The Effectiveness of Differentiated Learning Through Providing Structured Assignments in Algebraic Form Operational Materials Reviewed from the Learning Achievements and Learning Motivation of Class VII Students

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Abstract This research aims to describe how the effectiveness of differentiated learning strategies through giving structured assignments on class VII students' algebraic operations material in terms of: (1) student learning achievement, (2) student learning motivation, and (3) student learning achievement and student learning motivation simultaneously. This research is a quasi-experimental research with a pretest and posttest non-equivalent group design. This research is quantitative research with experimental methods, This type of research is a quasi-experiment, a pretest-posttest nonequivalent control group design. The subjects in this research were 66 students, divided into two classes, namely 33 experimental class students and 33 control class students. The data collection technique for student learning achievement uses a multiple choice test with 20 questions and an essay with 2 questions, while for data on student learning motivation uses a questionnaire in the form of a questionnaire with 25 questions. Data analysis used two sample t-test analysis using statistical formulas and the SPSS 27 for Windows program. The results showed that the differentiated learning strategy through structured assignments on the material of the operation of algebraic forms of seventh grade students was 1) ineffective in terms of student learning achievement, 2) effective in terms of student learning motivation, and 3) effective in terms of student learning achievement and student learning motivation simultaneously.

Keywords: Differentiated, Learning, Strategies, Structured, Tasks.

1. INTRODUCTION

The change from the 2013 Curriculum to the Independent Curriculum which will be implemented simultaneously in 2022 is a response to advances in technology and information which have ushered in a digital civilization that cannot be separated from the dynamics of science which ensures that it continues to develop in accordance with developments in human thinking. It is also stated that in the Independent Curriculum, learning must adapt to students' learning abilities and speed, so learning plans and processes should be directed to truly meet students' learning needs which are not only diverse, but can also change, which we know as Differentiated Learning. .

Through differentiated learning practices, students will not only be able to maximize student potential, but students will also be able to learn about various important life values, values about the beauty of differences, respect, new meanings of success, self-strength, equal opportunities. , freedom to learn, and various other important values that will contribute to their development in a more holistic or complete manner, and are thought to reduce students' feelings

of anxiety and even fear regarding mathematics lessons, so it is important for teachers to know how this differentiated learning process can be carried out in a way which allows teachers to manage it effectively (Kusuma, O.D. & Luthfah, S., 2020).

According to the Ministry of Education and Culture's guidebook on the 2021 differentiated learning development model, it is stated that differentiated learning is a learning process where each student can study and understand the subject matter provided according to each student's abilities, likes and needs so that students are not frustrated or feel like they have failed in their learning experience.

According to (Marlina, 2020), one of the differentiated learning strategies is that teachers and students can determine a comfortable learning environment, and how students work and feel in learning. Teachers also provide opportunities for students to reflect on learning activities periodically, to develop students' leadership skills, so that students learn from experience regarding what they have learned, what they are learning, and what they will learn.

Several research results related to differentiated learning by giving structured assignments include, research results through research (Naibaho, D.P., 2023) with the results of his research it was concluded that differentiated learning strategies are thought to be able to increase students' understanding of learning, also the results of Safarati's research & Zuhra (2023) in the Scientific Education journal, Vol 14, No.1 with the title "Differentiated Learning in Middle Schools". The research results show that differentiated learning can improve student learning outcomes, as well as research results through research (Rahayuono, A., 2014) with the research results concluding that mathematics learning achievement using the STHL learning model based on structured assignments is better than Mathematics learning achievements of students who use conventional learning methods on circle material for class VIII students at SMP Negeri 5 Kepil for the 2013/2014 academic year.

Structured assignments are assignments that students must complete within a time limit determined by the teacher and students. Learning with structured assignments can be interpreted as a learning model where the teacher can ask students to first study the material or topic that will be discussed, ask them to look for proof of theorems that must be solved independently or in groups, then the results are discussed with the teacher. According to Bruner's theory in the book (Sujadi, I., & Dhoruri, A., 2016), it states that learning mathematics will be more successful if the learning process is directed towards the concepts and structures contained in the subject being taught, in addition to the related relationships between mathematical concepts and structures themselves. From the description above, researchers can say that the relevance of giving structured assignments to mathematics learning is that giving

structured assignments can train students to enrich and strengthen basic mathematical concepts through materials prepared by teachers in a structured manner.

