Single Subject Research: Implementation of Problem Posing Learning on Creative Thinking Ability of Field Dependent Student

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Abstrak

Penelitian ini bertujuan untuk menganalisis proses dan mendeskripsikan hasil perlakukan pembelajaran *problem posing* terhadap kemampuan berpikir kreatif siswa *field dependent* pada materi statistika. Penelitian ini termasuk dalam penelitian *Single Subject Research* (SSR) A-B dengan pendekatan kuantitatif. Penelitian didesain selama 8 sesi dengan 4 sesi awal tahap *baseline* dan 4 sesi terakhit tahap intervensi (pembelajaran *problem posing*). Sampel penelitian dipilih dengan teknik *purposive sampling*. Pengumpulan data menggunakan GEFT, tes pengajuan masalah (TPM), observasi, dan wawancara. Data penelitian dianalisis dengan 2 cara, yaitu analisis dalam kondisi dan antar kondisi. Hasil penelitian menunjukkan bahwa siswa dengan gaya kognitif *field dependent* dapat mengajukan permasalahan pada materi statistika dengan menggunakan model pembelajaran *problem posing*. Hasil evaluasi sebelum dan sesudah perlakuan menunjukkan peningkatan pada komponen berpikir kreatif kefasihan dan kebaruan, sehingga perlakuan yang diberikan dapat meningkatkan kemampuan berpikir kreatif matematis siswa *field dependent*. Walaupun demikian, pada komponen kreatifitas kebaruan belum dapat ditingkatkan.

Kata Kunci: *problem posing*, berpikir kreatif, *field dependent*, *single subject research*

Abstract

This study aims to analyze the process and describe the results of problem posing learning treatments on students' creative thinking skills field dependent on statistical material. This research is categorized as Single Subject Research (SSR) A-B research with a quantitative approach. The study was designed for 8 sessions with 4 initial sessions of the baseline phase and 4 final sessions of the intervention phase (problem posing learning). Research sample were selected using purposive sampling technique. Collecting data using GEFT, problem submission test (TPM), observation, and interviews. Research data were analyzed in 2 ways, i.e. analysis under and between conditions. The results showed that students with field dependent cognitive style could pose problems in statistical material by using a problem posing learning model. The results of the evaluation before and after treatment showed an increase in the components of creative thinking, fluency and novelty, so that the treatment given could improve the mathematical creative thinking skills of field dependent students. However, the creative component of novelty cannot yet be improved.

Keyword: *problem posing*, *creative thinking*, *field dependent*, *single subject research*

INTRODUCTION

Statistics is a branch of applied mathematics that discusses methods of collecting, organizing, presenting, analyzing data, and drawing conclusions (Firmansyah, 2017). Studying statistics improves the students' critical thinking skills in solving problems in daily life (Abdullah & Suhartini, 2017).

Similar to other branches of mathematics, studying statistics also requires creative thinking skills. Creative thinking is an ability that students should have in all mathematics learning (Effendi & Farlina, 2017). Creative thinking is one of the most important things in modern society since it can make humans more mentally flexible (Hidayat, 2012). People who think creatively consider the problems from various perspectives which allow obtaining various alternative solutions (Komarudin, Sujadi, & Kusmayadi, 2014).

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Silver (Siswono & Kurniawati, 2004) created a reference for creativity assessment consisting of components of fluency, flexibility, and originality. Below is a clear explanation of each.

Table 1. The Relatio of Creativity in Submitting Problems

Creativity Component	Problem Submission
Fluency	Students created many problems that can be solved. Students shared the problems proposed.
Flexibility	Students proposed problems that can be solved in different ways. Students used a "what if not" approach to proposed problems
Originality	Students examined several proposed problems and then pose a different problem.

The criteria to assess creativity in problem-posing refers to the 3 components presented by Silver, there are fluency, flexibility, and Originality. Fluency is a person's ability to produce many different problems that can be solved. Flexibility is a person's ability to produce questions that can be done in many ways (more than one way). Originality is a person's ability to produce questions that are different from one another in the concept or context.

The learning and creative thinking process of each individual have its characteristics. One of the individual characteristics is cognitive style. Cognitive style is closely related to a person's ability to process information in response to stimulation from the environment. One of the 10 pairs of cognitive style types according to Riding and Reyner (Arvianto, Mardiyana, & Usodo, 2013) is field-dependency-independency. Field-dependent type is more dependent on environmental conditions, while field-independent is the opposite.

