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DEVELOPING MATHEMATICAL LOGICAL INTELLIGENCE THROUGH COOPERATIVE LEARNING MODEL TYPES OF TEAMS GAMES TOURNAMENT FOR STUDENT

Bintang Fahlia Lestari [1*], Conny Dian Sumadi[2], Elvina Ocatvia[3], Wijining Wulan Suci[4], Ineke Putri Wicandra[5]
[1,2,3,4,5] Elementary School Teacher Education, Faculty of education, Universitas Trunojoyo Madura, East Java, Indonesia

correspondence e-mail: : 190611100241@student.trunojoyo.ac.id[1], conny.diansumadi@trunojoyo.ac.id[2], 190611100244@student.trunojoyo.ac.id[3], 190611100247@student.trunojoyo.ac.id[4], 19061110271@student.trunojoyo.ac.id[5]

ABSTRACT

Logical-mathematical intelligence for a student is related to the student's ability to calculate, measure, and complete mathematical operations. This study aims to see whether there is an effect of the team games tournament (TGT) cooperative learning model to develop logical-mathematical intelligence on the learning outcomes of third grade students at SDN Kedung Peluk 1 Candi. The approach used in this research is a quantitative approach. This type of research is associative research. The population in this study, amounted to 21 students of class III. There are two methods used to collect data in this research technique, namely: test and observation. Based on the results of data analysis, this study shows that there is a positive and significant influence on mathematical logical intelligence on student learning outcomes, using the team games tournament (TGT) cooperative learning model with the help of bingo, third grade students at SDN Kedung Peluk 1 Candi get with an average score of 96 with fractions math material

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A. Introduction

Education is the process of changing the behavior of a person or group of people in maturing humans through learning expositions. Effective learning compositions mean that learning to obtain ideal results in accordance with the expected goals is one of the characteristics of successful learning expositions (Jawara, 2013).

Basic education is the forerunner of education that will determine the quality of education at the next level. The success of dealing with basic education problems is a strategic step to fix the education system at the next level and in turn will touch the national education system. Given its very important role in the process of improving the quality of human resources, efforts to improve the quality of learning at the basic education level require serious attention.

In the 1980s, Gardner formulated the concept of intelligence from being limited to those who are intelligent, mathematical logic and language, to musical, kinesthetic, intrapersonal, relational, spatial, and naturalistic intelligences. The existence of recognition and respect for individual differences, of course, will have further consequences, namely that education must pay attention to differences and develop as far as possible what the child has. With

Human intelligence consists of 8 parts, namely (1) visual and spatial intelligence; (2) Musical intelligence; (3) Linguistic intelligence; (4) Logical-mathematical intelligence; (5) Kinesthetic intelligence; (6) Intelligence between private; (7) Intra-individual intelligence; (8) Naturalist intelligence (Gardner in Masykur and Fathani, 2007). However, the direction of Indonesian education tends to prioritize and optimize mathematical and linguistic intelligence which is often used in everyday life, so that the attention of schools or madrasas is more towards this intelligence (Masykur and Fathani, 2007). To be able to undergo education while in school until college well, students are required to be able to master mathematics well, because the position of mathematics in science is as a basic science or science tool to be able to work in other disciplines (Masykur and Fathani, 2007).

In fact, there are still many problems related to mathematics, including at SDN Kedung Peluk 1, Sidoarjo district. Based on information obtained through interviews with the third grade homeroom teacher at SDN Kedung Peluk 1, Sidoarjo Besar district, problems related to mathematics, especially those related to the learning process.

The first problem is that students still perceive mathematics as a difficult subject, with lots of formulas, symbols, confusing calculations, and boring lessons, causing students to be lazy to learn. The second problem, there are some students who do not do their homework with the reason that students often say is forgetting and some students also do not re-learn the material that has been studied at school. This is indicated by some students leaving their textbooks under the desk at school. The third problem, students are impatient and lack of skills in solving math problems. This shows that students' mathematical logic intelligence has not functioned optimally. Based on these problems, it can be indicated that the mathematical logic intelligence of students who have not functioned optimally and the lack of student learning discipline. Logical-mathematical intelligence.

