An Overview of Third Grade Students' Understanding of The Concept of Fractions

Topanus Tulak[1] Abdur Rahman[2] Asdar Asdar[3]
[1]Universitas Kristen Indonesia Toraja
[2]Universitas Negeri Makassar
3Universitas Negeri Makassar
topan@ukitoraja.ac.id

Abstract. Fractional material is a complex study that makes it difficult for students to understand the concept. The concept of fractions differs from natural numbers and integers because it has its own uniqueness that creates pedagogical challenges for the mathematics education community. The purpose of this study was to determine the understanding of grade III elementary school students regarding the concept of fractions based on Bruner's theory. This research uses qualitative methods with a descriptive approach. The subjects of the study were grade III elementary school students in North Toraja Regency. In Bruner's theory, the understanding process starts from the enactive stage to iconic then to symbolic but based on the findings in this study conducted on several elementary school students in North Toraja Regency, different results were found, namely the understanding process starts from iconic to symbolic, without passing the first stage, namely enactive. Students find it too difficult to understand the enactive stage because the concepts taught in school start directly with the medium of images so that is what causes the loss of this stage. Therefore, teachers are expected to teach concepts starting from the enactive stage because at this stage students are easier to understand by using concrete objects related to everyday life.

Keywords: Fractions, Understanding Concepts, Bruner Theory

1 Introduction

In mathematics education, every student is expected to have mathematical abilities, which must be developed to improve learning achievement and grow their mindset. In mathematics education, every student is expected to have mathematical abilities, which must be developed to improve learning achievement and grow their mindset. It is important to maintain objectivity by excluding subjective evaluations unless clearly marked, while following conventional academic structures, clear and concise language, and formal lists. Understanding the relationships and interconnections between internal representations of mathematical objects in a network of representations is essential to forming meaningful and communicable external representations. In addition, using proper and technical vocabulary and correct grammatical language is very important. Finally, the formatting features of citations and footnotes should be used consistently,

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and the text should avoid biased language and maintain a logical and balanced structure. The various strategies used in mathematical representation include: (1) Tables, graphs, and figures for visual presentation; (2) Mathematical symbols and statements; and (3) Formal and informal written text in the author's language [1], [2].

To enable students to better understand the material being learned, media aids should be used to encourage direct engagement between learners and the subject matter, thus enabling the creation of personal insights by students [3], [4]. In addition [5] It suggests that interventions aimed at improving mathematical literacy among students should be implemented while also providing teaching aids. Innovative learning approaches demand that educators and students utilize creative thinking to adapt to changing times. This approach aims to produce students who embody qualities such as active, innovative, and cultivating noble character [5], [6].

Understanding concepts is an important foundation for thinking in solving mathematical problems and problems in everyday life. Developing the ability to understand concepts is one of the goals in the curriculum, this ability is very supportive of other mathematical skills, namely communication, reasoning, connection, representation, and problem solving. The process of translating representations can occur in the process of thinking to understand an idea or concept. This translation is necessary because of the need to accommodate information structures in order to obtain mental equilibrium. Translation or shifts in the representation of ideas can lead to maturity of thinking or an increase in the level of thinking. One of the cognitive theories about the level of thinking is the theory of meaningful learning by Bruner [7], [8], that is, to connect or correlate information with concepts in cognitive structures of enactive, iconic, symbolic level [9]. In the development of thinking, students will experience enactive, iconic and symbolic phases and in the process, students will experience translation in representing ideas / concepts that are thought or solved. The characteristics of each translation of thinking experienced by students are interesting information in cognitive psychological theory to underlie the need to design knowledge transfer strategies in learning.

One of the mathematical concepts that is the focus of research today is fractions. The 2013 curriculum for elementary school's states that the scope of mathematics subjects includes numbers, geometry, measurement, and data processing. Based on the curriculum, fractional matter is part of numbers. Furthermore, fractional material and how it works is one of the teaching materials that is very important for learning mathematics further and is often used in everyday life [10].

In improving understanding of concepts, educators need preparation in delivering material. Efforts are made in the form of selecting the right teaching materials where students are directly and actively involved so as to increase understanding of concepts and achieve learning objectives. Fhina Hariyanti (2016) argues that mathematics subjects emphasize the concept of understanding.

From observations and interviews with several teachers in North Toraja Regency conducted by researchers in grade III, researchers found problems that the results of students' understanding of the concept of fractions were still low. So researchers are interested in conducting research in finding what causes students' low understanding of concepts.

