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IMPROVING CREATIVE THINKING SKILLS THROUGH DISCOVERY LEARNING MODEL IN VOCATIONAL HIGH SCHOOLS

Luthfiyah Nurlaela[1], **Suparji**[2], **IGP Asto Buditjahjanto**[3], **Any Sutiadiningsih**[4], **and Febri Lukitasari**[5]
[1 2 3 4]Faculty of Engineering of Universitas Negeri Surabaya, Indonesia
[5]Technology and Vocational Education, Universitas Negeri Surabaya, Indonesia
E-mail: luthfiyahnurlaela@unesa.ac.id

ABSTRACT

Several studies indicated the low creative thinking skills of vocational high school students. The objective of this study is to describe the application of discovery learning models to improve the ability of the teachers to manage learning, student activities during the learning process, the student learning outcomes in terms of creative thinking skills, and the student responses to the learning activities. The research subjects were 35 students from the study program of Catering Food Service in a Public Vocational High School, SMK N 6 Surabaya. The lesson plan included the syllabus, learning implementation plans, student activity sheets, and assessment. Meanwhile, the data collection instruments included tests, observations, and questionnaires. The data were analyzed using descriptive statistics and t-test. The results showed that discovery learning model could improve the teacher's ability to manage the learning, students' activities, learning outcomes of creative thinking skills, and students' responses.

Keywords: creative thinking skills, discovery learning, vocational high schools

INTRODUCTION

Higher-level thinking ability refers to the broader use of the mind to find new challenges [1]. Filsaime [2] states that creative thinking is a thinking process comprising of fluency, flexibility, originality, and elaboration. Johnson [3] defines creative thinking as a mental activity used by a person to fluently and flexibly build new ideas. Evans [4] further adds another component of creative thinking, namely the problem sensitivity which is the ability to recognize the existence of a problem or ignore facts that are not suitable (misleading fact), and originality is the ability to unusually build ideas. Starko [5] also suggests the elaboration component, which adds ideas to make it clearer. From these various views, in principle, all opinions are in line with each other. Primarily, the characteristics or components of creative thinking include sensitivity, fluency, flexibility, elaboration, and originality [6].

To teach creative thinking skills, teachers can no longer use conventional learning models, in which they are the center of learning. Students are facilitated with more opportunities to build their knowledge and experience in their way. The students must struggle for ideas, discuss, and finally make a concept of the initial understanding of the knowledge they are learning; then, with the help of teachers, the students will gain a deeper understanding through discussion activities and working groups in and out of class.

To carry out the aforementioned processes, various learning models and strategies need to be known and applied. The learning models and strategies are intended to develop the students' thinking skills. For that purpose, one of the learning models that can be applied is discovery learning.

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According to some scholars, discovery learning enables the students to take part directly in learning activities. Accordingly, the students will be able to utilize their mental processes to find a concept or theory studied. Discovery learning helps students shape effective ways of working together, share information, and hear and use the ideas of others [7]. This learning model gives students more direction and feedback about what and how well learning takes place [8]. Discovery learning models develop active students' learning by finding and investigating themselves. The learning outcomes obtained will thus last long in memory and are not quickly forgotten [9]–[11]. Discovery learning models can also help students relate the experience they have to new experiences they faced; therefore students may discover new principles. Students are motivated to accomplish their work until they find answers to the problems they face [6].

The stages in the learning process of discovery learning models are stimulation or giving stimuli, statement or problem identification, data collection, data processing, verification, and drawing conclusions or generalizations. These stages encourage students to direct their learning activities by involving their reasons and motivation. Students can, therefore, be active in following the learning process that takes place [12], [13].

To conclude from some of these opinions, discovery learning is a series of learning activities that involve the ability of students to search and investigate learning materials systematically, logically, analytically, critically, and creatively. Students can formulate their findings thoroughly in their learning activities and build up confidence about what they found.

This study aimed to describe how the application of discovery learning models could enhance the teacher's ability to manage learning. Besides, analyzing students' activities during learning activities, students' learning outcomes in terms of creative thinking skills, and analyzing students' responses to learning activities were also attempted.