Based on these problems, it can be indicated that the mathematical logic intelligence of students who have not functioned optimally and the lack of student learning discipline. Logical-mathematical intelligence for a student is related to the student's ability to calculate, measure, and complete mathematical operations. This means that students who have high mathematical logic intelligence tend to be able to think logically, solve problems, recognize concepts that are quantity, time and causal relationships needed in solving math problems (Masykur and Fathani, 2007).

The level of students' logical mathematical intelligence can affect their mathematics learning outcomes. This is in line with the findings of Huri Suhenri (2012) that mathematical logic intelligence has a positive and significant effect on mathematics learning outcomes. High mathematics learning outcomes can be used as an increase in mathematics learning activity. This positive learning raises the desire of students to achieve higher mathematics learning outcomes. So, students are automatically proficient in learning and ultimately have a high level of discipline in learning.

During the process of learning mathematics, a thinking process also occurs, because a person is said to think if that person does mental activity and people who study mathematics must carry out mental activities. A person's thinking ability is determined by the level of intelligence (Masykur & Fathani, 2007: 43-44). Mathematics learning must be given to all elementary school students so that they can develop logical, analytical, systematic, critical, creative, and collaborative thinking skills (Masykur & Fatani, 2007: 52).

The purpose of learning mathematics in elementary schools is for students to be able to apply various types of mathematical concepts in everyday life (Susanto, 2012: 189). According to the Ministry of National Education (Susanto, 2012: 189), general abilities or skills for learning mathematics in elementary schools are: 1. Performing arithmetic operations such as addition, subtraction, multiplication, division, and mixed operations which include fractions. 2. Determine the properties and elements of various flat shapes and shapes to determine the circumference, volume, area and angle. 3. Determine the nature of symmetry, versatility, and coordinate systems. 4. The use of measurements such as units, equivalence to units, and measurement estimates. 5. Determine simple data, such as the highest, lowest, average, mode, collect and present. 6. Solve problems, draw conclusions, and convey ideas mathematically.

Logical-mathematical intelligence is a person's ability to solve problems related to mathematical needs, namely one's ability to measure, calculate & solve things that have a mathematical nature (Masykur & Fathani, 2007:153). Uno & Umar (2009:11) define "logical-mathematical intelligence is the ability of a person to think inductively & deductively, think based on reason, know & analyze patterns of numbers, solve problems using their thinking skills. Another opinion was also expressed by Syamsu & Nurihsan (2009: 230) which states that "mathematical logic intelligence is an intelligence that includes the ability to say mathematically, think logically, think deductively and inductively, and sharpness in creating patterns and logical interactions".

Pound & Lee (2015: 7-12) argue that mathematics education requires creative education, creative learning, creative partners, and creative mathematics. Teaching creative mathematics is an art. Teachers need to use their skills to prepare activities that stimulate imagination, create learning experiences, and expand resources. Creative learning is the ability to symbolize, support, and express mathematical ideas. Creative friends are a condition in which mathematics learning is supported by the environment such as friends, teachers, parents, and the creative community (learning community). Mathematics is not just about what is right and what is wrong. Mathematics often uses guesswork and intuition. Mathematics requires the ability to think with symbols, pictures, diagrams, and models. Mathematics requires the skills of observing patterns and solving problems.

According to Marpaung (2001), learning mathematics that does not start with the reality and environment of children causes children not to realize the benefits of mathematics for themselves and makes students desperate to learn. As a result, students perceive mathematics as a difficult subject. Soedjadi (2004) suggests that realistic mathematics learning is essentially the use of reality and the environment that students understand to facilitate the mathematics learning process and achieve better mathematics learning goals. In addition, Soedjadi (2004) explains what is meant by reality, namely reality or concrete things that students can observe and understand through imagination, and the environment is where students are both at school and in the family. Understandable community setting. Therefore, students not only promote understanding of mathematical concepts, but are also actively involved in knowledge discovery. The introduction of mathematical ideas/concepts using context encourages students to actively participate in the process of generating these ideas/concepts.

The application of mathematics learning in the real world also requires the support of learning media as a bridge between the real world and concepts. Sadiman (2010) states that the media is a component of various types of student environment that can stimulate learning. A good medium for applying realistic mathematics learning is visual media. Fractions material is one of the basic materials that students must learn since elementary school. This material is a basic material whose terms continue to be used at a higher level even at the university level. Fractions are closely related to algebraic material. This material is also widely used to solve problems in everyday life. A simple example: If you want to share a cake with several people, use the concept of fractions to calculate how many pieces each person will get.

