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COMPARATIVE ANALYSIS OF INDONESIA AND THAILAND STUDENTS' MATHEMATICAL THINKING ABILITY

Anisa Agustiana[1]✉, Andika Arisetyawan[2], Supriadi[3], Krittika Anusaen[4]

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Abstrak

Penelitian ini bertujuan untuk membandingkan kemampuan berpikir matematis antara siswa sekolah dasar di Tangerang, Indonesia dengan Mahasarakham, Thailand. Metode yang digunakan dalam penelitian ini adalah studi komparasi yang dilakukan dengan cara membandingkan jawaban soal tes matematika yang diberikan kepada subjek penelitian, yakni siswa sekolah dasar kelas 3 dan 5. Tujuan utama dari penelitian ini adalah mengetahui faktor penyebab adanya perbedaan jawaban dari tiap siswa. Hasil penelitian ini menunjukkan bahwa terdapat perbedaan antara siswa dalam menjawab soal tes matematika yang disebabkan oleh variasi tingkat kecerdasan di dalam satu kelas, mencakup aspek-aspek tertentu seperti pemahaman konsep, keterampilan pemecahan masalah, dan kemampuan berpikir abstrak. Dengan demikian kemampuan berpikir matematis setiap siswa dapat dipengaruhi oleh faktor-faktor spesifik yang mencakup karakteristik kognitif dan perkembangan matematis mereka. Meskipun jawaban siswa bervariasi melalui proses yang berbeda, hal ini menunjukkan adanya keunikan dalam pendekatan dan strategi berpikir matematis yang diterapkan oleh masing-masing siswa dalam menyelesaikan soal. Penelitian ini diharapkan dapat memberikan kontribusi dalam dunia pendidikan khususnya dalam merancang rencana pembelajaran yang disesuaikan dengan karakteristik dan kemampuan dari setiap siswanya.

Abstract

This research aims to compare mathematical thinking abilities between elementary school students in Tangerang, Indonesia and Mahasarakham, Thailand. The method used in this research is a comparative study which is carried out by comparing the answers to mathematics test questions given to the research subjects, namely elementary school students in grades 3 and 5. The main aim of this research is to find out the factors that cause differences in the answers of each student. The results of this research show that there are differences between students in answering mathematics test questions caused by variations in the level of intelligence within one class, including certain aspects such as understanding concepts, problem solving skills, and abstract thinking abilities. Thus, each student's mathematical thinking ability can be influenced by specific factors that include their cognitive characteristics and mathematical development. Even though students' answers vary through different processes, this shows the uniqueness of the approach and mathematical thinking strategies applied by each student in completing the test. It is hoped that this research can make a contribution to the world of education, especially in designing learning plans that are tailored to the characteristics and abilities of each student.

✉**Alamat korespondensi:**
Kampus Daerah Serang, Universitas Pendidikan Indonesia[1,2,3]
Mahasarakham University Demonstration School (Elementary), Thailand[4]
E-mail: anisa14@upi.edu[1]

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INTRODUCTION

Mathematical abilities are needed in everyday life, especially in the world of digital technology. Mathematics is a fun science that is often less popular with students because of its abstract nature. Elementary school students whose thinking is still concrete need learning media or a bridge to understanding a mathematical concept. Teachers should prepare learning tools (identifying learning content and objectives) more maturely for students by using educational tools (Radhy, 2018).

A grade has diverse student characteristics. Therefore, mathematics should be packaged in the form of appropriate learning strategies. Strategies and programs are created based on an educational philosophy that consists of four categories, namely e-learning, active and cooperative, mental maps, and brain-based learning and thinking. These four categories can be applied in primary and secondary schools (Alhadoor et al., 2023).

Thinking is the concept of consciously using intellect to make a decision or solve a problem. Mathematical thinking means the ability to find solutions to mathematical problems. Mathematical reasoning abilities according to (Risaldi et al., 2023) consist of six indicators, namely 1) making conjectures, 2) manipulating mathematics, 3) providing reasons or evidence for the correctness of the solution, 4) concluding, 5) checking the correctness of the argument, and 6) find patterns/characteristics of mathematical phenomena for generalization. The required mathematical competence is currently hampered by a lack of mathematical ability caused by anxiety about mathematics.

