

# Analysis of Mathematics Learning Process : Planning, Implementation and Evaluation Qualitative Case Study at Phase A Elementary School in Malang City

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Mathematics Learning

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## Abstract

Learning mathematics among primary school students in Phase A requires an approach tailored to the developmental characteristics of early childhood. This study explores the planning, implementation, and evaluation of mathematics instruction in primary schools in Malang City. Employing a qualitative strategy through a case study approach, data were collected using observations, interviews, and documentation. The findings reveal that teachers design instructional plans based on the Merdeka Curriculum, utilizing flexible teaching modules aligned with students' needs. The implementation of learning is conducted in an active and enjoyable manner through the Teams Games Tournament (TGT) model and the STEAM approach. Evaluation is carried out continuously through formative assessments such as tests, assignments, and student worksheets (LKPD). These methods enhance students' understanding and engagement in the mathematics learning process. The study highlights the significance of employing diverse, flexible, and enjoyable instructional strategies to improve the quality of mathematics education at the Phase A level. Furthermore, active student participation in the learning process has been shown to increase learning interest and foster critical thinking skills.

## 1. Introduction

Primary education is an important foundation in the learning process for character development, value inculcation, and enhancement of intellectual potential in students. At this stage, children are in a crucial phase of development, where students begin to create a basic understanding of various concepts that will become capital in life and education at a later stage. In the context of Merdeka Curriculum, basic education, especially Phase A which includes grades I and II, focuses on aspects of early childhood development. One of the lessons that has a crucial role in improving children's thinking skills.

Mathematics is one of the sciences that has a very important role in human life. Mathematics makes a huge contribution, ranging from simple to complex, ranging from abstract to concrete for problem solving in all fields. Mathematics is one of the subjects that has been introduced to students since the basic level (elementary school) to a higher level (university). Mathematics learning is the process of providing learning experiences to students through a series of planned activities so that students gain knowledge about the mathematics studied, intelligent, skilled, able to understand well the material taught. In learning mathematics, the success of a teaching is influenced by factors that are summarized in the teaching system. One of the factors that determine the success of teaching is the use of learning methods that are in accordance with the development and abilities of students, so that optimal teaching objectives are achieved (Amir, 2014).

Mathematics not only teaches numbers and calculations, but also serves as a way to hone logical, systematic, analytical, and critical thinking skills. This statement is in line with the opinion of (Bahrum, Ramdani, and Samsiah, 2023). Which states that Mathematics is a crucial thinking tool for solving everyday problems, as well as a universal language that makes it easier for humans to understand the world. Therefore, mastering the basic concepts of Mathematics from the beginning has a great influence on the success of students in undergoing learning (Azzahra et al., 2023), at a higher level. Therefore, learning Mathematics in Elementary School needs to be designed and implemented with an approach that is not only interesting, but also meaningful and in accordance with children's cognitive development. However, the reality in the field shows that learning mathematics in the early grades of elementary school still faces various obstacles. It is often found that teachers do not fully understand the right approach in teaching mathematics to stage A students who are at the concrete operational stage in cognitive development. The dominant learning approach is conventional and abstract, causing students to have difficulty understanding concepts. In addition, the low motivation of students to learn, the lack of use of concrete media, and the evaluation process that is not in accordance with the characteristics of

early childhood are significant challenges. This phenomenon shows that the mathematics learning process at stage A is still not implemented effectively and optimally.

The problem emphasizes how important it is to focus on three main aspects in the learning process, The first is planning, the second is implementation, and the last is evaluation. The three merge into one unit in a connected and inseparable learning cycle. Planning for learning is an important first step. Lesson planning is an important first step in identifying the direction and quality of learning. At this stage, educators should be able to set relevant learning objectives, select appropriate materials and methods, and design learning and assessment strategies based on students' needs and characteristics. (Joyce & Weil, 2003), emphasizes that effective planning will result in a supportive learning environment and can facilitate the maximum development of student potential.

