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Analysis of Learning Difficulties in Multiplication and Division Operations with Porogapit in Fourth Grade Primary School Students

Ulfa Afifah Nurfauzi[1*], Wahyudin[2]

[1,2]Sekolah Pascasarjana, Universitas Pendidikan Indonesia, Bandung, Indonesia

*ulfafifah.nf@gmail.com

Abstract. This study aims to identify the learning difficulties of multiplication and division operations with porogapit experienced by fourth-grade students. This research used a qualitative approach with an exploratory descriptive method with 5 students as participants The instruments used were diagnostic tests and interview guidelines. Data collection was done through observation, interview and documentation techniques. The data were then analyzed through reduction, presentation, and inference. The results showed that overall the students understood the concept of stacked multiplication. Only a few minor errors and a lack of accuracy in working on problems were found. However, it is still seen that almost all the students have difficulties in stacked division, this is because the students do not understand the concept of division, are weak in remembering multiplication, and tend to rush and lack concentration when solving problems. Therefore, teachers should make sure that students understand the prerequisites of the division operation, and provide lots of practice, different teaching methods to help students understand the concept of division, and fun learning to arouse students' interest in learning mathematics. Consistency and thoroughness in providing guidance and support are also essential to overcome students' difficulties in solving division. With proper guidance and support, it is hoped that students can overcome these difficulties and perform well in mathematics.

Keywords: Learning difficulties, multiplication, division, porogapit, elementary school

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INTRODUCTION

Education is one of the most important strategies to develop and prepare quality human resources to face and adapt to the continuous changes of the times. 21st-century skills are being demanded in the world of education, a very important content to be taught to achieve 21st-century skills is learning mathematics (Amaliyah et al., 2022). Mathematics is one of the subjects studied from primary school to university level. The importance of mastering mathematics in everyday life has a positive impact on improving students' ability to understand and assimilate subject matter more efficiently. In addition, mastery of mathematics plays a role in developing students' ability to think rationally, critically, logically, analytically, and systematically (Waskitoningtyas, 2016).

Cockroft in (Yuliana et al., 2020) states that mathematics is a very important subject to be taught to students for the following reasons: (1) Mathematics is often used in every aspect of life. (3) Mathematics is a strong, concise, and clear means of communication (4) Mathematics can be used as a tool to present information in different ways (5) Mathematics trains logical thinking, accuracy, and spatial awareness (6) Solving complex mathematical problems can be satisfying in itself.

The purpose of mathematics education according to the Ministry of Education and Culture, as stated in Law No. 20 of 2003 Article 3 on the National Education System, is for students to understand mathematical concepts, explain the relationship between concepts, and apply

concepts or algorithms flexibly, accurately, efficiently, and precisely in problem-solving (Permendikbud, 2013). The reality is that mathematics is seen as a subject that is difficult for students to understand, which is also supported by the number of students who do not enjoy learning it (Heryanto et al., 2022). This can be seen from the results of the Trends in International Mathematics and Science Study (TIMMS) 2016, where Indonesia scored 395 out of an average score of 500. The highest score was achieved by Singapore with a score of 618 (50% higher than Indonesia) (Han et al., 2017). Based on these data, Indonesia's performance is included in the low category, which is due to the difficulties experienced by students in learning mathematics. The difficulties experienced by students have an impact on low mathematics learning outcomes.

There are many differences in learning, each student has a different learning speed, so some students can understand lessons faster than others. This causes learning difficulties that arise during the learning process. Therefore, teachers have to adapt their learning strategies according to the needs of each student (Amelia & Mustika, 2022). Learning difficulties or disabilities are obstacles or disabilities experienced by students in the learning process that make it difficult to achieve learning goals and hinder learning progress (Urbayatun et al., 2019).

Learning difficulties are a real condition faced by students from primary to higher education. According to Blassic and Jones, learning difficulties can occur when expected academic abilities do not match actual abilities. Students with learning difficulties have normal intelligence but have deficits in learning, such as thinking, remembering, focusing attention or motor functions (Mabruria, 2023). The learning difficulties that students often face in schools are an important issue that requires serious attention from teachers (Fariana et al., 2022). This is because students' learning difficulties in school have a negative impact on both the students themselves and those around them. This occurs through fear, frustration, school strikes, dropping out of school, and wanting to change schools because they are embarrassed to stay in class more than once (Mulyadi, 2018).