Based on research by (Brewster & Miller, 2020) mathematics anxiety causes students to experience cognitive dimension disorders that inhibit working memory. Missing the opportunity to learn basic mathematical concepts causes great stress and feelings of anxiety. It requires a process of expressing anxiety in the form of writing something or keeping yourself busy. Researchers hypothesize that positive expression writing is much better than expressive writing interventions because it can change thought patterns into opportunities. The mindset of each individual is not the same. Each student in the grade has a different level of thinking ability. Mathematics learning often has ongoing misconceptions. This is also explained by (Supriadi, n.d.) there is a symbol for the number 24 and we say "two and four", this is a misconception, it should be twenty-four. The material taught is too rushed and has nothing to do with conceptual understanding. Memorizing questions is often done in mathematics, the forgetting factor which is very influential in answering a question/exam can at least hinder the completion action. Misconceptions (misunderstandings) occur so that what has been wrong is considered to be the truth (Nurfadhilah AM. Hindi & HR, 2023).

Based on the results of research conducted by (Ahmad et al., 2023), there are differences in the quality of the answers submitted between students in the low, medium, and high categories. Answers from low-category students tend to be shorter and do not clearly explain each problem in the question. Answers from students in the medium category tend to be shorter, but the subject explains clearly and precisely each problem in the question. Meanwhile, high-category students answered in very detail by explaining the stages of solving the problem asked in the question. This is caused by several factors, including the level of intelligence, ability to understand mathematics, and additional facilities from parents. Globally, the STEM integrated education system in schools involves students being active in teaching and learning activities. Direct practice and problem-based activities have become the main characteristics of STEM learning, so the role of parents and schools is needed to provide good facilities for children (Siregar et al., 2023).

As for the supporting factors for learning mathematics that teachers need to pay attention to, one of them is productive fighting power. This is also explained by (Mefiana et al., 2023) that students with highly productive fighting power do not give up easily when faced with difficult questions. Students with productive fighting spirit are shy and hesitant to ask the teacher but still have the motivation to learn mathematics. Meanwhile, students with low productive fighting power tend not to try when given difficult problems. Mathematics problems are often found in everyday life. In previous research, it was

found that mathematical thinking skills greatly influence the lives of elementary school students in the future. For each problem given, student feedback should be asked for. Tests that are very helpful for getting feedback from students aim to see if there are any problems with any topic. The success rate is also influenced by the quiz time limit (Pasáčková, 2023).

Based on research conducted by (Ernawati & Firdaus, 2020), subjects with high abilities have good mathematical reasoning abilities because students with high abilities can carry out both indicators on the problem, namely estimating the answer or solution and carrying out calculations based on certain rules or formulas. Mathematics learning that is connected to the real-world can improve students' mathematical thinking abilities. Students need to understand how to use knowledge to solve real world situations so that the teaching process focuses on the integrated application of knowledge and higher-order thinking activities, such as creative problem-solving (Zhang, 2023).

Elementary school students' mathematical thinking abilities tend to dislike formulas. This was also explained by (Harahap & Nurlaelah, 2023) that students can think mathematically with flexibility and are less superior in terms of originality of ideas. In interviews, they mastered questions that compared objects better than exploration questions because they were fixated on formulas. Based on research from the Asian South Pacific Bureau of Adult Education (ASPBAE) and the Global Campaign for Education in 2005, Indonesia was only ranked 10th among 14 developing countries in the Asia Pacific region in the category of basic education quality, so Thailand was able to rank first, which was then followed by Malaysia, Sri Lanka, Philippines, China, Vietnam, Bangladesh, Cambodia, India, Indonesia, Nepal, Papua New Guinea, Kep. Solomon, and Pakistan (Rifai, 2019).

The novelty of this research lies in the direct comparative analysis approach to the mathematical thinking abilities of Indonesian and Thai students. In contrast to previous research which tends to use deductive thinking and direct proof, this research focuses on analyzing differences in mathematical abilities between two groups of students from two different countries. Through the title "Comparative Analysis of Indonesia and Thailand Students' Mathematical Thinking Ability" researchers want to bridge the knowledge gap regarding the comparison of mathematical thinking abilities between students from two different educational cultures. This novelty is important because it provides in-depth insight into the factors that can influence differences in mathematical abilities between students from two countries, which can be the basis for designing learning strategies that are more effective and oriented to the specific needs of each group of students. Additionally, this direct comparative analysis approach can make a significant contribution to our understanding of variation in mathematics learning and add to the scientific literature with a broader perspective.