A deeper knowledge of concept formation is essential. Bezuk and Cramer (2012) say that this misconception stems from teachers who are in a hurry and do not give students enough time to develop basic concepts. What is really needed in learning fractions is not only children who can perform surgical procedures on fractions, but various examples / fractional models taught, or what Bezuk and Cramer call "physical models". Without physics models, students may be skilled at procedural problems such as: fraction similarity, fractional operations, converting fractions from ordinary fractions, mixed fractions to decimal fractions, percentages, or vice versa but what if faced with fraction modeling problems, these skills are not guaranteed to be mastered without learning that utilizes many physics models. This physical model will help students build their mental schemas about fractions. For example, students are faced with numerical fractions 1/2, 2/3 and others, the number is an abstract representation of a particular physical building, students must have a lot of primary experience with the physical model of the fraction so that the numerical representation becomes meaningful. And the teacher should not rush to the next topic before the basic concepts are well understood.

Teaching fractions is not only about transferring mathematical ideas, methods, and concepts, but rather a way to define fractions as (gradual) processes of origin, event, and development. It starts by connecting mathematical topics with real life, known as a contextual approach. Students build their own mathematical concepts.

One of the materials in mathematics that must be understood is fractions. The material discussion focuses on working on basic arithmetic operations, namely addition, subtraction, multiplication, and division, both for ordinary fractions, mixed fractions and decimal numbers. Fractions play a central role in mathematics learning [11]. Interestingly, the concept of fraction is not a simple concept but has its own uniqueness that is different from natural numbers and integers. However, the concept of fractions is considered a difficult to learn and difficult to teach concept thus creating ongoing pedagogical challenges among the mathematics education community [12]. Fractions are very difficult and complex mathematical materials that students find very difficult to understand.

One solution that can be applied to minimize student errors in understanding the concept of fractions is to provide explanations using concrete props. Therefore, through this research, it is expected that in understanding the concept of fractions, students start with real objects and then be guided to obtain something abstract, namely the concept of fractions. First, students are invited to manipulate the representation (representation) of fractions in the form of real / concrete objects (enactive). The representation of a concept is called the representation of the concept. Then the activity is expressed with (iconic) images. Finally, students express concepts with representation in the form of mathematical (symbolic) symbols or notation. From these three activities, students are expected to obtain the concept of fractions. Improper use of representation or representation can result in students being unable to understand a concept. In addition, these transitions between representations can also cause students to lose meaning from the concept itself. The process of moving from the iconic level to the symbolic level needs attention in the formation of mathematical concepts. If not careful, then this process will become meaningless because symbols have abstract properties and empty

meaning (Soedjadi, 2000). According to the principle of notation, the achievement of a concept and the use of mathematical symbols should be gradual, from cognitively simple for students to understand and then slowly increasing to more complex. Bruner emphasizes that each student experiences and recognizes real events or objects around his environment, then finds himself to represent those events or objects in his or her mind. It is often known as a mental model of an experienced event, or an object observed and recognized by the student.The purpose of this study is to provide an overview of understanding the concept of fractions in grade III elementary school students.

2 Methods

This research adopts qualitative research methodology with a descriptive approach. According to Moleong (2016), the qualitative approach involves collecting written or spoken words or behaviors from observable individuals. In addition, Creswell (2014) asserts that qualitative research examines social phenomena and human problems. The research was conducted in Toraja. This study used the main and supporting instruments in the form of tests and interview guidelines to investigate third grade elementary school students in North Toraja Regency, South Sulawesi Province. This study used the main and supporting instruments in the form of tests and interview guidelines to investigate third grade elementary school students in North Toraja Regency, South Sulawesi Province. The abbreviation of technical terms is described in the first usage, and a logical flow of information is maintained throughout the text. The language used is formal, unbiased, and value-neutral, using consistent technical terms where appropriate. Standard language is used throughout the text, and passive tones and impersonal constructions are used. The text adheres to proper citation style and formatting guidelines, and citations are clearly marked, and filler words avoided. Grammatical correctness is ensured throughout the text.

4 Conclusion

Research conducted on elementary school students in North Toraja Regency found different results from Bruner's theory, namely the process of understanding starts from iconic to symbolic without passing the first stage, which is enactive. Students struggle with the enactive stage because concepts taught in school are only presented through visual media, hindering their ability to understand this early stage. Therefore, the teacher should start teaching concepts from the active stage since this allows students to understand more easily by using concrete objects relevant to everyday life. It is very important to follow a logical flow of information with causal relationships between statements, while avoiding subjective evaluations and biased language. In addition, language should be formal, value-neutral, and grammatically correct, and technical term abbreviations should always be described when first used. The general academic section and format of regular authors and institutions should also be maintained, along

with a clear structure and consistent citations. Finally, proper vocabulary and hedging should be used to maintain an objective and balanced language.

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