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Analysis of Student Learning Difficulties on Number Pattern Material Reviewed from Student Learning Independence

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Abstract

This study aims to analyze students' learning difficulties in the number pattern material based on their level of learning independence and to look for factors that cause students to have learning difficulties. The method used in this research is descriptive qualitative. The subjects of the study were students of class VIII D, totaling 3 people, selected based on their level of learning independence. The instruments in this study were a learning independence questionnaire, interview test, and a test instrument consisting of 4 questions related to the number pattern material to analyze students' learning difficulties. The results showed that: 1) students with high learning independence did not experience learning difficulties, 2) students with learning independence were having learning difficulties in determining concepts, and relating concepts to material (principles), 3) students with low learning independence had learning difficulties. in determining concepts, linking concepts with material (principles), and converting verbal problems into mathematical language.

Keywords: Learning difficulties; Number patterns; Independent learning

INTRODUCTION

Mathematics is a universal science that underlies the development of modern technology, plays an important role in various disciplines, and advances the power of human thought. To advance the ability of human thinking power, it is necessary to have strong mathematical abilities from an early age and learning that can make students learn and make mathematics learning more meaningful. But in fact, there are still many students who think that mathematics is a difficult subject (Abdurrahman, 2012). So that learning difficulties arise in learning mathematics.

Learning difficulties are a condition where students cannot learn properly, due to threats, obstacles , or disturbances in learning (Al Fath, 2015). Learning difficulties are often associated with failure to achieve student achievement. Students who have learning difficulties will find it difficult to understand the learning material delivered by the teacher. As a result, students become lazy to learn and even avoid learning, ignore the tasks given by the teacher, and there is a decrease in learning outcomes and low learning achievement.

Basically, students' learning difficulties in mathematics are not due to students' inability to learn, but several conditions that cause students not to be ready to learn. The difficulties faced by students in general, are inactivity and the low test

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scores of students are caused by the lack of mastery of basic mathematics (Agustina & Patimah, 2019). So that students' difficulties can be seen from students' mistakes in working on questions.

In this study, indicators of learning difficulties used are indicators of learning difficulties according to Cooney ((Abdurrahman, 2012) where difficulties are categorized into 3 types, namely: a) Difficulty in learning the concept (difficulty in learning the concept of a material) ; b) Difficulty in applying principles (difficulty in applying concepts where students find it difficult to associate concepts with a material) ; c) Difficulty in solving verbal problems (difficulty in solving problems related to verbal problems or story problems).

Based on the results of interviews conducted with one of the mathematics teachers in one of the junior high schools, grade VIII students still have learning difficulties. One of the materials that many students still have difficulty with is the number pattern material. Number pattern material is one of the prerequisite materials for studying sequences and series material at the high school level. Therefore, it is very unfortunate if there are still many students who have difficulty in this number pattern material. Therefore, it is necessary to take steps in analyzing the learning difficulties experienced by students so that steps can be taken to solve the problem.

According to Syah (Syah, 2007) there are two factors that cause students to have learning difficulties, namely internal factors , and external factors. Internal factors come from within the students themselves while external factors come from outside the students. Internal factors include interest, attention, motivation , and study habits. While external factors include learning methods, learning media , and learning resources.

Based on internal factors, one way that can help students to reduce difficulties is to increase their learning independence. Many research data show that learning independence has a positive influence on learning and achievement of learning outcomes. Such as the findings from the study of Darr and Fisher (Sugandi, 2013) which shows that learning independence is highly correlated with a student's learning success. In contrast, the results of studies conducted by Schloemer and Brenan, as well as by Borkowski and Thorpe (Izzati, 2017) show that failure to independence in the learning process is the main cause of low learning achievement.

According to Haris Mujiman (Mujiman, 2011) learning independence is defined as the nature and ability of students to carry out active learning activities that are driven by the motive to master a competency. Learning independence is defined as a learning activity that takes place more driven by their own will, their own choice, and accompanied by a sense of responsibility from the learner (Rahardja & Umar Dan, 2005)

Then, based on Permendikbud No. 65 of 2013 concerning Process Standards, student independence in learning becomes an important thing. According to research by Susilo & Kharisudin (Susilo & Kharisudin, 2010), it is said that the indicators of learning independence are (1) self-confidence, (2) not relying on others, (3) willing to do it yourself, (4) being responsible, (5) always

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wants to be high achievers, (6) uses careful judgment in making judgments, making decisions, and solving problems and wants freedom, (7) always having new ideas.