Effective evaluation serves not only as a tool to measure learning outcomes, but also as a way to diagnose student learning difficulties and as a basis for improving future learning. In evaluation activities, it is necessary to prepare based on the principles of authentic assessment that not only assesses cognitive abilities, but also pays attention to the process aspects of ongoing learning. (Intan, Kuntarto, and Sholeh, 2022), emphasized that success in learning is determined by the achievement of learning indicators by students, as well as the fulfillment of the minimum completeness criteria (KKM) that have been set. Many previous studies have validated the importance of these three aspects in Mathematics teaching. (Prisma et al. n.d, 2022), revealed that lesson planning tailored to the characteristics of early childhood has a great influence on the success of Mathematics learning. The study by (Wijaya, Vioreza, and Marpaung, 2021), also showed that the use of concrete media can improve the understanding of basic mathematics concepts at the early elementary level. In addition, research conducted by (Andayani and Madani, 2023), showed that evaluation strategies that apply a continuous formative approach can improve learning outcomes and student participation in the learning process. However, most of the research still discusses these aspects separately, and not many outline these three aspects thoroughly in one learning process, especially in Phase A students.

The theoretical framework of this research refers to Piaget's cognitive development theory and Vygotsky's constructivism theory. According to Piaget, Phase A students are at the concrete operational stage, which means they understand math concepts better through real objects and direct experience. Therefore, learning should use concrete media and explorative activities. Vygotsky emphasized the importance of social interaction in learning through the concept of Zone of Proximal Development (ZPD) and scaffolding. The teacher acts as a facilitator who guides students to gradually build their understanding through appropriate guidance. In evaluation, an authentic assessment approach is used, which not only assesses the final results, but also the overall learning process of students. This assessment is important to determine the development of students' cognitive and affective abilities during the learning process.

Research by (Wijaya, Vioreza, and Marpaung, 2021) shows that the use of concrete media can improve understanding of mathematical concepts in low-grade elementary school students. (Bahrum et al., 2023) emphasized that mathematics is important to form logical thinking skills from an early age. (Prisma et al., 2022) emphasize that learning planning that adapts to the characteristics of early childhood has a positive impact on learning effectiveness. Meanwhile, (Andayani and Madani,2023) highlighted the importance of continuous formative evaluation to improve student participation and learning outcomes. However, most of these studies only focus on one or two aspects. This research is here to integrate all three aspects of planning, implementation and evaluation thoroughly in the context of Phase A Mathematics learning Below is a table of relevant previous research, as well as a visual conceptual framework to support the discussion.

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Learning Aspects	Main components	Example of Classroom Implementation	Theoretical Objectives/Relationships
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<b>Perencanaan</b>	Learning Objectives, Independent Curriculum Materials, Methods & Media	Develop CP and TP according to student characteristics, Design concrete game-based lesson plans.	Adapting learning to children's cognitive developmental stages (Prisma et al., 2022, Dick & Carey, 1996)
<b>Pelaksanaan</b>	Concrete Activities; Visual Media & Props; Teacher-Student Interaction	Number play with blocks; Counting real objects; Contextual question and answer.	Fostering understanding of concepts through direct and interactive experiences (Wijaya et al., 2021; Bahrum et al., 2023)
<b>Evaluasi</b>	Formative & Authentic Assessment, Learning Reflection	Observation of learning process, Simple oral test, Student journal or drawing work.	Evaluate the process as well as learning outcomes for improvement feedback (Andayani & Madani, 2023)

**Table: Conceptual Model for Learning Mathematics Phase A**

This model brings together planning, implementation, and evaluation as a whole learning cycle in the context of Merdeka Curriculum, especially for Phase A (grades I and II). This model is also inspired by the learning systems approach (Dick & Carey, 1996) which emphasizes the importance of continuity between learning components for optimal results

## 2. Method

This research is a qualitative study with a case study approach conducted in one of the elementary schools in Malang. The purpose of the research is to understand the phenomenon of learning through the experiences, behaviors, and perceptions of the subject, in accordance with the views of (Haki, Prahastiwi and Selatan 2024). Case studies describe reality through individual and collective portraits (Creswell, 2015). The research subjects consisted of five informants, namely two classroom teachers and three students who were purposively selected based on their active involvement in the learning process. Data collection was conducted through observation and interviews, using instruments such as observation guidelines and interview guidelines. Data analysis refers to the Miles and Huberman model (1994), including three main stages: data reduction, data presentation in narrative-descriptive form, and conclusion drawing. Data validation was done by triangulating sources (comparing data from teachers, students, and relevant documents/articles) and triangulating techniques (comparing observation and interview results). Although the data has been analyzed systematically, this study still has shortcomings, including the number of respondents who were not explicitly mentioned in the initial version, as well as the explanation of data analysis which was previously general without referring directly to the Miles and Huberman model. This is an important note for improvement to make the research report more structured and informative.

