3.11 Analyzing the workings of geometric optics using the reflecting properties and refraction of light by mirrors and lenses. 4.11 Making works that apply the principles of reflection and / or refraction to mirrors and lenses. From this basic competence why the material of geometric optics is very suitable to be used in improving students' creative thinking skills. Thus, if the guided inquiry model is applied to the material of optical devices, it is hoped that it can create interesting student worksheets, innovative, and train students to always think creatively.

METHOD

This type of research is the development of a 4-D model, which develops inquiry-based student worksheets with interview confirmation of creative thinking to determine its effect on students' creative thinking skills when tested on a large scale. Development of 4-D model learning tools from Thiagarajan, Semmel, and Semmel (1974), namely: define, design, develop and disseminate. But dissemination was not carried out because the development was very wide and very long.

The subjects in this study were guided inquiry-based physics worksheets with confirmation of interviews tested in this large-scale experimental phase 11th grade students studying in public school in Balongpanggang district. The trial in this study student worksheets were tested on 108 students divided into 7 groups per class. Based on the results of the best group product values in each class will be tested their creative thinking ability using One Group pretest-posttest design (Creswell, 2015). The next stage was taken by some students as a result of the test of creative thinking skills with proporative stratified sample techniques to conduct interviews for students.

Data collection techniques used are observation, test and interview techniques to measure students' creative thinking skills during learning. The research instruments used in the study were, creative thinking test sheets and interview test sheets. The technique of

data analysis for the test results of creative thinking in learning is the data of the students' pre-test and post-test results which function to determine the improvement of students' skills before and after learning using the creative worksheets that have been created. Interviews were conducted to confirm more deeply about the aspects of students' creative thinking.

RESULT AND DISCUSSION

Validators advise on worksheets based on valid and construct criteria (Almeida, et al., 2007. In general, worksheets have been good because they have followed the syntax of guided inquiry learning models. In addition, worksheets have also trained four aspects of creative thinking skills). The reviewers also suggested creating worksheets oriented to guided inquiry and labeling the title or cover (see Figure 1).

Figure 1. Cover of Worksheet

In this study, students were divided into 7 groups per class to carry out activities according to the worksheets that had been given. The assessment is based on the rubric of product assessment of the four aspects of creative thinking in the material of geometric optics, the data produced as presented in table 1.

Tabel 1. The results of Instruction Worksheet based on guided inquiry for assessment analysis by training 4 aspects of students' creative thinking skills

Grade	Group	Indicators of creative products				Product Assesment
		Flue	*Flex*	*Ori*	*El*	
11th 1	1	☐	☐	☐	☐	95
	2	☐	-	-	☐	75
	3	☐	-	☐	☐	80
	4	☐	-	☐	☐	85
	5	☐	-	☐	☐	85
	6	☐	-	☐	-	75
	7	☐	-	☐	☐	80
11th 2	1	☐	-	-	☐	75
	2	☐	-	☐	☐	80
	3	☐	-	☐	☐	85
	4	☐	☐	☐	☐	90
	5	☐	-	☐	☐	85
	6	☐	☐	☐	☐	95
	7	☐	-	-	☐	70
11th 3	1	☐	☐	-	☐	80
	2	-	☐	☐	☐	85
	3	☐	☐	☐	☐	95
	4	-	-	-	☐	75
	5	-	-	☐	☐	80
	6	☐	-	☐	☐	85
	7	☐	☐	☐	☐	90

Ket: Flue :Fluency Ori :Originality
Flex :Flexibility El : Elaboration

Creative thinking ability test (TCT-IT) prepared by researchers consisting of 9 questions used to determine students' creative thinking ability in the material of geometric optics. The results of the analysis of creative thinking ability tests with 21 research subjects with the details of the 3 major groups with the best product value taken from 108 students in 3 classes of trials. Data from the test of creative thinking skills can be seen in table 2 page 3.

