

Field Dependent and Field Independent Cognitive Style Analysis in Animal Ecology Problem Solving Students

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Abstract

One of the impacts of the Teacher Center Learning (CTL) learning model in the classroom is that students' thinking creativity is underdeveloped and students' ability to solve problems is low. This study aims to analyze the problem solving capabilities of Animal Ecology in Biology Education students based on the cognitive style of field dependent and field independent. This research is descriptive research using qualitative approach. The subject of this study is a sixth semester (VI) Biology Education student who has programmed animal ecology courses totaling 22 people. The research instrument is a Group Embedded Figure Test (GEFT) which amounts to 25 points. Problem solving problems in the form of descriptions as many as 4 numbers and interview guidelines. Based on the results of the study showed that the problem-solving ability of students with independent field cognitive style is better than field dependent because students with independent field cognitive style are able to separate themselves from their environment while students with field dependent cognitive style are still influenced by the surrounding environment.

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Introduction

Problem solving ability is one of the skills demanded by the world of work today. Problem solving ability is able to find a solution to a difficulty by finding problems, establishing pre-existing rules and concepts (Mendrofa, 2021). Problem solving skills for students need to be pursued so that students are able to find solutions to various problems. In solving problems, students need to have adequate understanding and knowledge, and have various strategies that can be chosen when facing different problems (Dahar, 2012; Nugroho & Dwijayanti, 2019).

This study has examined the relationship between the dimensions of problem solving ability and cognitive style. This is because cognitive style is one of the factors that affect problem-solving abilities (Marfugah et al. 2020; Ranesa, 2019). Cognitive style refers to the way a person processes, stores and uses information and solves problems based on his environment (Uno, 2023). Therefore, it is very important to develop students' problem solving abilities from an early age. The more often students solve problems, the students will easily find the appropriate strategy to solve the given problem (Sumartini, 2016).

Cognitive style is a habit of acting that is relatively permanent in a person in terms of thinking, remembering, receiving and processing information (Agoestanto & Sukestiyarno, 2017;

Masni, 2018). Many experts distinguish the types of cognitive styles, but what will be the focus of this research is the Field dependent and Field independent cognitive styles proposed by Witkin. This is because Field dependent and Field independent cognitive styles are the most important dimensions (Salameh, 2011; Siahaan et al. 2019). In addition, Field dependent and Field independent cognitive styles are cognitive styles that are able to overcome the distracting effect on story questions (Istiqomah & Rahaju, 2014). This cognitive style is seen as one of the determining variables on students' ability to solve story problems (Andriyani & Ratu, 2018).

Relevant research shows that there is a significant difference in problem-solving abilities between groups of students who have a Field Independent cognitive style and a group of students who have a Field Dependent cognitive style. Students who have a Field Independent cognitive style have higher Ecological problem solving abilities than the group of students who have a Field Dependent cognitive style. There is no interaction between learning strategies and cognitive styles on students' ecological problem solving abilities (Kasim, 2017).

Based on the results of interviews that have been conducted with lecturers and students in the Biology Education study program, information was obtained that the ability of teachers to develop interesting and meaningful learning for students is

still very limited and the implementation of learning in general is still dominated by teaching activities. Learning is more centered on the teacher (Teacher Center Learning) and is dominated by lecture and question and answer methods. One of the impacts of this kind of learning model is that students' creative thinking is less developed and students' ability to solve problems is low. Thus, students' cognitive style needs attention in the learning process, especially in solving student problems in Biology Education FKIP Universitas Tadulako.

This research was conducted on students of the Biology Education Study Program, FKIP Tadulako University with the aim of: (1) researchers want to test the differences in the field dependent and field independent cognitive styles of each student in solving biological problems, especially in the Animal Ecology course in the VI semester of the 2020/2021 academic year. (2) problem solving ability is one of the skills demanded by the world of work today. So that biology education students are required to be able to solve problems before students enter the world of work. Thus research on cognitive style on problem solving abilities is expected to provide new knowledge so that in problem solving students are not only oriented to memorization skills, but also to cognitive processes (way of thinking) which can encourage students to think to a higher level (Rochmah, 2017).