Dalam In terms of learning difficulties at school, many people think that the biggest learning difficulty for students is in mathematics (Saraseila et al., 2020). They already have a conscious assumption that learning mathematics is difficult. So when children experience difficulties in learning mathematic it is seen as normal. Maths is seen as a scary subject for children. Maths is considered a difficult science to understand, not only for primary school children but also for university students, because of its abstract nature (Mutahharah et al., 2022) . However, when examined further, children's learning difficulties are an issue that needs to be addressed early as this can affect them in their later academic careers (Andri et al., 2020).

Basic numeracy skills that students need to master Pupils need to have basic skills in arithmetic operations such as addition, subtraction, multiplication and division. Mastery of division should follow mastery of addition, subtraction and multiplication. Multiplication skills should be mastered after students understand the concepts of addition and subtraction (Heryanto et al., 2022). Skills in multiplication operations are closely related to skills in addition and division. A student who cannot add will not be able to multiply, and a student who cannot multiply will not be able to divide. It is a fact that some students in fourth and fifth grades do not master the basic concepts of addition and subtraction, and in middle and upper grades some students do not master the concepts of multiplication and division.

The mathematical topics taught in Grade 4 start with fractions, therefore students need to master the basic skills of multiplication and division using porogapit, which is often referred to as the method of division in the arithmetic operation of division. In the context of mathematics, porogapit is explained as a method of dividing numbers using a line (Abdurrahman, 2009). Several aspects need to be considered when using the porogapit method, such as the division process, the number being processed, and the result of the division.

Based on the results of the interviews conducted on 24 September 2024 with teachers at SDN 3 Pagerwangi Lembang, it is found that the mathematics learning process so far has been quite difficult, especially in the higher grades, because students still have difficulty in understanding the concepts of multiplication and division and completing the arithmetic operations of multiplication and division, while the mathematics material in the higher grades is becoming increasingly difficult and requires an understanding of the basic concepts of multiplication and division.

There are several studies on mathematics learning difficulties, including a study (Ayu et al., 2021) that analysed mathematics learning difficulties and the factors that cause them that occur in fourth grade primary school students. The results showed that students had difficulties in understanding concepts in fractions, difficulties in counting skills in multiplication and division materials, and difficulties in solving problems in the form of story problems. Then, the factors that cause difficulties in learning mathematics consist of internal factors and external factors. In addition, research conducted by (Amaliyah et al., 2022). Research that aims to analyse the difficulties of 4th grade students in answering geometry questions. The results of the analysis show that there are difficulties faced by students in answering geometry problems, these difficulties include (1) students have difficulty in using concepts, (2) students have difficulty in using principles, and (3) students have difficulty in solving verbal problems.

Based on the above explanation of the background of the problem, the purpose of this study is to identify the learning difficulties of multiplication and division operations among fourth

grade students. This research is important because it can be used as a basis for knowing what difficulties students face in performing the arithmetic operation of stacked division, so that further solutions can be found to overcome these problems. As well as improving and enhancing the quality of learning the arithmetic operation of stacked division.

METHODOLOGY

This is qualitative research. Qualitative research methods are often called naturalistic research methods because the research is conducted in natural conditions (natural settings). Qualitative research methods are an approach or search for understanding the central symptom, where researchers interview research participants or participants by asking general and rather broad questions.

The information provided by the participants is then collected (Sugiyono, 2017). The information is usually in the form of words or text and is then analysed. The results of the analysis may be in the form of representations or descriptions, or in the form of themes.

This research uses an explorative descriptive method through written tests, interviews and field notes. According to (Arikunto, 2013), exploratory research is research that aims to explore broadly and deeply the causes or things that influence the occurrence of something.

The subjects of this study were fourth grade of West Bandung Regency, 18 people. The number of students who became subjects was 5. The method of selecting the subjects was based on the level of mathematics ability of the students with the consideration of the fourth-grade teacher. The subjects selected were students who had a high ranking in the class. The instruments used in this study were diagnostic tests and interview guidelines. The data collection techniques used consisted of three parts, namely observation, interviews, and documentation. Observation was carried out directly on the learning process and recorded things related to the object of study. After the observation, the researcher gave the stacked division questions to the students and conducted interviews about the students' answers to the questions to find out the learning difficulties experienced. Furthermore, documentation was used to obtain the data needed in the study, such as documentation of students' answers and others. The data analysis used in the research is data reduction, data presentation and drawing conclusions.