## 3. Results and Discussion

This study was conducted in one elementary school with a qualitative approach to examine how the process of planning, implementing, and assessing mathematics learning is used by elementary level teachers. The results of observations and interviews show that the lesson plans used by teachers are in accordance with the principles of the independent curriculum and meet the needs of students. The teacher has prepared a teaching module designed based on the characteristics of students in the classroom, the teacher not only prepares the teaching module contextually, but also prepares various learning media that support the achievement of learning objectives including materials and adaptations of learning activities to be more easily understood from low grade students, the learning methods used in the classroom are diverse, namely discussion and game methods using concrete objects in the classroom. in addition to concrete objects in the classroom, According to the teacher, “children understand more quickly when using concrete objects such as money or number cards, because they can directly see and hold.” In addition to concrete objects, the learning media used include number cards, limbs, interesting pictures, and videos shown through the projector. Teachers also rely on textbooks and utilize internet technology to support learning effectiveness. Educators use Learner Worksheets (LKPD) to assess students' cognitive level.

In the application of learning, educators utilize interactive learning, discussion, and educational

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games to foster a fun and interesting learning environment. The learning model used is TGT (Teams Games Tournament), which is collaborative learning combined with games. Teachers form study groups based on students' cognitive skill level and difficulty level, ensuring that the learning process is more uniform. The media used in learning is quite diverse, including concrete objects, limbs, numbers on cards, pictures, and videos displayed through the projector. Teachers also utilize the Steam approach to increase students' interest and participation in the learning process by incorporating art elements into the classroom through media. Therefore, facing challenges in the form of differences in the nature of students, especially in their ability to read long texts. To overcome this, the teacher showed patience and understood the students' characters by providing individual guidance so that students could still follow the learning well. One student said, "If I learn math using games, I remember more easily and enjoy learning." Another student added, "If something is difficult, the teacher always helps me until I understand."

Learning assessment is done through exams, tests, and assignments given regularly. Tests consist of daily evaluations (UH), midterm evaluations (UTS), and end-of-semester evaluations (UAS), which include questions that measure students' understanding of concepts, critical thinking skills, and skills. Teachers also use LKPD (student worksheets) as an instrument to measure students' structured cognitive performance. The conference was designed to ensure that teachers are adaptable, creative and useful implementation of students' needs as required by the curriculum.

### **Mathematics Learning Planning in Primary School**

Lesson plans are decisions that determine what has to be achieved in the learning process, how to achieve it, and how the goals have been achieved. Learning planning does not only focus on setting goals, but also includes strategies for achieving and evaluating learning outcomes. Thus, teachers are required to design a comprehensive and systematic learning process so that learning activities can take place effectively, measurably, and according to student needs. In implementing the learning process, a teacher is required to be able to realize a learning process that can make students feel interested and have great curiosity, especially in learning mathematics. In their efforts to recognize quality learning, teachers must be able to bring creativity and innovation in the implementation of the learning process. For this purpose, it is important for teachers to determine and choose which strategies to apply in the implementation of learning according to the needs of students. stated that because each individual has a different way of learning, educators must pay attention to the instructional techniques used based on the situation and the needs of students (Astini Ni and Rini Purwati, 2020).

In the learning process, teachers apply various methods to make the classroom atmosphere more interactive and interesting. The methods used include lectures, discussions, and educational games where concrete objects are available in the classroom. The use aims to help students understand the concept of units of place more realistically and easily understood. In addition, the learning media used is not only limited to concrete objects, but also includes body parts and fingers as tools for understanding. Referring to the theory of cognitive development (Juwantara, 2019), phase A students are at the concrete operational stage. Therefore, learning mathematics ideally uses concrete objects and direct experiences understood by early childhood. Therefore, it is important to understand basic math concepts such as the use of specific objects and manipulation activities such as counting on fingers, using real objects, and using physical forms that can be understood by young children children from an early age. This is in line with the results of research by Wulandari and Hartati (2022) which states that the approach to learning mathematics with concrete and contextual media can significantly improve students' understanding of concepts. In addition, research by (Fitriyah and Syamsudin, 2021) shows that learning planning that pays attention to learning styles and the use of relevant media can create more active and meaningful learning. By comparing these studies, it can be seen that the approaches teachers use in learning mathematics are in line with the good practices found in various studies.

