

Diagnose Junior High School Students' Learning Difficulties in Solving of System of Two Variable Linear Equations Problems

Study on Students with Field-Dependent Learning Style

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ABSTRACT

Every student has opportunity to have learning difficulties. To diagnose accurately what factors that cause learning difficulties on students with certain learning style, it is necessary to apply diagnostic tests to groups of students with same learning style on subject they will study together. The aim of this research is to describe in what factors that cause learning difficulties of junior high school students with field-dependent learning style in solving of system of two variable linear equations problems. This research uses a qualitative approach with a type of qualitative descriptive. Data sourced from the results of students' answer on each item of diagnostic test. Descriptive reasoning supported by relevant literature data. Based on the results of analysis of students' answers to each test item applied, it was found that the factors that cause students' learning difficulties is the occurrence of misconceptions, the occurrence of calculation errors and low problem solving skill.

Keywords: *Diagnostic test, Learning difficulties, Learning style.*

1. INTRODUCTION

There are various kinds of problem that can be experienced by students during their educational at school. There can even be cases where students who have good initial abilities can fail to solve the exam questions given to them during class learning, we call this case as learning difficulties. Learning difficulties is a problem that can occur in the classroom, this can be seen from the presence of several researchers who have discussed the problem. [1] discussing when teaches in class, students have learning difficulties, students' learning difficulties need to get properly teacher respond, so that teacher need to conduct continuous training programs with student. [2] explained that the model applied in her research (LDMAT) can make significant contribution to the improvement of teaching practices at overcoming of learning difficulties in mathematics. Finding research of [3] provide descriptions of factors that hinder in-depth learning of mathematics including student

discipline, time constraints and less exposure to the latest pedagogical techniques.

Students are individual with special characteristics so that in order to obtain detailed and accurate descriptions of the factors causing student learning difficulties. Students who are the subject of this research are clearly is known what learning style have, what level of education and learning process that take place on what subject.

To find out the factors that cause learning difficulties from the research subject, the appropriate instrument are needed. In the process of diagnosing learning difficulties experienced by students, diagnostic test are used. In this research, a three-tier diagnostic test will be used which specifically discusses subject matter of system of two variable linear equations. Besides us, there have been some researchers who have developed diagnostic test but not will be applied to students who have the same learning style as the object of this study. [4] develop a valid and

reliable two-tier diagnostic test to assess students' undergraduates' understanding of some concepts in the context of undergraduate general chemistry course. [5] study with pupose to develop a valid and reliable three-tier diagnostic test to assess students' understanding of acids-bases concepts. [6] researching with purpose to develop a diagnostic test and to quantify its quality. The research concentrate in students' mathematical problem solving skill. Moreover, the created diagnostic test will limit to the skill of solving adding and substracting fractions questions only.

1.1. Reseach Question

What are factor that cause junior high school students' learning difficulties with field-dependent learning style in solving of system of two variable linear equations problems?

1.2. The Purpose of This Study

To know factor that cause junior high school students' learning difficulties with field-dependent learning style in solving of system of two variable linear equations problems.

2. METHOD

2.1. Reseach Approach

This research uses a qualitative approach. The type of qualitative research used is descriptive qualitative. This research carried out in three stages, namely: preparation stage, application stage and conclusion-making stage. Preparation stage occurs where we prepares a research proposal containing: research background, problem and research aim, then applies to permission to the school where research is conduct, compiles to validiate auxiliariy instrument. Application stage occurs where process of selecting samples that will be subject of research, followed by process of collectiong data by applying auxiliary instrument (diagnostic test), diagnostic test are given to obtain data, data sourced from results of research subjects' answers to all diagnostic test item. Conclusion-making stage were data obtained from research subjects are analyzed to obtained research answer.

2.2. Key Instument and Auxiliary Instrument

Researchers (Authors) is the key instrument in this study and auxiliary instrument is diagnostic test. The selected diagnostic test is a three-tier multiple choice diagnostic test with 6 items. The first tier contains question about problem of system of two-linear variable. The second tier contains the reason for

choosing the answer of the first level questions. The third tier contains the level of confidence of research subject for choosing the answer to the first and second tier questions.