Data collection was carried out as follows (1) students were asked to answer descriptive test questions about multiplication and division in the form of scribbles within 25 minutes individually, (2) students' work in the form of scribbles became supporting data for written test results, (3) researchers took some answers from students who had difficulties for interviews. Data analysis in this study was carried out in two stages. (1) identification and classification of

students' errors in answering multiplication and division problems, (2) further analysis of the types of students' errors.

RESULTS AND DISCUSSION

During the observation at the researchers gave 6 mathematics problems consisting of 3 multiplication problems and 3 division problems. The results found were that 2 out of 5 students did the multiplication tables correctly and the other 3 were still struggling. As for division, 1 student filled in the correct answer but the method used still needed to be improved. Meanwhile, the other 4 students were still struggling.

Division and multiplication of tens and hundreds started to be taught in third class. However, it was found that students in Grade 4 were still struggling with multiplication and division. While mathematics in fourth grade requires basic knowledge of multiplication and division. Usually, teachers continue with the material according to the curriculum and syllabus without paying attention to students' basic knowledge or understanding of mathematical concepts.

Use the stacking method to answer the following questions!

1. 123 x 3 =
2. 547 x 35 =
3. 1375 x 134 =
4. 45 : 3 =
5. 552 : 6 =
6. 272 : 16 =

Figure 1 Multiplication and Division Operation Problems

1. GSL subject's mathematics learning difficulties in stacked multiplication and division operations

The following is the answer sheet done by subject GSL

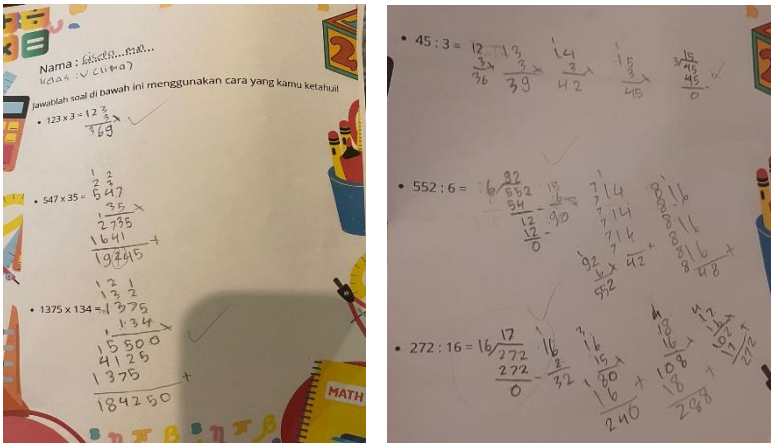

Figure 2. GSL Answer sheet

When GSL worked on multiplication problems, it was seen that GSL understood the method of stacked multiplication well. It can be seen from the way of answering and the correct answer except no 2, GSL looks less careful. However, when GSL worked on the division test, it was seen that GSL was confused about solving the problem. When solving the first number problem, 43 ÷ 3 = ⋯ GSL solved it in a way like stacked multiplication, seeing the answer number one to number 3, GSL tried to guess by multiplying one by one. The researcher then explained that this should be done according to the instructions in the question. The researcher observed that GSL did not seem to know how to solve the steps of stacked division. GSL worked on numbers 2 and 3 in the same way. When checked by the researcher, all of GSL's answers were correct, but she did not use her understanding of stacked division.

R : Where did you get the answer 15?

GSL : From 3 multiplied by 15.

R : Why did you try to multiply 3 by all the numbers?

GSL : Yes, that's what I usually do.

R : What if the numbers are thousands or tens of thousands? You try all the numbers and you run out of your book, son.

GSL : I forgot how to divide it again, teacher.