With the existence of Student Worksheets (LKPD), it can be useful to enrich students' learning experience. LKPD serves as a formative assessment instrument and a medium for independent group exploration. Through challenging tasks that are appropriate to the students' cognitive development level, LKPD allows students to develop a deeper understanding of the unit place concept, as well as exercise problem-solving and collaborative skills. However, in practice, the effectiveness of teaching modules largely depends on their flexibility and suitability to the real conditions in the classroom. Teachers need to regularly think about dynamics, categorize and study answers from students, and adapt to their results. Therefore, educational modules should be designed as dynamic documents, which are open to revision of diagnostic reviews and observations during learning. Nevertheless, the shortcomings that are still found in the planning of mathematics learning in the field include limited time in developing contextualized LKPDs, and there are still teachers who are not fully able to link material with students' real experiences. In addition, not all teachers routinely reflect on the implementation of

planned learning, so learning can be less adaptive to the actual needs of students. Overall, the learning approach that combines concrete objects, body media, LKPD, and various methods can create an active and comfortable classroom atmosphere. Students not only understand the concept of units of place conceptually, but are also able to apply it in everyday life, such as calculating the amount of money, understanding dates, or reading numbers on measuring instruments. This learning strategy reflects the essence of Merdeka Curriculum, which is to create meaningful understanding through relevant and enjoyable learning experiences.

### **Implementation of Cooperative Model-Based Mathematics Learning**

Learning implementation is the real condition of the learning plan that has been made by the teacher, where various learning activities are carried out to achieve predetermined learning objectives. At this stage, teachers direct teaching and learning interactions by providing resources, instructional techniques, media utilization, and recommendations, as well as motivating learners throughout the educational journey. Implementing learning involves the interaction between students, teachers and educational resources in a learning setting to achieve the goals outlined in the planning. This shows that implementing learning does not only involve delivering materials, but also includes monitoring the learning environment, time, and strategies aligned with student characteristics to ensure the learning process takes place optimally.

In the implementation of learning in the classroom, the methods often used are lectures and interactive games, which allow students to be more active in understanding the material being taught. The learning model applied is the Teams Games Tournament (TGT) model, where teachers can group students based on their cognitive abilities and difficulty levels so that the learning process becomes more effective and in accordance with the needs of each individual. This cooperative learning model is used for all students without status differences (Teranikha, Fatonah, and Saputro, 2024). The use of learning media is also an important aspect in supporting student understanding, so that concrete objects and body parts are used as tools to convey concepts in real terms and are more easily understood by children. In addition, the strategy used in this learning is the STEAM strategy (Science, Technology, Engineering, Arts, and Mathematics), which integrates art into learning media so that students are more interested and involved in the learning process. However, in reality, there are several challenges for teachers, especially in relation to the various characteristics of students. One of the main difficulties found is the limited reading ability of grade 1 students, especially in comprehending long texts. This is due to their early cognitive development and differences in learning speed among students. Therefore, as a solution, teachers need to understand the characteristics of each student, apply a systematic approach with patients, and apply it to reading long texts. With patience and the right method, students can be helped more in improving their reading skills, so that learning can run more effectively and according to their needs.

According to (Natasya Nurul Lathifa et al, 2024), cooperative learning models such as TGT can increase students' motivation to learn because of the social interaction that encourages them to support each other in understanding the material. Therefore, the use of this model, combined with the right method in assisting students, can produce maximum results in the learning process. This is also reinforced by the findings of (Yuliani & Susanto, 2020). which showed that the use of the TGT cooperative model significantly increased the engagement and achievement of learning outcomes of elementary school students in mathematics learning. The findings state that interaction between students in cooperative groups can increase their confidence and critical thinking skills.

The use of this flexible learning strategy shows that teachers have a central role in creating a learning environment that is inclusive and responsive to students' needs. The use of TGT sample combined with steam approach and real-world media can increase students' participation in learning cognitively and emotionally. In addition, understanding the characteristics of students, especially in low grades such as grade 1, is the main key in designing the right approach so that each child can develop according to their potential and learning pace. With the realization of planned, flexible, and fun learning, it is expected that the learning process is not only effective in achieving goals, but also creates a pleasant learning experience for students.