Animal Ecology material in this study was chosen because the main objective of Animal Ecology is an understanding of the basic aspects that underlie the performance of animals as individuals, populations, communities and the ecosystem they inhabit, including the introduction of patterns of interaction processes and important factors that cause success or failure. organisms and ecosystems in maintaining their existence. These various factors and processes are information that

can be used as a basis in formulating models, forecasting and their application for human interests, such as; habitat, distribution and abundance, food, behavior and others.

After studying and understanding these things, we can use this knowledge, for example, predicting their abundance and analyzing their condition and role in the ecosystem, maintaining their sustainability and other activities related to the existence of these animals. For example, we study one type of animal starting from its habitat in nature, its distribution and abundance, food, behavior, and others. After everything is understood with careful and thorough observation and research, then we can use that knowledge for example in maintaining its sustainability in nature by maintaining the integrity of the environment, its natural habitat, predicting the abundance of its population in the future, analyzing its role in the ecosystem, cultivating it and other activities by optimizing its environmental conditions to resemble its natural habitat.

Animal Ecology for humans is quite important in providing applied values in human life. These benefits are mainly related to issues of agriculture, plantations, animal husbandry, fisheries, health, as well as wildlife processing and conservation. Tolerance ranges and limiting factors have been widely applied in these fields. Thus, many problems can be solved by studying Animal Ecology which is always based on the concept of Ecological efficiency.

Based on the problems above, the researchers are interested in conducting research with the topic "field dependent and field independent cognitive style analysis in solving problems of Animal Ecology in Biology Education study program students at Universitas Tadulako".

Materials and Method

The research method used in this research is a descriptive method with a qualitative approach, namely research that uses qualitative data and describes the data to produce an in-depth and detailed picture of the thinking processes of students who have field dependent and field independent cognitive styles (Sugiyono, 2012).

This research was conducted in the Biology Education study program, FKIP Universitas Tadulako. The time of this research was carried out starting in the odd semester of the 2020/2021 academic year for sixth semester students who took the Animal Ecology course.

The subjects in this study were students of the 2018 Biology Education Study Program of 22 people who were 21 years old. This research subject taking with choosing respondents who have the cognitive style of the Dependent Field and Independent Field. Before choosing researcher respondents gave the GEFT (Embedded Figure Test) test to students and analyzed the test to determine the cognitive style possessed by students so that respondents will be tested regarding problem

solving abilities.

The instrument in this research is as follows:

1) Group Embedded Figure Test (GEFT)

The results of the GEFT test are used to determine the research subjects. Determination of students in the field dependent and field independent cognitive style groups is based on the speed and accuracy of students in finding simple images in more complex images with a predetermined time limit on the GEFT instrument.

2) Problem Solving Ability Test

The problem solving ability test used is in the form of a description that aims to measure the ability to solve animal ecology problems with predetermined problem solving indicators. The number of questions consists of 4 question numbers in the form of a description with the Rating Rubric 0-4.

3) Interview Guide

The interview will be carried out after students make a problem solving ability. The subject to be interviewed is all students who have taken a test with a 10 minute of each student. The results of interviews are

arranged into good and neat language, then processed into data that is ready for use. Transcripts of interviews from the research subjects are collected in the form of verbal data. The data is stored in electronic devices in the form of sound recordings to facilitate analysis of interview data, researchers conduct data transcripts by paying attention to all aspects of existing interviews. Interview transcripts will provide data on research subjects experience in resolving problem solving.

Data collection techniques are an attempt to collect data systematically in accordance with procedures. There are several data collection techniques used in this study as follows:

1) Group Embedded Figure Test (GEFT)

The GEFT test is intended to test students' ability to find simple shapes hidden in complex images. The number of questions in the GEFT test is 25 numbers with a processing time of 20 minutes. Assessment is done by giving a score of 1 for correct answers and 0 for incorrect answers. Thus, if students are able to answer the questions correctly, the maximum score is 25 and the minimum score is 0 (if there are no correct answers at all). For the categorization of cognitive style types, the following criteria are used (Wulandari, 2017).