Based on the problems mentioned above, the authors are interested in conducting a study to find out the difficulties of students in solving number pattern problems based on their learning independence with the title "Analysis of Student Learning Difficulties in Number Pattern Materials because of Student Learning Independence".

RESEARCH METHOD

The research method used is descriptive qualitative. The subjects of this study were students of class VIII D of SMPIT Adzkia, Sukabumi Regency, for the 2020/2021 academic year. The sampling technique used is purposive sampling and snowball sampling. The subject of this study was taken based on the results of a questionnaire regarding Student Learning Independence. The researcher took one student based on the teacher's consideration from each level of Independent Learning, then the students were given questions on the number pattern material to see the type of student learning difficulties that the researcher would analyze.

Data collection techniques used in this study are questionnaires, interview test instruments. The questionnaire given is a student learning independence questionnaire to see the level of student learning independence which is categorized into three, namely the level of high, medium, and low learning independence. The test instrument in this study consisted of 4 descriptive questions regarding the number pattern material to see the types of student learning difficulties, then classified according to the indicators of learning difficulties. Meanwhile, interviews were conducted to strengthen the analysis of students' answers on the learning difficulties test as field notes in the study.

Data analysis in this study was conducted by examining all data obtained from various sources, namely the results of questionnaires, tests, interviews, and documentation. After that, data analysis was carried out through data reduction. After being reduced, the presentation of the reduced data is made in the form of a narrative, table, or graph so that the data is organized, arranged in a relationship pattern so that it is easier to understand. The last step is to conclude from the data that has been reduced and presented so that conclusions are found regarding student learning difficulties.

RESULTS AND DISCUSSION

Learning Independence Questionnaire Results

This learning independence questionnaire was given to 20 students of class VIII D SMPIT Adzkia Sukabumi. From the results of the completed questionnaire, students are categorized into 3 levels based on their learning independence, namely high learning independence, moderate learning independence , and low learning independence. The following is a graph of the results of the student learning independence questionnaire.

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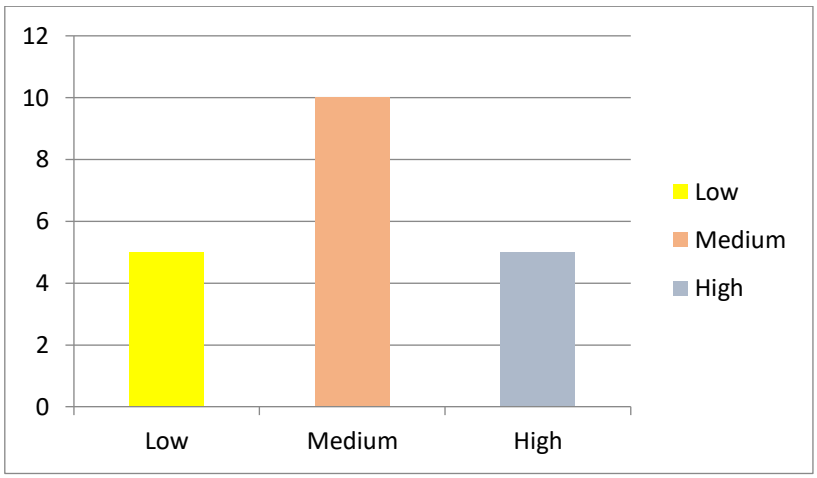

Picture 1. Student Learning Independence Questionnaire Results

Based on the results of the learning independence questionnaire, then 3 students were taken consisting of 1 student who had high learning independence, namely FH students, 1 student who had moderate learning independence, namely AG students and 1 student who had low learning independence, namely RF students. Below is a table of the final results of the learning difficulties test given to 3 students as research subjects based on their level of learning independence.