### **Evaluation of Mathematics Learning in Primary School**

Assessing learning is a systematic process of collecting, analyzing and interpreting information and ascertaining how far learning targets are achieved. This assessment not only serves as a reflective tool for teachers in improving learning methods. According to Nana Sudjana 2005, learning assessment is the process of determining the success of learning activities carried out by students and teachers who achieve planned goals covering three main aspects: cognition (knowledge), emotions and emotions (regulation), and psychomotor (skills). In the curriculum assessment focuses on formative and

comprehensive review as a whole so as to explain the overall development of students. Correct and continuous assessment allows supervisors to provide constructive feedback and learning that is immediate, more efficient and can adapt to the needs of learners.

Assessment in the educational process comes in different formats, including exams, tests, and assignments, to evaluate students' understanding of the content that has been taught. Tests are conducted regularly to ensure that students understand the concepts taught by the teacher. This form of repetition can take the form of daily repetition (UH), mid-term repetition (UTS), or end-of-semester repetition (UAS). As a rule, daily tests are conducted after one or more submaterials are completed in a lesson and serve as a measure of understanding of the material taught as a measure of student understanding. Meanwhile, mid-term tests will be conducted in the middle of the semester as a student evaluation for half of the study period, as a semester assessment, and as an evaluation of the semester test conducted at the end of the semester. To form a comprehensive assessment of all material investigated for the full semester. The questions provided in the test should generally test different aspects of students' skills, including basic concepts, detailed understanding, and skills in the use of learning knowledge. The questions used can vary. A variety of choice, explanation, and even practical skill-based questions, depending on the learning objectives being achieved. This test allows teachers to determine how well students understand the material they have learned and to know which parts they need to improve or enhance in the next learning process. In addition, the results of these assessments are also considered by teachers when designing more effective learning strategies to ensure that students achieve optimal learning outcomes. Therefore, assessment in the form of tests plays a very important role in supporting the success of the learning process, both for students and teachers developing better teaching methods.

Teachers play a central role in the whole process of learning assessment, not only as enforcers, but also as outcomes of assessment designers, processors, and users. According to (Nana Sudjana, 2005), teachers are responsible for compiling assessment instruments that conduct assessments by meeting learning objectives and metrics, taking into account the status of students and analyzing the results of assessment decisions of student performance and the level of learning limitations. In addition, teachers provide positive feedback to students as part of the learning process and as part of developing follow-up in the form of corrective action for students who have not completed and additional materials for students who have understood. Therefore, evaluation works as an important instrument for educators to improve the quality of learning and ensure the achievement of desired competencies. In comparison, a study by (Sari and Hakim, 2021). showed that formative assessment combined with immediate feedback can improve the understanding of mathematical concepts in elementary school students. This research confirms the importance of teachers in evaluating not only the final results, but also the learning process of students on an ongoing basis.

### **3.1. Conclusion**

This research shows that the low literacy skills of Phase A primary school students are caused by various interrelated factors, both from internal and external aspects of learning. Lack of variety in learning methods, limited access to interesting reading materials, and low teacher skills in delivering material effectively are the main factors influencing this condition. In addition, the use of learning modules that are general in nature and not tailored to the characteristics and needs of students is also an obstacle in improving literacy.

Monotonous learning methods and the lack of interactive learning media make students less interested and easily lose motivation. In fact, learning motivation is an important aspect in developing literacy skills from an early age. Teachers have also not given special attention to students who have difficulty reading and writing because they have not conducted a thorough initial assessment and have not designed differentiated learning strategies. To overcome this condition, teachers need to make adjustments to the learning module to make it more contextual and appropriate to students' backgrounds. The learning approach should also be more interactive, varied, and adapted to students' learning styles. The use of interesting and innovative learning media, as well as conducting accurate initial assessments, are key strategies in improving students' literacy in the early grades. It is also necessary to support a learning environment that is richer in reading materials and active participation from parents in accompanying their children's learning process at home.

This study was limited to one primary school in Malang city and used a qualitative approach, so the results are contextual and cannot be widely generalized. Therefore, further studies are recommended to be conducted in various regions with a more comprehensive approach to gain a broader and deeper understanding of literacy improvement efforts at the primary school level

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Nafilla Maulaya Nasitha: Conceptualization, Methodology, Investigation, Data Curation, Writing - original draft, Writing - review & editing.

The author has read and approved the final manuscript.

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