Each item has the ability to reveal what factors that cause learning difficulties in students. .When research subject answers the first, third and fifth item, it will be possible to reveal the factor that cause learning difficulties namely: pre-subject skills are not mastered, the occurence of misconceptions ; if the research subject answer the second item, it may be revealed that the factor cousing learning difficulties are: pre-subject skills are not mastered, the occurence of calculation errors ; minewhile, after the research subject answered the fourth and sixth items, the possibility of finding the factor cousing learning difficulties were: the occurence of calculation errors or low problem solving skill.

The following (Figure 1) is the first item of the diagnostic test question that are applied to research objects.

Tiers	Item
1st	1.1. How much solution of system of linear equations: $l_1: 3x + 3y + 3 = 0; l_2: 5x + 5y + 5 = 0$ a. One solution b. Two solution c. Infinte solution d. No solution
2nd	1.2. Which one of the followings is the reason of your answer for the previous question? a. Curve of l_1 and l_2 is parallel b. Curve of l_1 and l_2 is intersect c. Corve of l_1 and l_2 is coincide d. Curve of l_1 and l_2 is incrossing
3rd	1.3. Are you sure about your answer for the previous two question, a. I am guess b. I am not sure c. I am sure d. I am absolutely sure

Figure 1 First item from three-tier diagnostic test on the subject of system of two-variable linear equations

2.3. The Sample and Sampling Technique

This research was conducted in Public Junior High School Two of Pontianak (SMPN 2 Pontianak). The sample selection technique used is purposive sampling. The selected sample must satisfy this 4 following condition: (1) student where research was conducted, (2) students who will study the subject of system of two-variable linear equations (3) included in the 6 students with highest total score on the application of field-dependent learning style questionnaire, (4) students who has ability to communicate their thoughts in writing.

Sample candidates are selected by the 8th grade mathematic teacher where the research conduct, it candidates are all students who are members of Local VIII-H where research conducted. There are 15 male students and 17 female students. There are four stages of sample selection. The first stage is to apply learning

style questionnaire, where the sample candidates are answer 20 item of questionnaire, each item is developed based on field-dependent learning style indicator. Second stage is calculation of total score for each sample candidate based on the answer given by them to each item of questionnaire, sample candidates with total score above 50 (from maximum score is 100) will be classified as students who have field-dependent learning style. Six sample candidates with highest total score will be selected in next stage, third level is to select 4 of 6 sample candidates with the highest total score in answer learning style questionnaire, selection process involved 8th grade mathematic teacher, discussion were held to select students has ability to communicate their thoughts in writing.

2.4. Data and Data Analysis

Data in this research sourced from results of research subjects' answers to all diagnostic test item. Answers from research subjects have three-tier on each item according to form of the diagnostic test given.

Data analysis process is carried out based on flow model of analysis (see Figure 2). [7] When researchers take data, there a cycle that connects data collection, data reduction, data presentation, and drawing conclusions. The analysis was carried out in flow and interweaving from the beginning to the end of the study. In this model. After data is collected from research subjects, data reduction is carried out where things that are not focus of the research are removed, then data is presented and then analysis is carried out. If there are still missing data, then data collection is carried out again. And so on, until a solid theory is obtained.

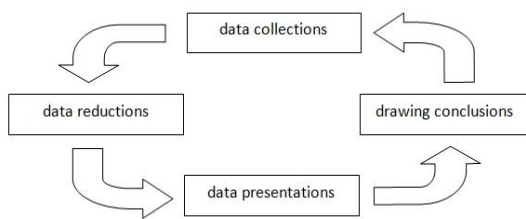


Figure 2 Flow model of analysis

3. RESULT AND DISCUSSION

After 4 sample was selected, diagnostic test apply to 4 sample who are classified as students with field-dependent learning style consist of 3 female students and 1 male student. In this part, we will refer to them as subject α_i ($i = 1, 2, 3$) for female sample and subject β for male sample. The factors that cause learning difficulties in referred to in this study are factors that

cause learning difficulties of junior high school students that occur simultaneously in all four research subject at once. The following will describe in detail, the results obtained in application of diagnostic tests to the four research subjects.