In mathematics learning, the field-dependent type is more interesting to be studied. This is due to the characteristics of this type according to Nasution (Arvianto et al., 2013) among others, having broad social relations, suitable for working in the fields of guidance, counseling, education, and social affairs; more common among women. In addition, the characteristics of do not like mathematics; prefer the humanities and social sciences; requires more detailed instructions. This statement is interesting to see how students with field-dependent cognitive style and the characteristics of not liking mathematics in processing creative thinking skills mathematical. This might be caused in the mathematical field there is a tendency that students who are field dependent have lower learning achievement than field independent students.

The common learning used by teachers is a conventional learning model. The students' roles as learning subjects, but as learning objects. This learning makes students less optimally sharpen their creative thinking skills. This is due to the absence of stimulation or opportunity to actualize it. The learning through problem-posing model which focuses on students in creating problems from existing material can be used as a medium to stimulate and improve the creative thinking process (Asriningsih, 2014; Kelen, 2016). The students with field-dependent cognitive styles also applied this model. The problem-posing model learning which is dominated by open-ended problem submission is considered suitable to encourage the creative thinking skills of field-dependent students. Through the description above, the purpose of this research is to analyze the process and describe the results of learning treatment with a problem-posing model on the students' creative thinking skills field dependent on statistical material.

METHOD

This research is the Single Subject Research (SSR) A-B research with a quantitative approach. The main data source is from the research subject which is used to reveal the statistical learning process for field-dependent students. This research was conducted at SMP Muhammadiyah 1 Kalasan, the academic year 2020/2021. The research instrument uses a cognitive style test (GEFT), a problem-posing task (TPM), statistical material, and a guidelines interview.

The research sample was selected by purposive sampling. Samples were taken based on the results of GEFT and TPM. Initially, GEFT was given to 1 class of students who were randomly selected. From the results of the GEFT, the TPM was then given to the field-dependent student

group. From the results of the TPM in the field-dependent group, 1 student was randomly selected who had low creative thinking skills with a field-dependent cognitive style.

The data were collected through GEFT, TPM, and interviews instruments. The research was designed for eight sessions, with details of the initial four sessions as the baseline/conventional learning stage (A) and the remaining four sessions as the intervention/ problem-posing model learning stage (B).

The collected data were analyzed based on two major conditions during the research process, there is analysis within conditions and cross conditions. Analysis under conditions includes components of condition length (interval length), directional trend, stability trend, trail trend, stability level and span, and level of change. Analysis cross conditions include the number of variables that are changed, changes in the direction and effects of trends, changes in stability and their effects, changes in data levels, and overlapping data.

RESULTS AND DISCUSSION (70%)

Based on the problem-posing test conducted by the researcher for eight days, the results are presented in Table 2. The eight days were divided into four sessions of the baseline phase (A) and four sessions of the intervention phase (B). The duration of each session of the baseline and intervention stages was 90 minutes.

Table 2. Result of Problem Submission Test at Baseline and Intervention Stage

Stage	Baseline (A)				Intervention (B)			
Sesi	A1	A2	A3	A4	B1	B2	B3	B4
Nilai	55	60	50	60	75	75	80	85
Rerata	55,00				78,75			

Table 2 shows the results of the problem-posing test for 8 sessions. At the baseline stage (A), the scores are 55, 60, 50, and 60, respectively, with the average, is 55.00. Meanwhile, at the intervention stage (B), the scores were 75, 75, 80, and 85, respectively, with an average, is 78.75. At the intervention stage, field-dependent students were treated with problem-posing learning. The significant difference indicates that problem-posing learning in field-dependent students on statistical material can significantly improve mathematical creative thinking skills.

Based on the data in Table 2, a line diagram presents to make sure the difference from each session shows in Figure 1. In Figure 1, the horizontal axis represents each session at each stage and the vertical axis represents the value. Points on a line chart show the value for each session. Meanwhile, the dotted line uses as a separator between the baseline and intervention stages.