Table 1. Final Result of Learning Difficulty Test

Learning Independence Level	Subject	Learning Difficulty Indicator											
		Difficulty in learning the concept				Difficulty in applying principles				Difficulty in solving verbal problems			
		1	2	3	4	1	2	3	4	1	2	3	4
High	FH student	-	-	-	-	-	-	-	-	-	-	-	-
Medium	AG student	-	√	√	-	-	√	√	-	-	-	-	-
Low	RF students	√	√	√	√	√	√	√	√	√	√	√	√

Based on the table above, it can be seen that FH students with high learning independence do not experience learning difficulties, AG students with learning independence are having difficulty in learning a concept and applying the principles in questions number 2 and 3, while RF students with low learning independence have difficulty in learning concepts, apply principles and difficulties in solving problems related to verbal problems.

Analysis of Students' Answers for Each Item

The following is a table of learning difficulty test questions given to 3 students based on their level of learning independence.

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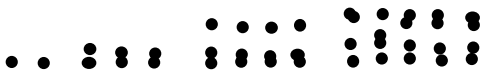
Table 2. Learning Difficulty Test Questions for Number Pattern Materials

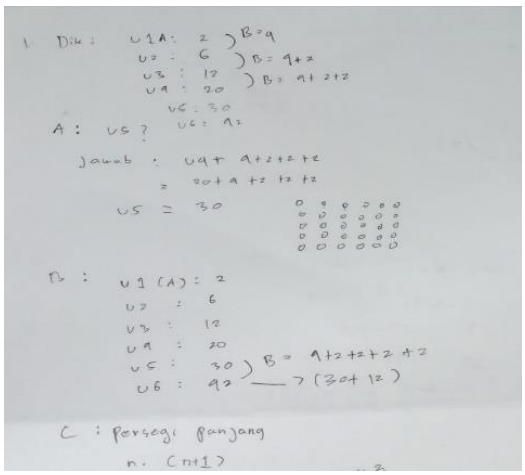
No.	Soal
1.	Andi has several marbles, he arranges them to form a pattern like the picture below!  a. Can you determine the number of marbles for the next pattern? Try to draw! b. Write down the number of marbles in each pattern and determine the 6th term of the above pattern! c. Does the picture above form a certain pattern? Mention the type of pattern!
2.	In every 20 minutes, the amoeba divides into two. At first, there are 30 amoebae, if for 3 hours then how many amoebae?
3.	It is known that the 5th term of the geometric sequence is 243, the quotient of the 9th term by the 6th term is 27. Find the 2nd term of the sequence!
4.	Every week Ahmad keeps money in a drawer. In the first week, Ahmad saved Rp. 500.00, second week Rp. 700.00, third week Rp. 900.00, fourth week Rp. 1,100,000, and so on every week. How much money did Ahmad save after 36 weeks? (explain in detail)

FH (High Learning Independence) students

Based on the overall work on the questions and the results of interviews, FH students with high learning independence did not experience difficulties in this number pattern material. Factors that affect FH students have high learning independence and have no difficulty learning on this number pattern material, FH students have a daily study schedule not only relying on study hours at school, have supporting facilities for learning such as stationery, textbooks, and the like, when having school assignments, FH students always try to do it themselves and when they have a little difficulty, they will ask the math teacher.

The following are the results of FH students' answers with high learning independence.