- If the score obtained is less than 50%, it is included in the field dependent cognitive style group.
- If the score obtained is more than 50%, it is included in the field independent cognitive style group.

2) Written Technique

The written technique in this study is solving problem solving problems in the form of descriptions with a total of 4 questions with a processing time of 60 minutes. The indicators of the Animal Ecology material are (i) students are able to explain the concept of habitat and biological niches, (ii) students are able to explain animal populations.

3) Interview Technique

The type of interview used is an unstructured interview because the researcher wants to reveal the actual situation and circumstances regarding the creative thinking process of students based on their cognitive style in solving problems of Animal Ecology. The subjects who will be interviewed in this study are students who have field dependent and field independent cognitive styles in solving animal ecology problems.

Data analysis is a way to process the collected data so as to produce valid and accountable conclusions. The data analysis of this research is a qualitative descriptive analysis of the data obtained. Analyze the data by describing the situation with the existing data set and drawing a conclusion.

The percentage of students' ability to solve problems based on field dependent and field independent cognitive styles can be determined using the following formula:

$$P_i = \frac{n_i}{N} \times 100\% \quad i = 1 \text{ and } 2$$

(Arikunto, 2010)

Information:

1 = Field dependent cognitive style

2 = Field independent cognitive style

P_i = Percentage of student problem solving

n_i = The total score obtained by students

N = Maximum score

The subject in this study was all Biology education students of the 2018 Tadulako University of Tadulako which temporarily followed the animal ecology course. The determination of the subject uses the GEFT test instrument (Embedded Figuretest Group) developed by Witkin and is standardized. Charging the GEFT instrument was carried out on Monday, April 26, 2021 at 10.00-10.20 WITA through online. Analysis of filling GEFT instruments, data obtained is as many as 22 students. Students with Cognitive Style Field Dependent are obtained as many as 11 people and independent fields obtained 11 people.

In this research, the research subjects worked on 4 questions about the problem-solving ability test. The categories of student problem solving abilities with field dependent and field independent cognitive styles can be seen in Figure 1.

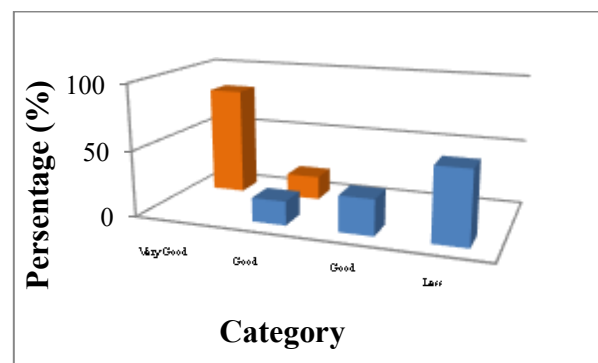


Figure 1. Average Percentage of Problem Solving Ability Students with Field Dependent (FD) and Field Independent (FI) Cognitive Style

Based on Figure 1, it is known that students have different levels of problem-solving abilities in Animal Ecology material based on the Field Dependent (FD) and Field Independent (FI) cognitive styles of Biology Education students.

Results and Discussion

This research was conducted with the aim of analyzing students' problem solving abilities based on their cognitive style. The subjects of this study were Biology students of the 2018 class, totaling 114 people, but only 22 students could be used as research subjects. This is due to the network factor so that other students cannot take the test. Based on the results of the analysis of the GEFT test instrument, 11 respondents had field dependent cognitive style (FD) and 11 respondents had field independent cognitive style (FI).

Based on the research data that has been analyzed, from 11 student respondents with field dependent cognitive style on solving the problem of Animal Ecology, the data obtained are as many as 6 respondents in the poor category, 3 respondents in

the sufficient category and 2 respondents in the good category.

