



DIFFICULTIES OF GRADE 6 LEARNERS IN SOLVING HIGHER-ORDER THINKING SKILLS (HOTS) IN THE CONCEPT OF FRACTIONS.

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ABSTRACT

This study aims to know the difficulties of grade 6 learners in terms of solving higher-order thinking skills (HOTS) in the concept of fractions and operations with fractions. Solving a Mathematics problem is an activity that can generate Higher Order Thinking Skills (HOTS) among students. In the study, maximum diversity sampling, which is a purposeful design, was used the research. The difficulties of every student incomes of solving-problem can be caused by various kinds of errors. Hence, this study was conducted to identify and analyze the difficulties of grade 6 students when it comes to solving Higher Order Thinking Skills in the concept of Fraction. In addition to this study, fraction makes the students mistakes in decoding and the reason for these mistakes was dwelled on. It is seen that the students have misunderstandings and make mistakes in solving Higher Order Thinking Skills about fractions. It is seen that the students are not fully used when it comes to solving operations with fractions, they have misunderstandings and making mistakes that would result in the difficulties of the students.

Key Words

"Difficulties in solving fractions", "Solving Higher-Order Thinking skills", "teacher's methods", "student fraction knowledge"

INTRODUCTION

In the new normal class education nowadays cannot be viewed merely as part of their study. Fractions are among the most complex concept that children encounter in their years in primary. Teaching and learning fractions have been problematic especially nowadays. Many intermediate pupils revealed that fraction is a complicated mathematics topic. Some teachers find it challenging to help their students understand mathematical concepts and make connections to other content.

Concepts related to fractions can be particularly difficult for some students to grasp. Understanding the meaning of fractions also requires the ability to solve problems related to fractions. On the other hand, through solving fractions problems, students can understand the HOTS about fractions and even construct the building of knowledge about fractions.

In this study, Mathematical abilities, knowledge, and skills are needed for students to be a success in solving Higher Order Thinking Skills (HOTS) in solving fractions. Learning by experiencing themselves towards mathematics will be developed the mathematical connection ability of students. For students to properly understand fractions, they must first understand the basic concept of fractions. Which are they need to identify the similarity, difference, and the types of fraction (proper fraction, improper fraction, and the mixed fraction). So they can understand fraction solving with four fundamental operations and HOTS.

The addition and subtraction of fractions are one of the basic, yet difficult for the student to master. Some students are confused when it comes to adding and subtracting fractions. Students are relieved when the denominator of the fraction is the same because you can now solve it without the right to change. But when the denominator of the fraction is different, students are confused as to how to solve it. For them to solve problems quickly, there are rules that they need to follow so that they can get the correct answer to the given mathematical problem.

In adding and subtracting dissimilar fractions, find the Least Common Denominator of the fractions. Then, divide the LCD by the denominator then multiply the result to the numerator. Then add the numerators and copy the denominator. These are the steps/ rules on adding and subtracting dissimilar fractions. Students will also encounter the addition and subtraction of fractions and mixed numbers. In solving fractions and mixed numbers will be different, it is necessary first, change the mixed fraction to improper fraction, then find the LCD of the given

fractions, then change them to similar fractions. Get the sum of the given fractions and lastly change the result to a mixed fraction if necessary.

Multiplication can also be used to solve fractions. Some students find it easier to multiply fractions than add and subtract because multiplying unit fractions is much easier. To multiply fractions, just multiply the numerator and denominators. If the result is an improper fraction, multiply the numerator over the product of the denominators to change it to a mixed number. If the student encounters a mixed number given they need to write a mixed number as improper fractions then multiply it. And to multiply the fraction by a whole number, rename the whole number as a fraction with one (1) as its denominator, then get the product of the numerators over the product of the denominators.

Some students use a different method to shortcut the multiplication of fractions. Others used cross multiplication or also known as “means and extreme”, where they divide the opposite numerator and denominator by their GCF, then multiply the numerator over the product of denominators. By that, the students can simply answer to the lowest term. The lowest term in the form of a fraction in which the numerator and denominator have no factor in common except 1 reduces a fraction to the lowest terms.

The division is the fourth fundamental operation that can be used in the fraction that most students have difficulty with. Many are confused about solving a division unit fraction because most students forget to reciprocal the divisor before solving. Solving the division of fractions requires changing the sign of the equation from division to multiplication and the divisor by its reciprocal. And then multiply the numerator over the product of the denominators.

Some of the fractions are easy to solve if focused but difficult to master especially during today’s pandemic, many students have difficulty understanding fractions because of new normal learning many have to study themselves to solve the fraction. But the help of teachers is still needed so that students can fully understand how to properly solve a fraction with an operation. So that when students understand fractions they can easily understand the solving of higher-order thinking skills (HOTs) in the concept of fractions. Higher-order thinking skills are a series of important competencies individuals can utilize to improve learning progress and critical thinking.