From the researcher's experience as a mathematics subject teacher at SMP Negeri 4 Banyakdem, especially as a mathematics teacher in class VII, periodically conducting assessments of students' initial abilities before the learning process on certain material, where the results generally and consistently show that students have initial abilities in mathematics subject matter. different levels, so that as educators we are able to identify the learning needs of each student. From the data that the researcher has at the current place of assignment at SMP Negeri 4 Burdendem, one of the materials with the lowest student learning achievement data is algebra operations material, where the learning achievement data in the last 4 (four) years is 51.89 in 2019/2020 academic year, 50.53 in the 2020/2021 academic year, 52.34 in the 2021/2022 academic year, and 54.13 in the 2022/2023 academic year, with student learning motivation generally still in the low category.

For this reason, the researcher who participated as a class VII mathematics teacher at SMP Negeri 4 Burdendem was interested in conducting research with the title "effectiveness of differentiated learning through giving structured assignments on algebraic operations material in terms of learning motivation and mathematics learning achievement of class vii students".

2. RESEARCH METHODS

This type of research uses quasi-experimental research. The independent variable in this research is the approach used in mathematics learning, namely differentiated learning strategies through giving structured tasks (X). The dependent variables in this research are student learning achievement (Y1) and student learning motivation (Y2). This research is directed at testing the effectiveness of variable (X), namely differentiated learning strategies through structured assignments, on students' mathematics learning achievement (Y1), and students' mathematics learning motivation (Y2) both univariately and multivariately. For univariate it was tested using the t-Test and for multivariate it was tested with the t2-Test with the help of the SPSS 27 for Microsoft Windows application.

The design of this research is an experimental class design and a non-equivalent control class design. The steps for the quasi-experimental nonequivalent group design can be described as follows.

Table 1. Steps in the quasi-experimental nonequivalent group design

Kelompok/Kelas	Pre-test	Perlakuan	Post-test
Eksperimen (E)	O_1	X	O_2
Kontrol (K)	O_3	X_2	O_4

Information:

E : experimental group/class (group that was given differentiated learning strategy treatment through giving structured, tiered tasks).

K : The control group/class (a group that is given learning using a scientific approach through giving unstructured and non-leveled assignments), functions as a standard for measuring the effects of the intervention or treatment given to the experimental class.

O_1: experimental group pretest

O_2: experimental group posttest

O_3: control group pretest

O_4: control group posttest

X_1: differentiated learning strategies through structured assignments

X_2: scientific learning approach through giving unstructured assignments

This research was carried out at SMP Negeri 4 Burdendem, with a class VII student population of 131 (one hundred and thirty-one) people in the even semester of the 2023/2024 academic year. Data collection in this research began from March to April 2024 on algebraic operations material. The population in this study were all class VII students in the even semester of SMP Negeri 4 Burdendem for the 2023/2024 academic year with a total of 131 (one hundred and thirty-one) students divided into 4 (four) parallel classes, namely VII A with 33 students, VII B with 33 students. 33 people, VII C as many as 33 people, and VII D as many as 32 people.

The sampling technique in this research is class random sampling, meaning that the sample is determined through the drawing stage for the existing classes, namely classes VII-A, VII-B, VII-C and VII-D. However, before the drawing stage is carried out, a population equality test is first carried out, whose members are students in each class VII-A, VII-B, VII-C and VII-D by calculating the average score of the report cards for 11 (eleven) previous semester subjects. . Furthermore, one experimental class with differentiated learning strategies through giving structured assignments, and one class as a control class with scientific approach

learning through giving unstructured assignments. From the calculations, the average results of the previous semester's report cards are as shown in Table 2 as follows:

Table 2. Average Report Card Scores for 11 Semester 1 Subjects

Roll number	Average Score for 11 Subjects Semester 1 2023-2024			
	VII-A	VII-B	VII-C	VII-D
1	79,43	80,55	77,82	77,62
2	76,64	78,36	76,73	77,91
3	77,55	79,64	80,27	78,65
4	77,36	78,18	75,64	75,45
5	76,50	77,64	78,00	79,73
6	79,45	78,82	78,55	78,74
7	77,55	79,64	77,91	75,82
8	81,32	79,55	79,09	77,82
9	79,09	76,91	77,55	75,73
10	80,36	74,82	78,18	78,50
11	79,45	78,36	77,82	75,73
12	80,73	78,82	76,73	79,63
13	78,18	79,18	76,82	78,36
14	81,70	79,91	79,18	77,91
15	81,27	80,18	79,36	78,73
16	80,55	81,64	77,45	79,18
17	79,27	83,36	79,27	79,82
18	78,09	79,36	77,36	78,27
19	79,09	80,73	81,36	79,64
20	81,51	79,91	78,55	77,64
21	78,36	78,36	81,18	77,92
22	77,18	77,18	81,18	79,63
23	80,27	78,45	78,73	81,32
24	81,45	81,36	79,55	79,84
25	78,55	78,73	77,27	79,73
26	80,73	76,27	79,09	79,57
27	78,43	78,27	79,18	79,64
28	82,27	78,09	80,73	78,30
29	77,60	80,45	78,84	78,73
30	80,00	77,82	78,73	78,73
31	82,00	80,18	77,45	78,50
32	78,18	79,27	78,82	77,91
33	79,52	81,27	80,09	-
Average	**79,38**	**79,13**	**78,62**	**78,46**

The average value of this report card shows that there is significant or representative equality that can represent the entire population. As well as the results of the random drawing, the experimental class was class VII A and the control class was class VII C.