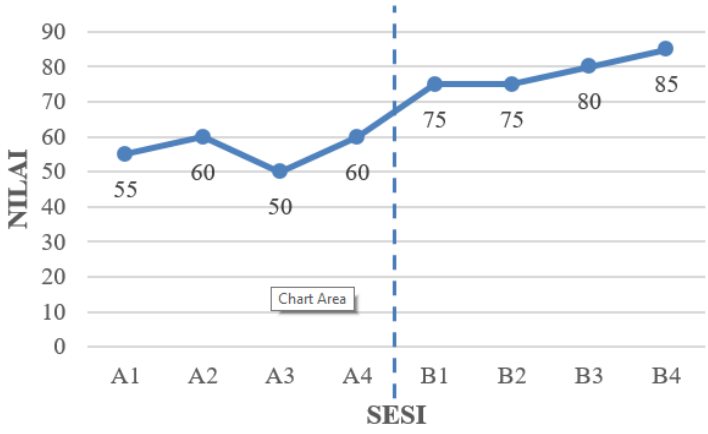

Figure 1. Comparison of Creative Thinking Ability in the Baseline and Intervention Phases

The collected data were analyzed using conditional analysis to determine the initial conditions of the subjects. The components include the length of the condition, the estimation of

the trend direction, stability tendency, trace tendency, stability level and range, and the change level.

Table 3. Summary of Analysis Results Under Conditions

Condition	Baseline (A)	Intervention (B)
Length Condition	4	4
Estimation of Directional Tendency		
Stability Tendency	Variabel (75%)	Stabil (100%)
Trace Tendency		
Stability level and range	Variabel 51,75 – 60,75	Stabil 72,38 – 85,13
Change level	60 – 55 = (+5)	85 – 75 = (+10)

Table 3 is a summary of the results of the analysis under conditions at the baseline (A) and intervention (B) stages. The length of the conditions between the baseline and intervention stages was the same, there are four sessions. At the intervention stage, field-dependent subjects were treated with problem-posing learning for four sessions with 90 minutes duration for each session. The estimation of the trend direction at the baseline stage shows that the creative thinking ability of the subject tends to be constant (constant), while at the intervention stage it shows a change with an increasing trend. At the baseline stage, the trend towards stability at the baseline stage is included in the variable (unstable) category, with a stability percentage of 75% of the stable criteria, namely 85%-90%. Meanwhile, the baseline stage tends for stability to fall into the stable category with a percentage of 100% stability. The stability level of the baseline stage lies between 51.75 – 60.75. Meanwhile, the stability level of the intervention stage lies between 72.38 – 85.13. The level of change at the baseline stage is (+5). The level of change at the intervention stage is (+10), which indicates a significant change.

Furthermore, the collected data was analyzed by using an analysis cross condition. Aimed to analyze the effect of giving treatment at the intervention stage on the subject. The changed number of variables, changes in trends and their effects, changes in stability trends, changes in levels, and overlaps.

Table 4. Summary of Analysis Results Cross Conditions

Condition Comparison	Baseline (A)/Intervention (B)
Number of variables changed	1
Changes in trend direction and the effects	
Stability trend change	Variabel ke Stabil
Level change	60 – 75 = (+15)
Overlap	0%

Table 4 shows the results of the analysis cross conditions from the baseline and intervention stages. The number of variables changed is 1, it is the ability to creatively think mathematics from the baseline stage to the intervention stage. Changes in the trend direction can be observed that at the baseline stage there tends to be no change (constant). Furthermore, after entering the intervention stage there is a tendency for changes to occur in the form of increasing values. The trend of stability changes from variable (unstable) at the baseline stage to stable at the intervention stage. The level changed by (+15) from the first intervention stage (B1). This shows that there has been an increase since conducting the intervention stage. Data overlap of 0% indicates that there is no similarity between the data at the intervention stage and the data at the baseline stage. The smaller the percentage of overlap, the better the effect of the intervention on the subject.

In each session of the baseline phase, subjects ask to work on a problem-posing task (TPM). In the TPM, the subject asks to propose a problem that fulfilled the three components of creativity (fluency, flexibility, and novelty) and then solves it.