Tabel 2. The result of Creative thinking ability test (TCT-IT)

No	Pre		Post		N-gain	
	N	Kr	N	Kr	N	Ka
1	53	Ck	89	Sk	0.76	Tinggi
2	56	Ck	92	Sk	0.81	Tinggi
3	61	K	94	Sk	0.86	Tinggi
4	64	K	97	Sk	0.92	Tinggi
5	53	Ck	89	Sk	0.76	Tinggi
6	53	Ck	89	Sk	0.76	Tinggi
7	56	Ck	92	Sk	0.81	Tinggi
8	47	Ck	86	Sk	0.74	Tinggi
9	44	Ck	86	Sk	0.75	Tinggi
10	58	Ck	92	Sk	0.80	Tinggi
11	64	K	97	Sk	0.92	Tinggi
12	50	Ck	86	Sk	0.72	Tinggi
13	25	Kk	78	K	0.70	Tinggi
14	36	Kk	97	Sk	0.96	Tinggi
15	42	Ck	94	Sk	0.90	Tinggi
16	50	Ck	89	Sk	0.78	Tinggi
17	58	Ck	97	Sk	0.93	Tinggi
18	61	K	97	Sk	0.93	Tinggi
19	53	Ck	89	Sk	0.76	Tinggi
20	56	Ck	94	Sk	0.88	Tinggi
21	64	K	97	Sk	0.92	Tinggi

Ket: Sk :High Creative K : Creative
Ck :Enough Creative kk: Low Creative
Tk : Not Creative

Based on Table 2. Indicates an increase before (pretest) and after (posttest) learning using guided inquiry-based worksheets, so it can be made a graph of analysis of creative thinking skills as follows:

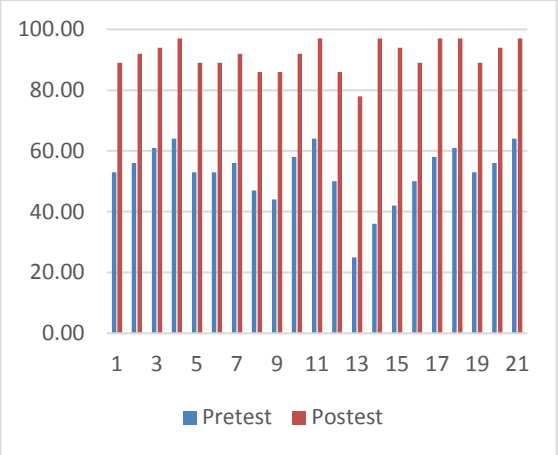

Figure 2. Diagarm Pretest-Postest

From Table 2 and Figure 2 it is found that all students experience an increase in creative thinking skills. The increase can be seen from the magnitude of the N-gain in the table, students based on the table have high category N-gain. The N-gain shows that the student's worksheet with model of guided inquiry is good for improving the creative thinking skills of high school students in geometric optics.

The success of improving students' creative thinking skills is the effect of the implementation of lesson plans, learning materials, and student's worksheets in the learning process. The use of media cannot be ignored, the media used can motivate students in the learning process. Motivation is not only important to make students involved in learning activities, but also determine how many students absorb information presented to them.

The success of increasing creative thinking skills is also supported by the results of SPSS 15 analysis by paired sample test which states as follows: the sig value <0.05 H_0 is accepted, meaning that there is a significant difference between the values before and after learning using student's worksheet with guided inquiry. The next stage was taken by some students as a result of the test of creative thinking skills with proporative stratified sample techniques to conduct interviews for students.

Tabel 3. List of Interview Participants

No	Initial	Indicators				Level Of Creative Thinking Abblity
		Fle	*Flu*	*Ori*	*Ela*	
1	AIN	□	□	□	□	High Creative
2	AS	□	-	□	□	Creative
3	SED	□	-	□	□	Creative
4	BA	□	□	□	□	High Creative
5	DH	□	□	□	□	Sangat Kreatif
6	SA	□	□	-	□	Tidak Kreatif

The interview results show students with high level of ability are at the 4th level of creative thinking (High creative) because they are able to show the four indicators of creative thinking, namely fluency, flexibility, novelty, and elaboration. Students are said to be not creative if students do not achieve all four aspects of creative thinking, and have not been able to spark ideas or make original products, meaning students are said to be creative at least reaching the originality aspect. This is in line with Guildford's opinion, creativity comes from the interaction between individuals who are disciplined and talented, and others in the environment who will provide an assessment of quality and originality, meaning that people who are creative have originality and quality (Guildford, 1950).

The results of the research described above are known that the level of creative thinking of each student is different. In addition, students who have the first creative level and the third creative level have differences in terms of results and understanding. In line with opinion (Guilford, 1950) which states that in creative thinking has two assumptions, namely: first, everyone can be creative to a certain degree in a particular way. Second, the ability to think creatively is a skill that can be learned. So, each person has different degrees of creativity and has their own ways to realize their creativity

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CONCLUSION

Based on the findings of the Result, and Disussion, it is generally concluded that worksheets with guided inquiry models and confirmation using creative thinking interview techniques on the material of geometric optics have an effect on measuring and improving creative thinking skills more deeply.

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