Analysis of Answers Number 1 Students With Code FH



Picture 2. Answer Number 1 Students With Code FH

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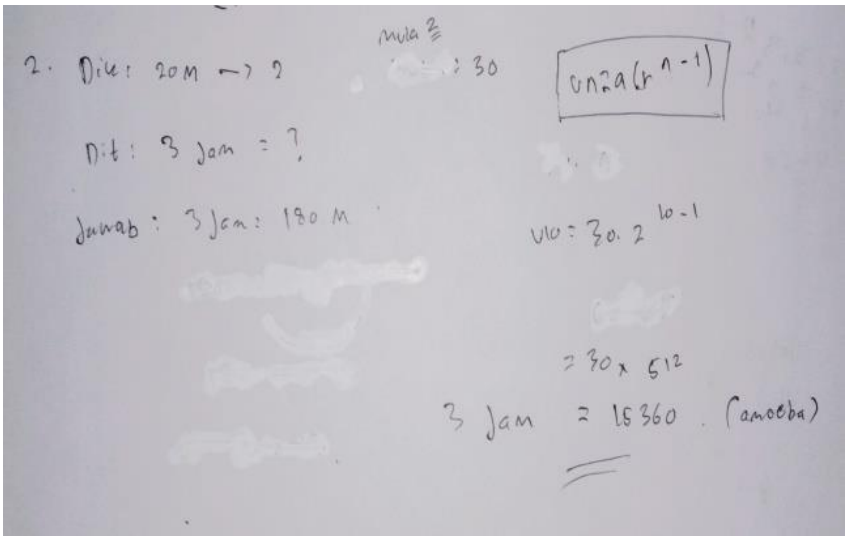
Based on the results of student answers and interviews that have been conducted, FH students with high learning independence can answer question number 1 correctly, even though in their Own way without using the proper formula. He can understand the concept of question number 1, it can be seen from the answers displayed by FH students who can determine the 1st term is 2, the 2nd term is 6 , and so on according to the pattern shown in the question. Can relate a concept to the material, as can be seen from the results of FH students' answers at points 1b and 1c. Can determine the 6th term of the displayed pattern, and can determine the type of pattern displayed, and be able to change verbal problems into mathematical language. This can be seen from the work of FH students displaying mathematical symbols such as U1 is the 1st term, U2 is the 2nd term , and so on. So it can be said that FH students have no difficulty in answering question number 1.

Analysis of Answers Number 2 Students With Code FH



Picture 3. Answer Number 2 Students With Code FH

FH students with high learning independence can answer question number 2 correctly and according to the question request. He understands the concept that is bythe question request, it can be seen from the answers displayed by FH students writing down what is asked in the problem, namely looking for U10, so that he can relate it to what formula should be used, namely using the formula for the nth term of a geometric series. So it can be said that FH students can relate a concept to the material and can change verbal questions into mathematical language. It can be seen from how FH students display what they know from the questions and calculations that are displayed according to the results requested in the questions. Based on the work on the questions, FH students can be said to have no difficulty in working on question number 2.

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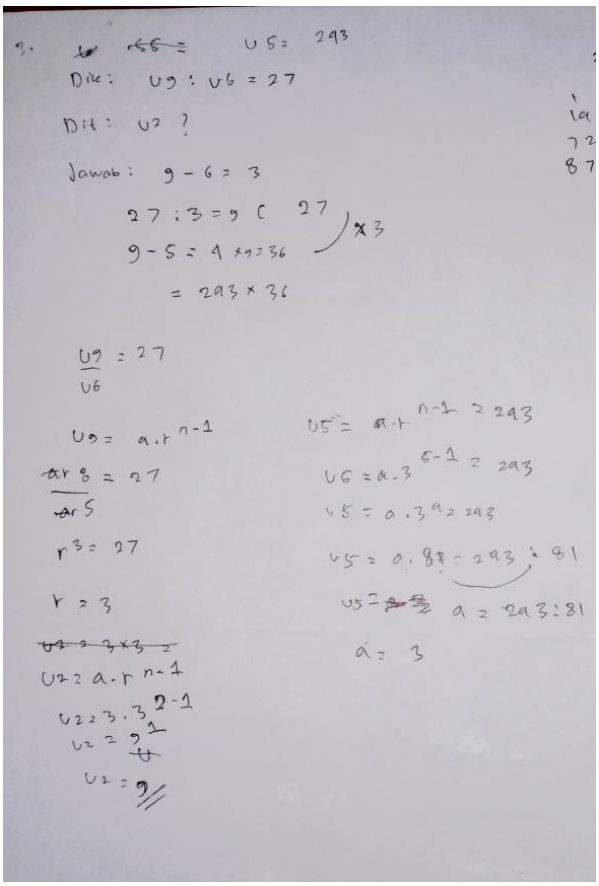
Analysis of Answers Number 3 Students With Code FH