2. AZN subject's mathematics learning difficulties in stacked multiplication and division operations

The following is the answer sheet done by subject AZN

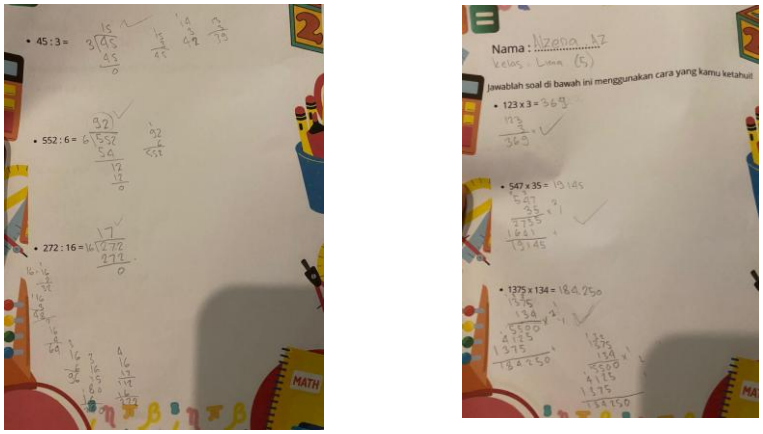

Figure 3. AZN Answer Sheet

When AZN worked on multiplication problems, it was seen that AZN understood the method of stacked multiplication well. It can be seen from the way of answering and the correct answers entirely. However, similar to GSL, AZN worked on the division test in a way like stacked multiplication, trying and guessing several numbers. visible answers number one to number three, AZN tried to guess by multiplying one by one. Researchers observed that AZN did not seem to know how to solve the steps of stacked division problems. After being checked by the researcher all of AZN's answers were correct but did not use an understanding of stacked division.

R : Why is this multiplication?

AZN : Because division is multiplication reversed.

R : So you always do division reversed into multiplication?

AZN : Yes, that's usually the way I do it.

R : What if the numbers are thousands or tens of thousands?

AZN : Try one number first

3. ARP subject's mathematics learning difficulties in stacked multiplication and division operations

The following is the answer sheet done by subject ARP

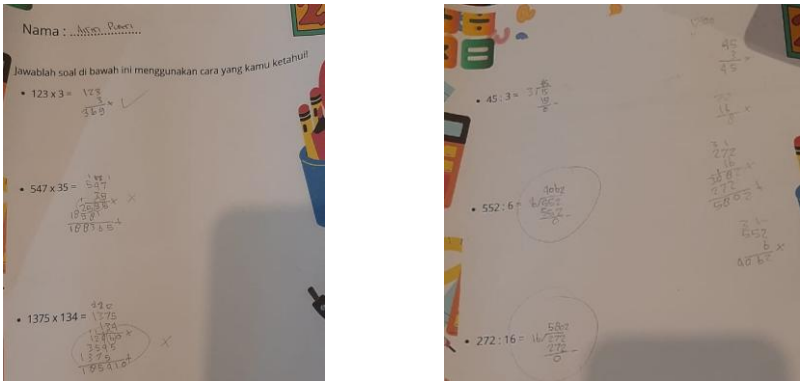

Figure 4. ARP Answer Sheet

When ARP subject was given a diagnostic test, it was seen that ARP was confused about solving the problem. When solving multiplication problems, it appears that ARP knows how to work with multiplication, it can be seen from the writing of ARP's answers no 1, 2, and 3 that ARP knows how to even the location of the numbers in multiplication. No 1 ARP's answer is correct and there are no obstacles; because the multiplication of hundreds with units, so it is easier and there are no numbers that must be stored. But in No 2 ARP seemed to have difficulty with the technique of storing numbers. He did not add up the multiplication results with the previously stored numbers, so the answer was not correct. Likewise, with question no 3 ARP had the same difficulty.

Furthermore, for the problem of stacked division, it seems that ARP is very confused, ARP does not understand how to divide by stacking. See problem number 1, namely 45 ÷ 3 = ⋯. ARP mistakenly wrote the number on the porogapit. Yes, he wrote 45 in the answer space. ARP also got the number 15 by asking a friend next to him, because how to get 15 ARP did not write it down. The researcher also asked him to solve it according to his understanding without help, explaining that it should be done according to the instructions of the problem. The researchers observed that the ARP subject did not seem to know at all how to solve the steps of stacked division problems.

It can be seen that when ARP worked on numbers 2 and 3, ARP had difficulty working so he gave up and wrote numbers randomly. ARP did not really seem to understand the computational operation of stacked division, judging from the completed answer sheet. As the time was almost up and the ARP subject was just looking at the question with confusion, the researcher asked the ARP subject to collect his answer sheet.

R : Why don't you work out the number 3 first?

ARP : I don't know how to do it, Mum.

R : Do you know your times tables by heart, up to how many times?

ARP : Yes, mum, up to 10, but I haven't really learned them by heart.