METHOD

This study was conducted at SMK N 6 Surabaya. The subjects of the study were 35 students of the 10th grade of Catering Service Program. The learning tools and instruments developed included the syllabus, learning implementation plans, students' activity sheets, tests for learning outcomes, creative thinking, instruments for implementing lesson plans, students' activity instruments, and students' questionnaire responses.

The data included the lesson planning validation sheets, learning process implementation sheets, students' activity observation sheets, creative learning test results, and students' responses to learning activities. The data were then analyzed using descriptive and inferential statistics. The descriptive statistics were used to illustrate the results of the implementation of lesson plans, student activities, and student responses [14]. The inferential statistics employed was the paired t-test to compare the student learning outcomes before (pretest) and after learning (posttest).

RESULTS AND DISCUSSION

Reviewing the applicability of the lesson planning was carried out by two observers. Aspects observed included the

pre-teaching, whilst-teaching, and post-teaching under the discovery learning syntax, as well as time management during the learning process. The observation results of the applicability of the learning process are in Figure 1.

The observation results show that learning using the discovery learning model works well at all stages. As in the figure, the average score reached a minimum of 3.75 indicating that it is in good and very good category. Discovery learning model is student-centered, and therefore, the teacher must be a good facilitator. It is revealed that student learning is seen as a learning subject that needs to be actively involved in the learning process, and the teacher acts as a guiding facilitator [15]. This is also in line with the opinion of Marzano [8], who states that teachers must ensure students have adequate knowledge to negotiate the conditions around their activities.

The observation of the students' learning activities was carried out by two observers. The activities observed included listening to or observing the teacher's explanations, reading the guidebooks for learning activities, observing the instructional media being shown, actively engaging in the group discussions, paying attention to other group presentations, expressing opinions, and other irrelevant activities. The observation results are in Table 1.

Table 1 shows that the students learning activities were following the discovery learning syntax. Although there were activities that were not relevant, with a percentage of 8.10, this was normal in a learning process. The learning activities with the discovery learning models were effective and attractive strategies for the students. The students sought answers to questions and solved problems using their skills. The students felt challenged to solve problems; accordingly, their activities increased. Dina et al. [7] suggested that student activities were essential and needed to be considered by the teacher. Thus, the learning implemented was truly meaningful and obtained optimal results.