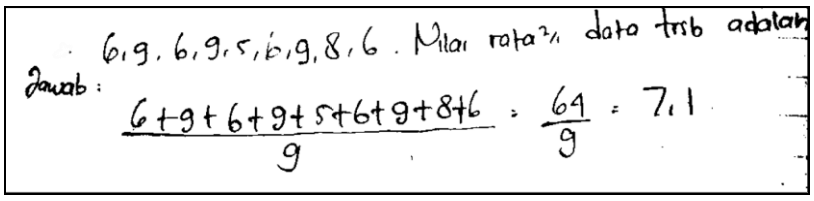

Figure 2. Problem Submission of Baseline Stage

In Figure 2, the questions posed by the research subjects were at the baseline stage. The subject can pose one problem related to the search for a single mean data based on the given data, and then the problem has been solved by the subject correctly. The subject poses a problem and solves it according to the examples given regularly. From the three components of creative thinking, the new subject can fulfill one of the components of creativity, fluency. Meanwhile, the components of originality and flexibility have not emerged from this issue. This supports the research results that the fluency component has a better interpretation rather than the flexibility and originality component (Effendi & Farlina, 2017; Siswono, 2008).

From the above findings, the FD students have quite low creative thinking skills. This is due to the characteristics of FD students who tend to prefer the humanist and social fields, and do not like mathematics lessons (Arvianto et al., 2013). Therefore, at the intervention stage, efforts were made to increase the creative thinking ability of FD subjects. The steps taken are by providing a problem-posing learning model.

In each intervention phase, the problem-posing learning model gives to the subject. The researcher started the lesson by delivering the learning objectives, explaining the material, giving examples of practice questions about posing problems. After learning, students are asked to do the TPM and then complete it. As in the baseline stage, TPM is designed for the subject to propose a problem that fulfills the three components of creativity.

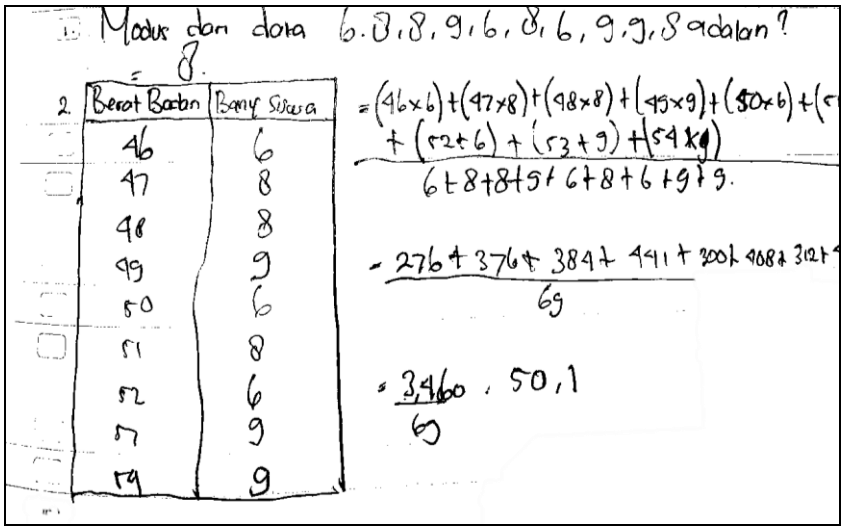

Figure 3. Submission of Problems in the Intervention Stage

In Figure 3, the subject in the intervention phase can pose two problems, there is the search for a single data modus and the single data. This problem presents in the frequency distribution table and is solved by the subject correctly. Subjects have been able to pose more than one different problem. The two problems posed by the subject are problems that the subject usually gets. Although in the submission of the two problems, each of the problems posed was only solved in one way which was routinely done by the subject.

Based on the three components of creative thinking, the subject was able to fulfill two components of creativity, there are fluency and originality. Meanwhile, the flexibility component has not emerged from the submission of this problem, because the subject has not been able to propose a problem that can be solved in more than one way. When compared to the baseline stage, at the intervention stage there was an increase in the achievement of the creativity component, it is the originality. This indicates that problem-posing learning can improve students' creative thinking skills. It is in line with the research of Asriningsih (2014) & Kelen (2016). However, the creative component of flexibility still requires more special efforts, because it has not been achieved at this stage of the intervention.

CONCLUSION

Students with field-dependent cognitive styles can pose problems on statistical material using a problem posing learning model. The evaluation results before and after treatment showed an improvement in the components of creative thinking, fluency, and originality thus the treatment given could improve the student's mathematical creative thinking ability of field-dependent students. However, the component of originality creativity is yet able to be improved.

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