R : If you know your times tables by heart, why didn't you answer the question?

ARP : I don't know how to do it, Mum, it's hard to remember the steps.

4. NRC subject's mathematics learning difficulties in stacked multiplication and division operations

The following is the answer sheet done by subject NRC

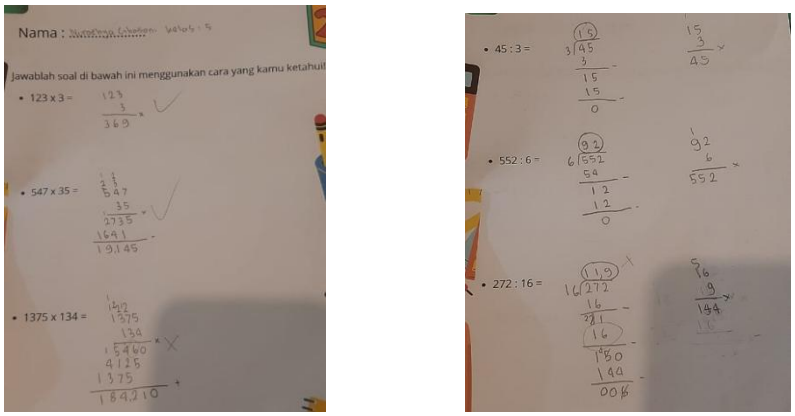

Figure 5. NRC Answer Sheet

When the NRC subject works on multiplication problems, it appears that NRC understands and understands how to work on stacked multiplication well and correctly. Seen from the answers and how to work on number 1 to number 3, the method used by NRC is correct. However, in working on number 3, NRC was less careful so that when multiplying 1375x4 and 1375x3 the answer was not correct. So that the final answer was wrong.

When NRC did the division problem, she looked so calm and ambitious in solving the problem. First NRC immediately worked on problem number one, namely 45 ÷3 = ⋯, the answer obtained was correct, namely 15 with the right steps. NRC also included the result of stacked multiplication 15 x 3 = 45 to ensure the answer she wrote was correct. Next, NRC moved on to number two, 552 ÷ 6 = ⋯. Again, NRC answered correctly. However, when working on number three, NRC made a mistake when subtracting 27 and 16 which should have been 11, NRC wrote 21. If seen initially NRC wrote 11 but she replaced it with 21 so that the subtraction result was wrong and the final answer was wrong.

R : Why is the answer to number one 15?

NRC : Because that's the correct answer Mum.

R : Are you sure?

NRC : Yes, mum.

R : Why is there stacked multiplication here?

NRC : To make sure mum, my answer is correct or not

R : Number 3, why is 11 changed to 21?

NRC : Because 11 can't be reduced by 16, mum

R : Then where did you get 21 from? Why didn't you reduce 9 directly to 112: 16 ?

NRC : Oh yes mum, I forgot how to do it earlier.

5. VN subject's mathematics learning difficulties in stacked multiplication and division operations

The following is the answer sheet done by daVN

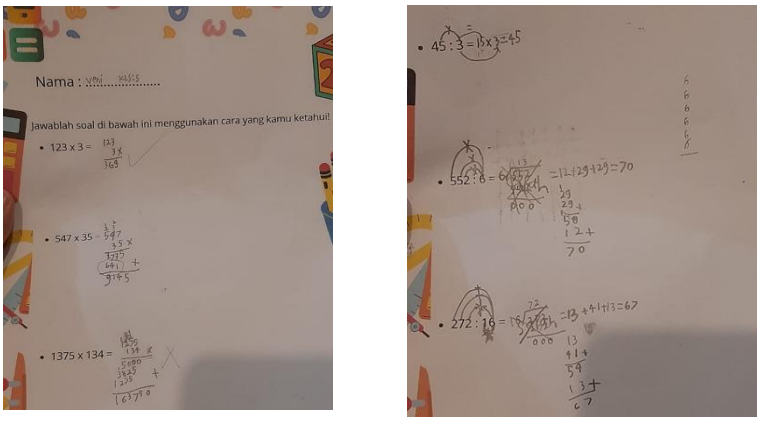

Figure 6. VN Answer Sheet

When the subject VN was given a diagnostic test of multiplication and division in stages, at the beginning of working on VN seemed eager to work. It appears that VN knows and understands how to do multiplication well.

PL: How is the question difficult or easy VN?