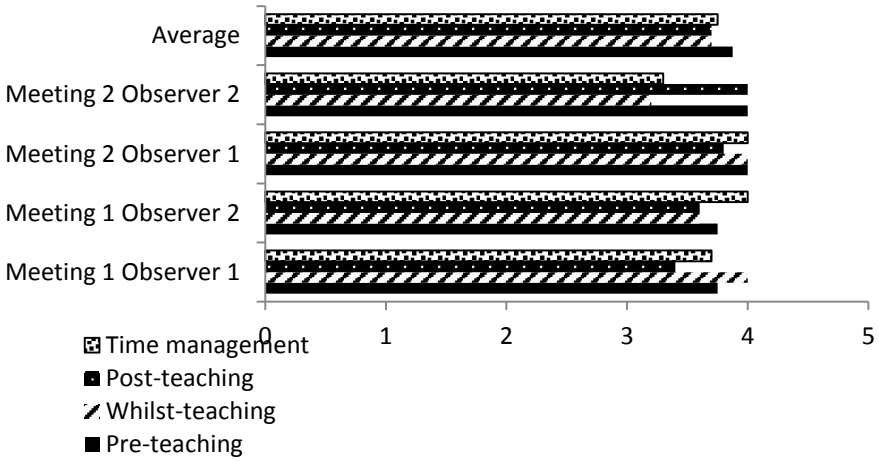

Figure 1. The Observation Results of the Implementabilty of the Learning Process

Table 1. Percentage of Student Learning Activities

No	Aspects to observe	Percentage Student activities (%)				Average
		Meeting 1		Meeting 2		
		O1	O2	O1	O2	
1	Listening and paying attention to the teacher's explanation	3.3	2.9	2.16	3.12	2.9
2	Reading the guidebook on steps for the learning activities	6.5	5.7	7.2	4.67	6.0
3	Observing the learning media shown	16.4	14.7	17.3	15.3	15.9
4	Actively involved in group discussions	34.5	36.2	37.2	38.4	36.6
5	Paying attention to the presentation of other groups	13.5	15.5	19.2	11.4	14.9
6	Expressing opinions or responding to other group presentations	18.3	16.4	9.17	18.7	15.6
7	Activities that are not relevant to learning activities	7.5	8.7	7.8	8.4	8.1
Percentage of the frequency of relevant student activities						91.9
Percentage of irrelevant student activity frequency						8.10

The learning outcomes of the students were obtained through tests, which were administered at the beginning and the end (pretest and posttest) of the learning. The test developed was a cognitive process learning outcomes test aimed at measuring the students' creative thinking skills. The tests were in the form of essays, supplemented by a creative thinking assessment adapted rubric [16]. The three components used to assess the creative thinking abilities included fluency, flexibility, and novelty.

The data concerning the learning outcomes were then analyzed by the t-test, using SPSS version 22. The results of the t-test are in Table 2. Based on the previous test results it can be seen that the probability value (sig. 2 tailed) was .000. This value was smaller than the significant level of 5% (sig. .05) thus it can be concluded that there were differences in test results obtained by the students before and after implementing the learning.

Table 2. The Results of T-test

Paired Samples Test								
	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pre Test - Post Test	-53.57	11.02	1.86	-58	-49.79	-29	34	.000

Learning with the discovery learning model can help the students connect the experiences they have had with the new experiences, the students could find new principles. The students were motivated to complete their work until they found answers to the problems they faced. Students who are directly involved in concept

acquisition learning can store concepts learned longer in their cognitive structure [17]. This is consistent with the results of research conducted by Mubarok [18] that the students' learning outcomes using discovery learning model were higher than the students' learning outcomes using direct learning model.

The students' responses to the questionnaire on learning activities were given after the learning process. Theses' responses included aspects of novelty, ease of understanding, interest, and teacher activities. The data regarding the students' responses are in Figure 2.

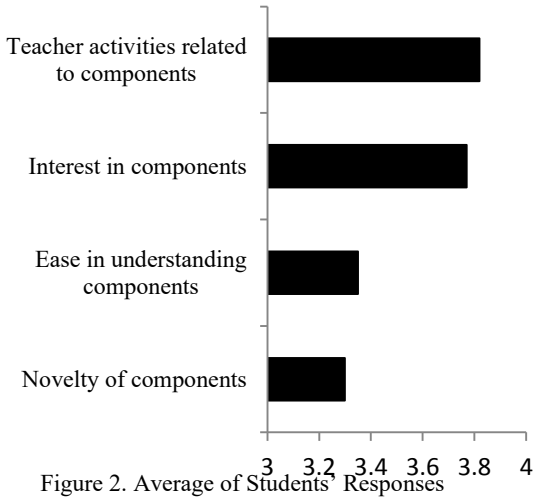

Figure 2. Average of Students' Responses

Based on the results of data analysis of the students' responses the average values of each component was 3.3, 3.35, 3.77 and 3.82 respectively. These data indicated that students were interested in learning, and they appreciated all components of the learning with a good response. This is because the content of learning applying the discovery learning model focused on the students' ideas and was relevant to their interests. In addition, the content of learning was also balanced with the daily experience of Luthfiyah & Buditjahjanto [19].

CONCLUSION

Based on previous data analysis and discussion, the conclusion is that the discovery learning model could improve the teachers' ability to manage the learning, the students' activities, the learning outcomes of creative thinking skills, and the students' responses. Thus, this model is highly recommended to be applied in learning in vocational high schools as a variation of learning. The application of the discovery learning model is significant in developing vocational students' thinking skills, complementing other skills. The current and future competency demands that vocational high school graduates do not only have hard skills but also thinking skills to solve problems.

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