Picture 4. Answer Number 3 Students With Code FH

independence were able to answer question number 3 correctly according to the question request. He understands the demand for the questions displayed, FH students can understand the concept of question number 3. Seen from the answers displayed, FH students can determine the question request, namely looking for the 2nd term by first finding the ratio of each term from the 6th term. and the 9th term that is known in the problem and looks for the 1st term of the information displayed on the question, namely U5 = 243. Can relate the concept to the material (principle) in this problem, it can be seen from the students' work in determining the 2nd term, using formulas that are by the request for questions and can change verbal questions into mathematical language. This can be seen from how FH students determine what things are known in the questions, question requests , and calculations that are displayed according to the desired results in the questions. So it can be said that FH students have no difficulty in working on question number 3.

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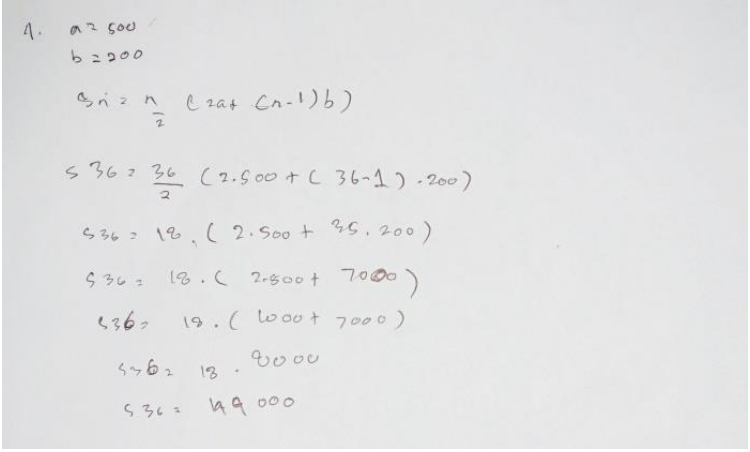
Analysis of Answers Number 4 Students With Code FH



Picture 5. Answer Number 4 Students With Code FH

The results of FH students' answers with high learning Based on the work on questions and interviews, FH students were able to answer the questions correctly. He understands the concept according to the question request. This can be seen from the answers of FH students who can determine the difference and the first term of the questions displayed, namely 200 and 500, can relate a concept to the material in the question. It can be seen from the formula used by the request for questions and can change verbal questions into mathematical language. This is indicated by the answers written by FH students displaying what is known in the problem and performing calculations with the Sn formula correctly according to the desired answer to the question. So, it can be said that FH students have no difficulty in working on question number 4.

AG Students (Medium Learning Independence)

Based on the results of the questions and interviews, AG students with moderate learning independence still have difficulty in determining concepts and linking concepts into a material (principle), but when given verbal questions, they can convert them into mathematical language. Factors affecting AG students still have difficulty, because they easily forget the material that has been taught and do not repeat it at home. Does not have a special time to study every day outside of school hours, if there is a test he only studies the night before the test takes place. When having school assignments, especially math subjects, parents are usually assisted at home when experiencing difficulties. The atmosphere at home is sometimes not conducive to learning and the internet network is often disrupted.

The following are the results of the answers of AG students with moderate learning independence.

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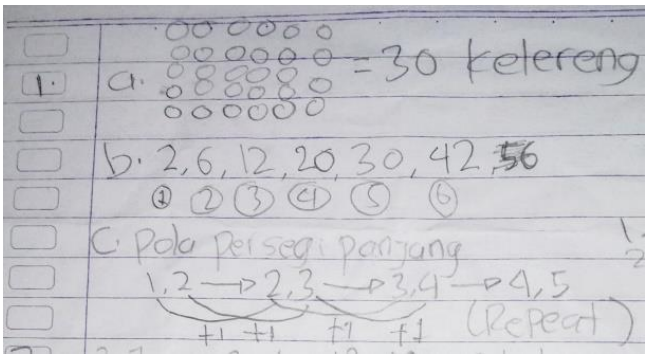
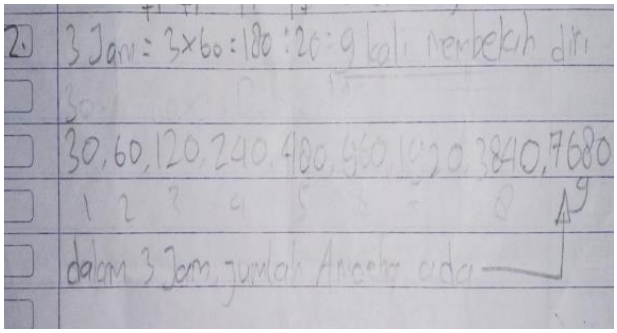
Analysis of Answers Number 1 Students With Code AG