3.1. Factor of Causing Learning Difficulties in α_1

When the diagnostic test was applied to α_1 , we obtained: (1) α_1 was wrong in choosing the answer of question in the first tier, this happened not only on the first item but so on the second, fourth, fifth and sixth items. (2) α_1 is wrong in choosing the reason in the second tier, this occurs in the first, second, fourth, fifth and sixth items. (3) the highest level of confidence in choosing the answer of question is "sure" occurs when α_1 answers all test items.

Based on the aswers given from α_1 for the six items of test, it was found that the factors causing the learning difficulties she experienced is pre-subject skills are not mastered, the occurrence of misconceptions, the occurrence of calculation errors and low problem solving skill. Pre-subject skills are not mastered was revealed when α_1 answered the first item, The occurrence of misconceptions was revealed when α_1 answered the first and fifth item, the occurrence of calculation errors occurred when α_1 answered the second, fourth and sixth items. For low problem solving skills, it occurs when α_1 answer the fourth and sixth items.

3.2. Factor of Causing Learning Difficulties in α_2

After α_2 answered the diagnostic test we get: (1) α_2 correctly answered the questions only on the first tier of the first item and incorrectly answered the questions on the other five items. (2) α_2 is correct in choosing the reasons in the second tier of the first, second and fourth items, but wrong in choosing the reasons for the third, fifth and sixth items. (3) the highest level of confidence in choosing the answer is "absolutely sure" occur when α_2 answer the fourth item of test.

After α_2 answered six diagnostic test items, it was found that she had the occurrence of misconceptions when answering the third and fifth items, she had the occurrence of calculation errors when answering the second and sixth items. Her low problem solving skill was seen when she answered fourth and sixth items.

3.3. Factor of Causing Learning Difficulties in α_3

When the diagnostic test was applied to α_3 we have: (1) incorrectly in choosing the answer is occurs

when α_3 answers the first tier of all items. (2) α_3 was incorrectly in choosing the reason in the second tier of the first, second, third, fifth and sixth items and only correctly chose the reason in the fourth item. (3) the highest level of confidence in choosing the answer is “sure” occur when α_3 answers all test items.

Based on the answers given by α_3 to the diagnostic test, it was concluded that none of the six questions given were answered correctly. α_3 experienced the occurrence of misconceptions when answering the first item, third item and fifth item. Meanwhile, the occurrence of calculation error occurred when α_3 answered the second and sixth items. The low problem solving skill is seen when she answer the fourth item.

3.4. Factor of Causing Learning Difficulties in β

We obtained from the answers given by β to the diagnostic test is following: (1) β only correctly answered the first tier of the fourth item and incorrectly answered the first tier of other five items of test. (2) β was incorrectly choosing the reason in the second tier of all items. (3) the highest level of confidence is “absolutely sure” occur when β answer the first, second and third items.

After β answered the six items of diagnostic test, it was found that he experienced the occurrence of misconception when answer the first, third and fifth items. β experienced calculation errors when answering the fourth and sixth items. Low problem solving skill is shown when β answer the fourth and sixth items.

4. CONCLUSION

Base on result and discussion, there are three factors that cause learning difficulties that appear simultaneously in the four research subjects, namely: the occurrence of misconception, the occurrence of calculation errors and low problem solving skill. Only the first subject has factors that cause learning difficulties: pre-subject skills are not mastered. So, it can be concluded that factor that cause junior high school students’ learning difficulties with field-dependent learning style in solving of system of two variable linear equations problems are the occurrence of misconception, the occurrence of calculation errors and low problem solving skill.

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