The data collection technique used was a diagnostic test to determine the learning difficulties faced by students before determining the differentiated process group based on the

students' learning needs or difficulties before being given treatment in the experimental class. Meanwhile, non-test data collection is used to measure students' learning motivation in the mathematics learning process. The procedure for giving a learning achievement test is carried out after the algebra form of operations material ends, namely at the seventh meeting with a time of 2 x 40 minutes. Meanwhile, data taken using non-tests, namely motivation to learn mathematics, was carried out using a questionnaire (checklist procedure) from the student's mathematics learning motivation instrument at each learning meeting.

Determining the validity of an evaluation tool should be based on various aspects, some of which are content validity, construction validity (psychology), content validity and construct validity (Nanang Priatna, et al. 2016). Mathematics learning achievement test instruments on algebraic operations material, and student mathematics learning motivation checklists will be validated to test the suitability of the instruments to be used in research.

Meanwhile, data analysis is first carried out with descriptive analysis, then testing the analysis prerequisites, and continuing with hypothesis testing. Statistical techniques used for descriptive analysis include average and standard deviation.

3. RESULTS AND DISCUSSION

Research Results

In the experimental class, namely the group of students in class VII-A, they were given treatment with differentiated learning strategies through giving structured assignments. Meanwhile, in the control class, namely the group of students in class VII-C, they were given conventional learning treatment, namely learning with a scientific approach through giving unstructured assignments.

The learning process at each experimental class meeting, the differentiated learning strategy here is focused on process differentiation based on learning readiness (in stages). The names of the groups at each level are obtained from the results of diagnostic tests or students' initial learning readiness tests. From the results of the researcher's observations during the learning process and data collection in the experimental class, at the beginning of the learning meeting, students in each group were still trying to adapt to their members, because the existing groups were not selected based on students' wishes but based on level (readiness to learn) through results. diagnostic test, where this situation occurs in learning meetings one and two. At meetings three to six, students in each group were willing to accept each other, although there were still one or two people who had not accepted or were not compatible with other members in their group.

In the control class the learning is conventional learning. What is meant by conventional here is learning that has often or predominantly been given by researchers as teachers, namely learning with a scientific approach through giving unstructured assignments. In general, the learning process activities in the control class went according to the learning plan as in the teaching module, however, student discussions in each group were quite limited because the group members were only their seat mates.

The learning process at each meeting with differentiated learning strategies is synchronized through giving structured assignments to the experimental class. Structured tasks are given differently according to the level of each group. When students in each group discuss and complete their assignments, both in the experimental class with structured assignments and in the control class with unstructured assignments, the teacher helps with questions that lead to answers that help students resolve any learning difficulties. in accordance with the expected completion of the tasks on the structured assignment sheet for each group.

Regarding the seating plan position, in the experimental class students sit in each group according to their level which has been determined previously based on the results of diagnostic tests as in Appendix 12. Each group according to this level consists of large groups and each large group is divided into small groups (4-5 people) to make the work of each group more effective.

Figure 1. Sitting plan for experimental class students according to level

Meanwhile, in the control class, students sat in groups according to their seat mates (consisting of two people) like the learning groups that researchers often or commonly carry out as teachers in previous lessons.

Figure 2. Seating plan for control class students

The pre-test and post-test results for both the experimental class and the control class are detailed in Appendix 15, and the final results can be seen in Table 12 below:

Table 3. Pre-Test and Post-Test Data for Experimental and Control Classes

No.	Calculation Results	Experimental Class		Control Class	
		Pre-Test	Post-Test	Pre-Test	Post-Test
1	Average value	28,89	70,07	29,34	56,89
2	Maximum value	100	100	100	100
3	Minimum value	0	0	0	0

The average score increase was 12.35 (value 41.17). Meanwhile, in the control class which was given conventional learning (learning with a scientific approach through giving unstructured assignments), the results showed an increase in the average score to 17.07 (value 56.90). This means an increase in the average score of 8.27 (value 27.57). In the experimental class the increase in the average score was higher than the increase in the average score in the control class. Meanwhile, the Minimum Completeness Criteria (KKM) for the school where the research was conducted, namely SMP Negeri 4 Burdendem, in class VII mathematics is 70.00 (seventy point zero zero). So the post-test results in the experimental class, which were 70.07, already met the school's KKM target. Meanwhile, in the control class, the post-test result of 56.89 did not meet the school's KKM target.