Higher-order thinking skills, also called high-order thinking or HOT, refer to skills that go beyond memorizing information or regurgitating stories- skills at the bottom of Bloom’s Taxonomy hierarchy and emphasize the development of analytical skills. (tophat.com/Glossary).

LITERATURE REVIEW

Problem-solving is a very important element of Mathematics learning. Fraction is also a difficult subject for learners to master. And because of that many learners are said to have difficulty with mathematics because many are confused by it. (Mokhtar, M. A. M., Ayub, A. F. M., Radhiah, R., & Said, S. S. M. 2019). Some of the learners are slow learners that will cause errors to analyze and solve fractions problems. As a result, they are left out of the lesson and do not care how will to solve it. (Novitasari, N., Lukito, A., & Ekawati, R. 2018).

Many errors can be identified when students solve mathematics problems, specifically in solving problems that may be probabilistic. They can solve this with their experience which they can use to solve a mathematics problem. (Arum, D. P., Kusmayadi, T. A., & Pramudya, I. 2018, March). Visual methods can help students to overcome the difficulties since the method help students to make meaningful visual representations and link abstract concepts in Mathematics. (Hadi, S., Retnawati, H., Munadi, S., Apino, E., & Wulandari, N. F. 2018).

Knowledge of fractions is thought to be crucial for success with algebra, but empirical evidence supporting this conjecture is just beginning to emerge. (Booth, J. L., Newton, K. J., & Twiss-Garrity, L. K. 2014). According to (Aksoy, N. C., & Yazlik, D. O. 2017), they use this method to determine students' errors and misconceptions about fractions, they prepared two tests. But before the test were formed, the related field was scanned and the existing misunderstanding and mistakes about fractions. Failing to compare the fraction on each other will result in a difficulty of pupils in solving operations about fractions. (Lestiana, H. T., Rejeki, S., & Setyawan, F. 2017)

Learning fraction is a critical step in children's mathematical development. However, many children struggle with learning fractions, especially small arithmetic. The framework, Putting Fractions Together (PTF), emphasizes that both individual fractions and the sum of fractions consist of units of fractions and may be representative of their aggregation of them. (Braithwaite, D. W., & Siegler, R. S. 2021). According to an article, they introduce a continuum of children's understanding of unit fractions to explore the complexity and to help teachers understand children's strategies and identify milestones in developing an understanding of unit fractions. Suggestions for developing this understanding are provided. (Empson, S. B., Jacobs, V. R., Jessup, N. A., Hewitt, A., & Krause, G. 2020).

According to Crawford and Matthew, their article shows how they can write the number 1 as the sum of the unique behaviors of fractions called “fraction units”□, that is, fractions with 1 in the numerator and some natural number counting in the denominator. Counting the number of ways it can do this has revealed several properties about key numbers and how they interact with each other and push the boundaries of computing power. (Crawford, M. B. 2019). The Erdos-Straus hypothesis is a well-known problem that illustrates that for every natural number $n(2), 4n$ can be represented as the sum of three-unit fractions. (Maiti, S. 2020).

The researcher’s main objective was to create a course aimed at a process of gradual algorithmization, in which students could acquire a method for subtracting fractions with different denominators, without force in the last stage. (Streefland, L. 2017). According to the article, this study was to analyze students’ skills to generate representations (such as number, model, number line, and verbal) by examining the transitions between representations involving addition and subtraction operations. (Kara, F., & Incikabi, L. 2018). Here the ability of elementary preservice teachers to contextualize and decontextualize small subtraction by asking them to write word problems to represent fraction subtraction expressions and to select reported word problems to support given fraction reduction expressions. (Dixon, J. K., Andreasen, J. B., Avila, C. L., Bawatneh, Z., Deichert, D. L., Howse, T. D., & Turner, M. S. 2014). In the study of Siu Cheung Kong and Lam For Kwok, they used the model of Cognitive Tool (CT) for primary school children to find out the common addition/ subtraction of fractions that are not the same as denominators. (Kong, S. C. 2002).

In Nancy’s study of the long-term effect o student knowledge on the multiplication of fractions, she gave students individualized instruction that encouraged them to build on their informal knowledge of division to understand solve problems, a problem involving the multiplication of fractions. (Mack, N. K. 2000). According to an article, this research is to share techniques invented by children to solve problems involving the division of fractions in the absence of algorithm instruction. In his research he conducted by two sources, the first was a teaching experiment and the second was regular classroom practice. (Bulgar, S. 2003).

METHODOLOGY

This study used the descriptive method, which is conclusive, as opposed to exploratory. This means that descriptive research gathers quantifiable information that can be used for statistical inference on your target audience through data analysis. As a

consequence, this type of research takes the form of closed-ended questions, which limits its ability to provide unique insights.

However, used properly it can help an organization better define and measure the significance of something about a group of respondents and the population they represent. Descriptive research gives either a qualitative or quantitative, or both, description of the general characteristics of the group or case under study. Using this method, we can collect the data of each student when we observing or surveying.

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