Respondents with problem-solving abilities categorized as less are caused because respondents do not understand the questions from the problem-solving questions given, the solution to solving the problems of these respondents uses a problem-solving strategy and procedure that leads to the correct answer, and at the time of interview respondents with this category only check written answers but do not check the discourse in the questions.

Respondents with sufficient problem-solving abilities because these respondents did not understand the questions from the problem-solving questions given, the solution to solving the problems of these respondents used a problem-solving strategy and procedure that led to the correct answer, and at the time of the interview respondents with this category only checked written answers but do not check the discourse in the questions.

Respondents with good problem solving skills are respondents who understand the problem well because these respondents understand the questions from the problem-solving questions given, the solution to solving the problem of this respondent uses several problem-solving strategies and procedures that lead to the correct answer, and at the time of interviewing the respondent with this category only checks the written answers but does not check the discourse on the questions.

Based on the research data that has been analyzed, from 11 students with field independent cognitive style on solving problems of Animal Ecology, the data obtained are 2 respondents in good category and 9 respondents in very good category.

Respondents with good problem solving skills were able to understand the problem well because these respondents understood the questions from the problem-solving questions given, the solution to solving the problem these respondents used several problem-solving strategies and procedures that led to the correct answer, and at the time of interviewing respondents with This category reads the discourse on the questions and re-examines the answers written on the questions.

Respondents with problem-solving abilities categorized as very good understand the problem well because these respondents understand the questions from the problem-solving questions given, the solution to solving the problem these respondents use several problem-solving strategies and procedures that lead to the correct answer, and at the time of interviewing respondents with This category reads the discourse on the questions and re-examines the answers written on the questions.

Based on the results of the analysis of problem solving abilities obtained by students with field dependent and field independent cognitive styles, it can be seen that the problem solving abilities of students with field independent cognitive styles are better than students with field dependent cognitive styles. In accordance with the theory of [Witkin \(1977\)](#) which states that in relation to problem-solving skills, students with field dependent cognitive style have difficulty solving problems on their own. So to overcome them they need help and motivation from fellow friends and teachers.

Unlike the case with respondents who have a field independent cognitive style in learning, they tend to be more independent by prioritizing analytical and systematic thinking skills. In addition, in solving problems, they are more independent and are not influenced by criticism and motivation from fellow friends and teachers.

The results of this study are relevant to the research conducted by [Wulan & Anggraini \(2019\)](#) that the field independent subject (FI) is better than the field dependent subject (FD). And it is also relevant to the research conducted by [Hasan \(2020\)](#) students with field independent cognitive style have more detailed characteristics in making explanations and are able to organize the information obtained and are able to separate themselves from the influence of the surrounding environment while students with field dependent cognitive style tend to only be able to accept the given concept so that they have difficulty in understanding the concept, besides that students with field dependent cognitive style are still influenced by the surrounding environment.

Based on the research results obtained, several factors that affect the problem solving ability of students with field independent cognitive style are better than students with field dependent cognitive style, among others, students with field dependent cognitive style find it difficult to understand the command questions of the problem solving questions given. while taking the test. When respondents worked on problem solving questions consisting of four problem solving problems, only a few respondents understood the commands of the questions. Respondents only read the question instructions from the question, but did not understand the content of the problem discourse from the given question.

Respondents with field independent cognitive style have better problem solving abilities than students with field dependent cognitive style, because respondents understand the questions well, before answering questions from problem solving problems they first understand the content of the discourse on the questions. Several other factors were caused by the condition of ongoing teaching

and learning activities in the midst of a pandemic caused by the Covid-19 virus which was not conducive. This is because the learning process is more directed at giving independent assignments, so students do not understand the material given.

Conclusion

Based on the results of the research and discussions that have been described in the previous chapter, it was obtained by conclusions, namely the ability to solve students with the cognitive style of the Dependent Field in the category of less than 54.54%, the category was enough of 27.27% and a good category of 18.18%. The ability to solve students with the cognitive style of Independent Field category is either by 8.20% and is very good at 81.20%. The ability to solve students with the cognitive style of independent fields is better than the Dependent Field.

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