Research Discussion

The results of testing hypothesis 1 (regarding student learning achievement), it was concluded that Ho was accepted, meaning that the differentiated learning strategy through giving structured assignments on algebraic operations material was not effective in terms of student learning achievement. That the average post-test score for the experimental class was 70.07, more than the school's KKM score of 70.00 (on a scale of 100). However, the results of hypothesis 1 testing with the one sample t-test show that the differentiated learning strategy through giving structured assignments on algebraic operations material is not effective in terms of learning achievement.

Less relevant to the Educational Standards, Curriculum and Assessment Agency, Ministry of Education, Culture, Research and Technology of the Republic of Indonesia Edition 1 of 2023 concerning Independent Curriculum Academic Studies, which states that in the Independent Curriculum, learning must adapt to students' abilities and learning speed, so Planning and meaningful learning processes should be directed to truly meet students' learning needs which are not only diverse, but can also change, which we then call differentiated learning. This is also less relevant to the opinion of Kusuma, O.D., & Luthfah, S., (2020) who say that differentiated learning is a series of common sense decisions made by teachers that are oriented towards students' learning needs. However, in this research, researchers have not been optimal in making decisions based on knowledge and understanding, as well as scientific reasons such as strengthening process differentiation based on learning readiness and also based on students' interests and learning styles, and researchers should design differentiated learning oriented to students' learning needs with appropriate studies. more mature and comprehensive.

From testing hypothesis 2, the conclusion is that Ho is rejected, this means that the differentiated learning strategy through giving structured assignments on algebraic operations material in junior high school is effective in terms of student learning motivation. In the results of the student learning motivation questionnaire in the experimental class, the overall average (six learning meetings) of student learning motivation in the experimental class was checked using the student learning motivation category, in the experimental class the average score of overall student learning motivation (six times) was obtained. questionnaire) reached 95.70 (high category). From the average score of learning motivation in the experimental class and from the results of data analysis in testing hypothesis 2 related to student learning motivation, it can be concluded that there is effectiveness of student learning motivation in the experimental

class who were treated with differentiated learning strategies through giving structured assignments.

This is relevant to the definition of motivation to learn mathematics according to Zebua, T.G. (2020) is a driver or driving force to achieve a learning goal that occurs in learning mathematics. So mathematics teachers are expected to be creative and innovative in providing media and teaching aids that make students' learning more interesting and enjoyable, so that students' learning motivation can be optimized. Relevant to the research results (Juwana, I.D.P., & Fitriana, A., 2023) with research results that the application of differentiated learning assisted by the live worksheet application can increase students' level of mathematics learning motivation.

From the results of research on testing hypothesis 3 which has been described, there is a difference in effectiveness between differentiated learning strategies through structured assignments given in the experimental class when compared to scientific (conventional) learning approaches through giving unstructured assignments given in the control class in terms of learning achievement. students and student learning motivation. In fact, it is known that in the initial condition, students in the experimental class and control class had significantly similar cognitive abilities, namely through calculating the average score of the previous semester's report cards. Furthermore, from the further independent sample t-Test the results were that the differentiated learning strategy through giving structured assignments was better in terms of increasing student learning achievement (pretest-posttest) and more effective in terms of increasing student learning motivation (beginning-end).

In accordance with the theory according to Kompri, (2015) states that the learning process and achievement are influenced by internal factors including students' intelligence, motivation, interests, attitudes and talents. Furthermore, it is said that the learning outcomes achieved by students are influenced by one of the main factors, namely factors within the student (internal factors).

4. CONCLUSION

Based on the research results that have been explained, it shows that differentiated learning strategies through giving structured assignments on algebraic operations material are not effective in terms of student learning achievement. Differentiated learning strategies through providing structured assignments on algebraic operations material are effective in terms of student learning motivation. There is a difference in the effectiveness of differentiated learning strategies through giving structured assignments compared to the scientific learning

approach through giving unstructured assignments in terms of students' learning achievement and learning motivation simultaneously. Furthermore, through further testing, namely the independent sample t-Test on each variable, namely the differentiated learning strategy through giving structured assignments is better compared to the scientific learning approach through giving unstructured assignments in terms of student learning achievement. Differentiated learning strategies through giving structured assignments are more effective than scientific learning approaches through giving unstructured assignments in terms of student learning motivation. The differentiated learning strategy through giving structured assignments is effective compared to the scientific (conventional) learning approach through giving unstructured assignments in terms of students' learning achievement and learning motivation simultaneously.

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