VN: Easy mum, this has been taught in grade three.

However, when finished working and the researcher checked VN's answers, there were mistakes in numbers 2 and 3. In question number 2 VN was wrong in multiplying 547 x 3 which should be 1641. VN wrote 641. But when viewed from the way of working, VN is only less careful in working. However, for work number 3 there were many mistakes made by VN in serial multiplication so that the answer to each multiplication and the final answer was wrong.

Furthermore, when VN worked on division problems. VN looked confused in solving the problem. Seen in problem number 1, namely, 45 ÷ 3 = ⋯. VN did not solve the division by using stacked division. VN changed the division into multiplication 45 : 3 = 15 x 3. The researcher observed that VN did not seem

to know at all how to solve the steps of stacked division. It was seen that VN tried various ways in numbers 2 and 3 but did not find the right answer. VN tried to multiply and add the numbers seen without using the concepts of multiplication and division. VN seemed to really not understand the calculation operation of stacked division, as seen from the answer sheet that was completed. Because the time was almost over and VN was just looking at the question with confusion, the researcher asked VN subject to collect his answer sheet.

R : How do you know the division method?

VN : I think division can use multiplication method, so I multiply the numbers.

R : Do you know multiplication by heart, up to what multiplication?

VN : Yes, up to 10 but I haven't really memorised it.

R: Why are no 2 and 3 addition?

VN : I don't know how to do it, it's hard to remember the steps.

Based on the results of the diagnostic tests and interviews conducted on the GSL subject, there are similarities with the AZN subject. Subjects GSL and AZN already understand the concept of multiplication in series, but GSL is still a little less careful while AZN is very careful in working on multiplication in series, so that no errors are found. Similarities also occur in the completion of stacked division sosl GSL and AZN do not understand well the concepts in solving stacked division operations even though GSL and AZN really understand how to multiply stacked and find all the right answers. GSL and AZN took a long time because they tried all the numbers to multiply and find the right answer. GSL and AZN understood that they had to find a number that could be multiplied by the number in the problem and the result was the number to be divided. and GSL had a hasty attitude which caused a lack of accuracy in working on the problem.

This shows that GSL and AZN subjects need an understanding of the concept of stacked division and various exercises to improve their ability to solve stacked division problems quickly and accurately, In dealing with more complex division problems, subjects also need to understand how the concept of stacked division works and how the right steps to (Amelia & Mustika, 2022). In addition, it is also necessary to emphasize to solve problems carefully and not to rush in answering.

As for the diagnostic tests and interviews of ARP and VN subjects, there are some similarities, it can be seen that ARP and VN subjects already understand the concept of stacked multiplication, but they still have difficulty in saving techniques and still don't really memorize multiplication, which should be mastered as a basis for solving division problems. For division problems, ARP and VN do not understand the concepts in solving the operation of stacked division and it can be seen from the three problems given that only one problem was solved and even then the way of working was not correct. This shows

that ARP and VN subjects need more practice and understanding of basic multiplication concepts before they can solve the stacked division problem independently.

This shows that ARP and VN subjects need more practice and understanding of basic concepts in stacked division before they can independently solve stacked division problems. This is in line with the opinion (Maghfiroh et al., 2021) that most students experience learning difficulties because they cannot understand the concepts of the material they are learning. Therefore, ARP and VN need more intensive practice in subtraction and correct number placement (Jeheman et al., 2019).

Meanwhile, from the results of diagnostic tests and interviews, it can be concluded that the NRC subject understands and can solve multiplication and division problems correctly, although it still takes a long time to solve them. This is evidenced by the NRC subject being able to answer all the questions even though there are slight mistakes in 2 numbers due to lack of accuracy. For stacked division, the decrease in the number to be divided still needs to be corrected, as well as the previous subjects. To increase the speed in solving stacked division problems, students also need to practice calculation speed and understanding of basic concepts in multiplication and division (Purwanti & Pujiastuti, 2020). These exercises will help in improving the skill of recognizing patterns in division problems and speeding up the solving process (Sihombing et al., 2023). In addition, it is also necessary to emphasize solving problems carefully and not to rush answers.

