Analysis of problem solving in terms of cognitive style

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Analysis of problem solving in terms of cognitive style

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Abstract. The purpose of this study was to analyze the problem solving based on the type of cognitive style. Subjects used in this study are students of class X SMK located in Purworejo. The method used in this research is qualitative descriptive. Data collection techniques used in this research is a problem-solving test to determine student problem solving and GEFT to determine the type of cognitive style possessed by students. The result of this research is to determine the mastery of each type in cognitive style, that is Field Independent type and Field Dependent type on problem solving indicator. The impact of this research is the teacher can know the mastery of student problem solving on each type of cognitive style so that teacher can determine the proper way of delivering to student at next meeting.

1. Introduction
Problem solving is an important part of mathematics learning. Problem solving requires knowledge and skills in solving problems [1]. The knowledge gained will help in obtaining the information needed to solve the problem. While the skills will help to apply the knowledge already obtained and calculate the settlement of the problem.

Several factors influence in solving the problem one of which cognitive style. Every individual has a cognitive style. The individual's cognitive style is a difference in perception and thinking [2]. The individual cognitive styles will not be changed [3].

Mastery of indicators on problem solving on each type of cognitive style of students will vary, so it needs to be analyzed for each type of cognitive style. This research analyzes the problem solving answers of the students based on the type of cognitive style possessed by the students.

2. Methods
This research analyzes student problem solving answers based on the type of cognitive style. Subjects used in this study is a student of class X SMK located in Purworejo. The method used in this research is qualitative descriptive. Data collection techniques used in this study is a problem-solving test to determine the problem solving owned by students and GEFT to determine the type of cognitive style possessed by students.
3. Results and discussion
Polya interprets problem solving as an effort searching out certain problems to reach certain purposes, not in immediate [4]. Problem solving is a process where students use knowledge to solve new problems encountered [5]. In problem solving, several indicators are: understanding the problem, making a plan, carrying out the plan, and looking back [6]. Problem solving indicator is a necessary step when the student solves the problem. The data used to determine the problem solving ability of students in the form of a problem that completion using the stages Polya.

In solving the problem, several factors influence, one of which is cognitive style. Cognitive style may be defined as an organizational approach to organizing and processing information during learning [7]. The cognitive style is an individual characteristic in remembering, thinking or accepting and understanding the information obtained [8]. There are several characteristic types for identifying cognitive styles, were field dependent and field independent (Table 1).

| No | Indicator | FD |
|----|-----------|----|
| 1. | Understanding the problem | a. Can write down the information contained in the problem clearly |
|    |           | b. Can write down the problems that are contained in the problem solving clearly |
| 2. | Making a plan | c. Can not plan on solving the problem coherently |
|    |           | d. Can not determine the formula to be used to solve the problem correctly |
| 3. | Carrying out the plan | e. Can not solve the problem correctly |
|    |           | f. Can not explain the complete problem solving solution |
| 4. | Look back | g. Can not make a conclusion that suits the solution of the problem solving |
|    |           | h. Can not check completion of problem solving already done |

Field dependent individuals typically rely more on external references [9]. According to the characteristics of field dependent at stage of understanding the problem on problem solving, field dependent subject will write down the information and problems as written in the problem solving problem. Field dependent tends to seek out external referents for processing and to structure their information [10]. By the characteristics of the field dependent, the subject requires guidance from others to write down the information needed to solve the problem.

Field-dependent individuals tend to work with external motivation, which is seeking guidance and instruction from others [11]. According to the characteristics of field dependent at stage of making a plan on problem solving, field dependent subject can determine the plan to solve the problem although the plan made by the subject does not match the required on problem. Field dependent subject determines the plan is not match the required on problem because it requires help from others or needs opinions from others. In determining the formula to be used to solve the problem solving there are some errors because field dependent subject prefers group study [12]. Field dependent subject requires an external reference to determine the formula used.

Field dependent subjects tend to accepted information as it is presented or encountered and rely to a great extent on memorization [13]. According to the characteristics of field dependent at stage carrying out the plan on problem solving, the field-dependent subject is still less precise in calculating the problem solving problem solving, sometimes the subject missed some steps in solving the problem. Field dependent subject missed a few steps in solving the problem because field dependent subject still needs someone else to have a structured settlement step and nothing to miss. Field dependent subject is less confident and still hesitant in explaining the completed solution.
Field dependent subjects will have trouble overcoming the effects of background elements and experience difficulty in focusing on the learning task [13]. According to the characteristics of field dependent at stage of looking back on problem solving, field dependent subject makes the conclusion not according to the requested by the question due to less of focus on a task (Table 2).

| No | Indicator                  | FI                                                                 |
|----|---------------------------|--------------------------------------------------------------------|
| 1. | Understanding the problem | • Can write down the information contained in the problem completely and correctly  |
|    |                           | • Can write down the problems contained in the problem solving completely and correctly |
| 2. | Making a plan             | • Can make a plan for solving the problem                          |
|    |                           | • Can determine which formula to use to solve the problem solving |
| 3. | Carrying out the plan     | • Can solve the problem properly                                   |
|    |                           | • Can explain solving the problem solving                         |
| 4. | Look back                 | • Can make conclusions according to the solution of the problem solving |
|    |                           | • Can check completion of problem solving already done             |

Field independent subjects rely more on internal reference [9]. According to the characteristics of field dependent at stage of understanding the problem on problem solving, field independent subject write down the information and problems following the written in problem solving problem but also write down the information needed in solving the problem. Field independent more capable of developing their own internal referents and more capable of restructuring their knowledge [10]. Under the characteristics of the field independent, the subject relies on internal reference because the subject is not dependent on others.

Field independent subjects do not require extrinsic motivation and rate low on interpersonal qualities [12]. According to the characteristics of field dependent at stage of making a plan on problem solving, independent field subject can determine plan and match the required on problem. Field independent subject can determine plan and match the required on problem because the subject does not want to depend on other people and tend to be independent in doing something. Field independent subject is correct in determining the formula to be used to solve the problem solving.

Field independent subjects were building up procedural understanding step by step [9]. According to the characteristics of field dependent at stage of carrying out the plan on problem solving, field independent subject no steps are missed in solving the problem solving, but still not careful in calculating the problem solving problem solving. According to the characteristics of the field independent, the knowledge of the subject field is so structurally independent that no steps on the settlement are missed. Field independent subject confident and steady in explaining the settlement that has been done.

Field independent subjects can easily overcome background elements and readily focus on the learning task [13]. According to the characteristics of field dependent at stage of looking back on problem solving, field independent subject to make conclusions in accordance with the requested by the problem and have checked the results of solving the problems that have been done. Field independent subjects set goals themselves [12].

The impact of this research is that teachers know the weaknesses and strengths of each student in problem solving. The teacher can determine the exact mode of delivery of each type of cognitive style. Teachers can improve student problem solving through the delivery of teachers tailored to the type of cognitive style or through the weaknesses and strengths of each student. Thus, the teacher knows how to deliver that can improve student problem solving. Students know the type of cognitive style they
have. Besides the students also know the weaknesses and advantages in problem solving. Thus students can overcome the weaknesses and improve the ability to problem solving.

4. Conclusion
Field dependent subjects cannot meet all the indicators in problem solving, while independent field subjects can meet all the indicators of problem solving although sometimes there are errors in the indicator. Field dependent subjects take a long time to understand the problems at hand. Field independent subject does not require a long time in understanding the problems being faced. That way, the teacher can know the mastery of problem solving students in each type of cognitive style so that teachers can determine the proper way of delivery to students at the next meeting. Students can overcome weaknesses in problem solving and can improve problem solving skills.

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