Picture 6. Answer Number 1 Students With Code AG

Based on the results of working on question number 1 and interviews, AG students with learning independence are understanding the meaning of the questions given, so it can be said that AG students understand the concept of this question. It can be seen from the answers shown that AG students can determine the 1st term, 2nd term , and so on, when linking concepts with material (principles) AG students can determine the 6th term using their Own way. AG students can change verbal questions into mathematical language, this can be seen from the answers displayed, AG students can determine the 1st to 4th terms of the displayed pattern and AG students can calculate correctly in determining the 5th and 6th terms of the request. question. So it can be said that AG students have no difficulty in working on question number 1.

Analysis of Answers Number 2 Students With Code AG



Picture 7. Answer Number 2 Students With Code AG

AG students in answering question number 2 cannot answer correctly. He had difficulty in understanding the concept, this could be seen from the answers given were not by the required work steps. In linking the concept to the material, AG students had difficulty because the answers given were not appropriate and during the interview, they felt confused. But he can change verbal questions into mathematical language, as can be seen from the answers displayed by AG students writing down what is known in the questions. Thus, it can be said that AG students have difficulty understanding concepts and linking concepts to material (principles).

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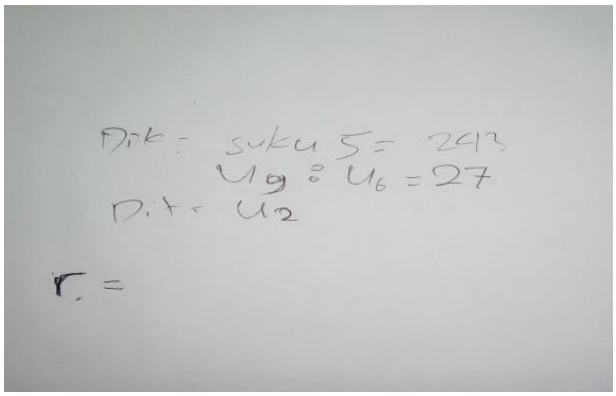
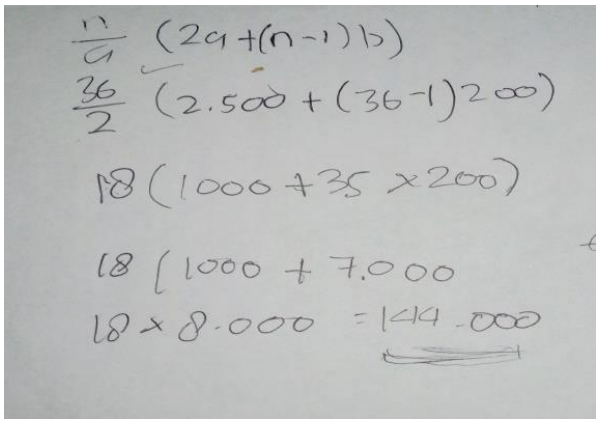
Analysis of Answers Number 3 Students With Code AG



Picture 8. Answer Number 3 Students With Code AG

AG students in answering question number 3, cannot answer correctly. AG students do not understand the demands of the questions, so they have difficulty in determining concepts and relating them to the material (principles). This can be seen from the answers displayed by AG students only writing down what is known in the problem, but to change verbal questions into mathematical language, AG students can already do it. It can be seen from the answers displayed, AG students write what they know in the questions. So it can be said that AG students have difficulty understanding the concept and linking the concept to the material in the problem.