Understanding Learning Media Nunu Mahnun (2012) states that "media" comes from the Latin word "media". It means "mediator" or "introduction" who is the recipient of the message. Meanwhile, according to Steffi Adam and Muhammad Taufik Syastra (2015), learning media are everything that is physical and technical in the learning process, helping teachers convey learning content to students to achieve their learning goals.

The game of bingo is a pile of cards containing numbers or letters that are marked by the player when the numbers or letters are called. According to Aqib and Murtadlo (2016: 251), bingo games are classroom actions by educators trying to solve problems that occur in the classroom. The advantage of this game is that

children can increase their vocabulary. In addition, Bingo is an active, innovative, creative, effective and fun game for students. (Aqib and Murtadlo 2016: 249). The material of the bingo game is very simple and can be decorated with a table of letters and pictures, which can attract children's attention. Bingo game is also a popular game to teach English vocabulary. Therefore, researchers are very interested in using bingo games to improve children's ability to recognize numbers.

One of the learning models that can activate students is the cooperative learning model of the Groups Games Competitions (TGT) type. The TGT learning model was developed by Robert Slavin by dividing students into small groups, this learning technique combines study groups with team competencies and will stimulate student activity because they are required to participate in completing academic assignments (Purwati et al, 2013:46). In TGT students play academic games with other team members to contribute points to their team scores, there are five main components in TGT, namely 1) class presentation, 2) group study, 3) games, 4) matches, and 5) group rewards. The Groups Games Competitions (TGT) learning model contains advantages such as the teaching and learning process taking place with the activeness of students, educating students to practice socializing, better learning outcomes, and being able to master the material in depth due to the creation of a pleasant learning environment (Wahyudi and Haryono, 2014).

B. Method

The approach used in this research is a quantitative approach. This type of research is associative research, which is to determine the interaction between 2 variables. This research is to examine the effect of variable X (logical-mathematical intelligence) on Y (Student Learning Outcomes). Noor (2011:147) states that population is used to reveal all elements based on an area as a research target based on the object of research. Sugiyono (2014: 80) "Population is an area of generalization consisting of objects/subjects that have qualities and characteristics that are exclusively determined by the researcher to be studied and then drawn conclusions". Thus, the population in this study were third grade students at the Kedung Peluk 1 State Elementary School, Sidoarjo Regency, which consisted of 21 students. There are two methods used to collect data in this research technique, namely: test and observation. A test is a measurement procedure in which there are various questions or a series of tasks that must be completed or answered by

the respondent to produce a value based on the data obtained from the measurement results. The measurement results can determine the respondent's behavior, such as: the ability of knowledge, attitudes, intelligence, skills, or talents of the respondents (Sudijono, 2009). This study applies the test method to obtain the value of mathematical reasoning intelligence in students as a measuring instrument for research

C. Result and Discussion

This research was conducted at SDN Kedung Peluk 1, which was conducted on May 1, 2022. The focus of this research was to understand the concept of learning for class III at SDN Kedung Peluk 1 on fractions. To find and measure students' understanding, focusing on indicators of conceptual understanding, as evidenced by test results in learning activities. The criteria for completeness of students' learning outcomes when they reach scores above 70. The results of the analysis show that the average value of students reaches 96.

Table 1. Calculation of Test Scores for Class III Students at SDN Kedung Peluk 1

No	Complete Aspect	Group and Number of Students	Score	Amount	Description
1.	Complete	Group 1 (5 student)	95	475	>70
		Group 2 (5 student)	100	500	
		Group 3 (6 student)	90	540	
		Group 4 (5 student)	100	500	
Amount		21 student		2.015	

Average student score : Total student score divided by number of students = 96

D. Conclusion

The effect of the Teams Games Tournament (TGT) cooperative learning model to develop logical-mathematical intelligence on student learning outcomes has a positive impact on teaching and learning activities. Class III students of Kedung Peluk can achieve a score of >70, using the Teams Games Tournament (TGT) cooperative learning model with the help of Binggo media. Developing logical-mathematical intelligence in students requires learning models and interesting media, so that students are interested in learning. When students are interested in learning and find it fun, students will not think that material related to numbers or counting is difficult.

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