Based on the results of diagnostic tests and interviews conducted with GSL and AZN subjects, several points need to be considered to improve the ability to solve stacked division problems:

1. Understanding Basic Concepts: GSL and AZN need to understand the basic concepts in a stacked division, including the appropriate steps to solve more complex problems. Mastery of this concept will help the subject recognize patterns in division problems and speed up the process.
2. Control of working style: The hasty attitude of the GSL subjects led to a lack of rigour. Subjects need to be trained to work more relaxed and to focus on the whole process, not just on how quickly the problem is solved.
3. Intensity of practice: GSL and AZN also need intensive practice. This practice should focus on subtraction and correct number placement, as well as strengthening the understanding of basic multiplication and division concepts.
4. Developing calculation speed: Calculation speed is an important factor in solving mathematical problems quickly. Students need to be given exercises to improve their calculation speed without sacrificing accuracy.
5. Continuity of improvement: It is important to remember that improving mathematical skills is a continuous process. GSL and AZN should be encouraged to continue to improve their number placement, speed and division skills.

When facing similar challenges with subjects ARP and VN, it is important to note the following:

1. Mastery of multiplication concepts: Subjects ARP and VN have not fully mastered the concept of multiplication, which should be the basis for completing division operations. Before moving on to stack division, the subjects need to strengthen their understanding and memorization of the multiplication table to be better prepared for division.
2. Intensive practice: Subjects ARP and VN need more intensive practice in mastering arithmetic operations, especially subtraction and correct number placement. These exercises will help to improve speed and accuracy in solving problems.
3. Understanding basic concepts: Similar to GSL and AZN. ARP and VN need to understand the basic concepts of stacked division, including the correct steps to solve more complex problems. Mastery of this concept will help candidates to recognise patterns in division problems and speed up the solving process.
4. Patience and meticulousness: Subjects ARP and VN need to learn not to rush when solving problems. Accuracy in placing the subtracted numbers is important and the subjects need to understand the importance of patience in solving mathematical problems.

For NCR subjects who already have the understanding and ability to solve stacked division problems, the following steps can help increase speed:

1. Speed training: Despite having the understanding, NCR subjects need practice to improve their speed in solving stacked division problems. Specific exercises that focus on computational speed can help the subject develop his or her working speed.
2. Pattern Recognition: NCR subjects need to train themselves to recognize patterns in division problems. By identifying certain patterns, the subject can find solutions faster.
3. Improving number placement: Although they already have a basic understanding, NCR subjects need to be emphasized to further improve the placement of the subtracted numbers so that the results are more accurate.
4. Reinforce basic concepts: Although NCR subjects may already understand, it is always good to remind them of the basic concepts of multiplication and division. This reinforcement will help the subject stay consistent and have a strong foundation.
5. Improve Efficiency: In addition to speed, subjects need to practice efficiency in problem solving. Finding faster and smarter ways to deal with stacked division problems is a valuable skill.

In conclusion, the most effective approach to learning math in dealing with subjects such as GSL, AZN, NCR, ARP, and VN is to understand the concepts, practice intensively, improve speed, accuracy, and strengthen the foundation in multiplication and division. Adequate support, continuous practice, and emphasis on understanding mathematical concepts are critical to improving students' ability to solve multiplication and division problems sequentially. Once the concepts are understood, intensive practice is needed to improve speed and accuracy in solving problems. In addition, strengthening the foundation

in multiplication and division is also very important. Adequate support from teachers or tutors, continuous practice, and emphasis on understanding math concepts are also critical in improving the subject's ability to solve multiplication and division problems sequentially. With the right approach, math can be easier and more enjoyable to learn.

CONCLUSION

According to the diagnostic tests and interviews discussed, it is concluded that the most common difficulties students have in solving stacked division operations are a lack of understanding of the concept of division and a weak ability to remember multiplication. Therefore, students have difficulty in finding the result. In addition, rushing and lack of concentration when working on problems can lead to calculation errors. Therefore, teachers should make sure that students master the prerequisites of division operations and provide plenty of practice. In addition, tips and fun can help students feel comfortable and increase their interest in learning math.

Teachers can also use different teaching methods to help students understand the concept of division. For example, teachers can use pictures or math manipulatives to visualize the concept of division to make it more tangible for students. Teachers need to create a fun and non-stressful learning atmosphere for students. Learning mathematics should not be difficult and boring, but should be perceived as an enjoyable challenge. In overcoming students' difficulties in performing division operations, consistency and thoroughness in providing guidance and support are also very important. With proper guidance and support, it is hoped that students can overcome these difficulties and achieve good performance in learning mathematics.

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