Analysis of Answers Number 4 Students With Code AG



Picture 9. Answer Number 4 Students With Code AG

AG students in answering question number 4 are by what is asked in the question. It's just that during the interview he felt confused about doing it even though the answers given were correct. So it can be said that AG students have learning difficulties.

RF Students (Low Learning Independence)

Based on the results of RF students' answers and interviews that have been conducted, RF students with low learning independence still have learning difficulties. He finds it difficult to define concepts, relates concepts to the material

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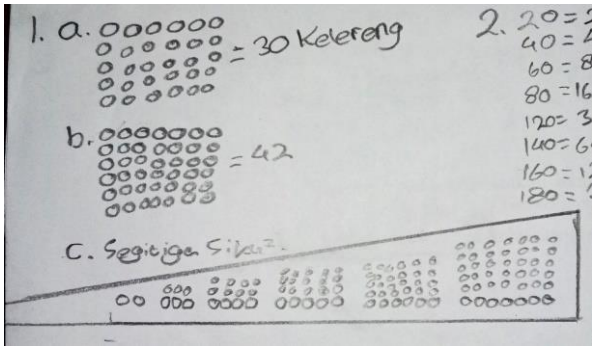
that should be used, and find it difficult to convert verbal problems into mathematical language. Factors that cause RF students to have learning difficulties, when the teacher discusses the number pattern material, RF students cannot follow the lesson because of illness or other obstacles so that they do not understand this material. RF students do not have a special time to study every day outside of school hours, when they are going to test they only study at night before the test takes place, RF students experience internet network problems during learning.

The following are the results of RF students' answers with low learning independence.

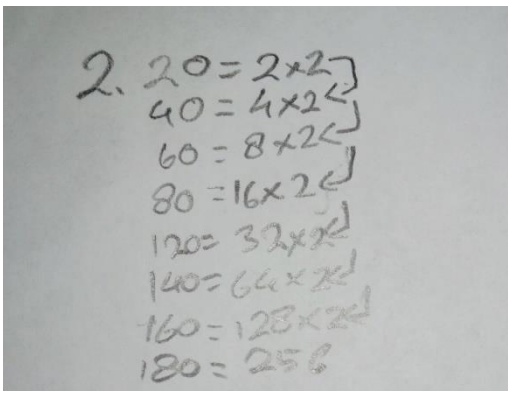
Analysis of Answers Number 1 Students With Code RF



Picture 10. Answer Number 1 Students With Code RF

RF students with low learning independence can understand the request for question number 1, but the answers given are less precise for answers 1b and 1c. Question 1a answers are by the question request. Answer 1b is not complete because the request from the question mentions the 1st to 4th terms. After that, they were asked to determine the 6th term without being asked to describe the pattern. Answer 1c is not correct because the pattern presented in the problem is a rectangular pattern. So that the answer to question number 1 can prove that RF students still have difficulty in determining concepts, linking concepts with material (principles) , and changing verbal questions into mathematical language.

Analysis of Answers Number 2 Students With Code RF



Picture 11. Answer Number 2 Students With Code RF

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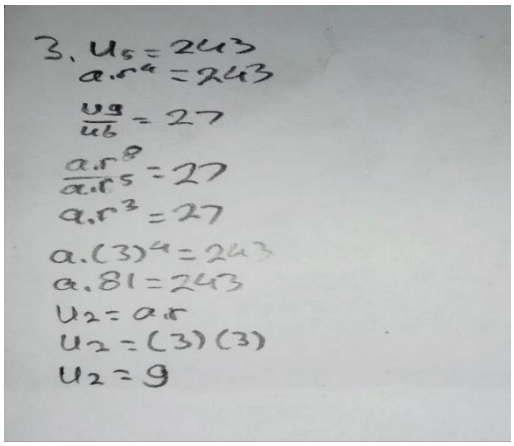
RF students were less precise in answering question number 2. When the interview was conducted, RF students had not been able to determine concepts and relate concepts to the material (principles) on this question and had not been able to change verbal questions into mathematical language. So the answer given is not by the question request

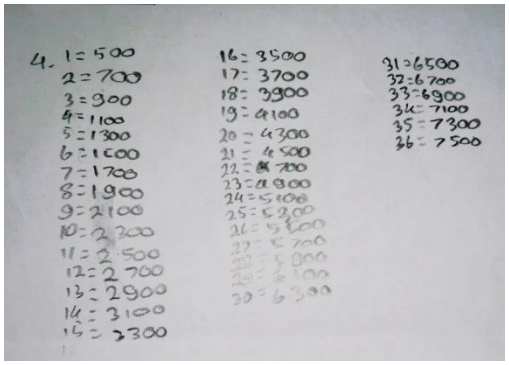
Analysis of Answers Number 3 Students With Code RF



Picture 12. Answer Number 3 Students With Code RF

RF students in answering question number 3 are bythe question request. It's just that, during the interview, he worked on question number 3 with the help of other people. Because he did not understand the request of the question. It can be said that RF students still have difficulty understanding concepts, linking concepts with material (principles) , and converting verbal questions into mathematical language.

Analysis of Answers Number 4 Students With Code RF



Picture 13. Answer Number 4 Students With Code RF

RF students answered question number 4 using manual calculations. Because during the interview he felt confused about the formula that should be used. The answer given to question number 4 is still not quite right. RF students have difficulty answering question number 4, he is difficult to understand the concept for question number 4, relates concepts to material (principles) , and has not been able to change verbal questions into mathematical language. So it can be said that RF students have difficulty in working on question number 4.

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After doing research, it can be seen if learning independence affects whether students have learning difficulties or not. This is in line with research conducted by Schloemer and Brenan, as well as by Borkowski and Thrope (Izzati, 2017) that failure to independence in the learning process is the main cause of low learning achievement.

CONCLUSION

FH students with high learning independence have no difficulty in answering the questions given. AG students with moderate learning independence still have difficulty in determining concepts, and linking concepts to the material (principles) in questions number 2 and 3. RF students with low learning independence have difficulty answering the questions given, RF students have difficulty determining concepts, linking concepts with material (principles) , and converting verbal problems into mathematical language.

REFERENCES

Abdurrahman, M. (2012). Anak Berkesulitan Belajar. *Jakarta: Rineka Cipta*.

Agustina, S., & Patimah, S. (2019). Analisis Hasil Belajar Matematika Siswa Kelas VIII pada Materi Pola Bilangan di Kota Cimahi. *UNION: Jurnal Ilmiah Pendidikan Matematika*, *7*(2), 201–208.

Al Fath, A. M. (2015). Pengaruh Motivasi, Lingkungan, dan Disiplin Terhadap Prestasi Belajar Siswa pada Mata Pelajaran IPA Kelas V SDN 19 Banda Aceh. *Visipena*, *6*(1), 1–11.

Izzati, N. (2017). Penerapan PMR Pada Pembelajaran Matematika Untuk Meningkatkan Kemandirian Belajar Siswa SMP. *Jurnal Kiprah*, *5*(2), 30–49.

Mujiman, H. (2011). Manajemen Pelatihan Berbasis Belajar Mandiri. *Yogyakarta: Pustaka Pelajar*.

Rahardja, T., & Umar Dan, S. L. (2005). La Sulo, Pengantar Pendidikan, Jakarta: PT. *Rineka Cipta*, *2*(3), 24–45.

Sugandi, A. I. (2013). Pengaruh Pembelajaran Berbasis Masalah dengan Setting Kooperatif Jigsaw Terhadap Kemandirian Belajar Siswa SMA. *Infinity Journal*, *2*(2), 144–155.

Susilo, B. E., & Kharisudin, I. (2010). IMPROVING THE AUTODIDACT LEARNING OF STUDENT ON KALKULUS THROUGH COOPERATIVE LEARNING "STUDENT TEAMS ACHIEVEMENT DIVISION" BY PORTFOLIO PROGRAMMED. *Jurnal Penelitian Pendidikan*, *27*(1).

Syah, M. (2007). *Psikologi Belajar. Jakarta*. Rajawali Press.