METHOD

The subjects of this research were elementary school students in lower and higher gradees with research locations at Mahasarakham University Demonstration School (MUDS), Thailand and SDN Sodong I, Indonesia. Researchers take samples randomly or by "random sampling". Based on the observations that have been made, as a sample of the lower gradees the researchers took grade 3 students, both in Indonesia and Thailand. This is based on the results of direct observations carried out by researchers looking at the English language skills of grade 3 MUDS students in the good category. Sitting in grade 3 is a transition period for students so that their thinking skills begin to be honed, compared to grades 1 and 2. In grade 3 students have graduated from beginner reading (Sdn et al., n.d.).

Then for high-grade students, namely grade 5 students. Of all the students at MUDS who have good English language skills, students in grade 3/1 Esc (English Study Club) and 5/1 Esc. Thus, when collecting data in Indonesia, students in grades 3 and 5 at SDN Sodong I will find it easier to compare. The selection of the 2 locations was based on the International Education Professional Strengthening Program (P3K) which was carried out by researchers on 7 July - 12 August 2023 in Thailand. This type of research is descriptive analysis, especially comparative descriptive analysis using a qualitative

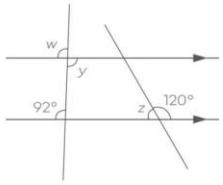
approach. The comparison method that researchers use is the method of similarity, namely comparing two things by looking at several similarities that they both have. All data found during interviews, observations, and field tests will be analyzed, summarized, and presented in a simple picture. Collection methods, namely observation, interviews, and tests.

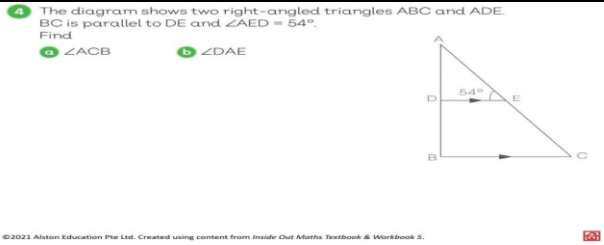
Interviews were conducted with tutor teachers at MUDS, and grade 5 teachers at SDN Sodong I. Observations were carried out in every grade 1 - 6. This aims to find out the extent of MUDS students' English language skills so that researchers can optimally conduct research in the form of mathematics tests (questions in English) for students. The question instruments given are based on the curriculum and books used at MUDS using the book Inside Out Mathematics Based on the Basic Education Curriculum B.E.2551 (Revised Edition B.E. 2560). The material tested by the author is based on ongoing material at MUDS. In grade 3 about multiplication and grade 5 about angles and lines. Multiplication is repeated addition for a set of natural numbers (Supriadi, n.d.) The material raised in grade 5 is in line with research (Tri et al., 2021) that angles and lines have basic competencies contained in Permendikbud No. 24 of 2016, namely analyzing the relationship between angles as a result of two parallel lines being cut by a transversal line, solving problems related to the relationship between angles as a result of two parallel lines being cut by a transversal line. This topic was chosen because the applications of this material are often found in everyday life.

The test instruments given are also based on the Higher Order Thinking Skills (HOTS) level. Students are expected to have high HOTS to understand in-depth concepts (Heron & Palfreyman, 2021) and make it more likely that they can use the knowledge and abilities they have built to find solutions to the problems they face (Liu et al., 2022) Apart from that, students need to develop their HOTS because these skills are needed so they can think creatively. Creativity is one of the keys to success in all fields and amid rapid development and triggers someone to be able to find new ideas or thoughts to make discoveries that might change the world for the better (Marczewska et al., 2023).

Based on the results of research conducted by (Dwi Rohmawati & Fathoni, 2022) show that the HOTS-based math problem familiarization method is effective and optimal in improving elementary school students' critical thinking skills. Therefore, the questions that researchers give can measure the level of students' mathematical thinking abilities. The grade 3 test instrument is based on the series that covers the learning objectives of the Basic Education Curriculum B.E 2551 (Revised Edition B.E. 2560) in Thailand and shows the indicator with the strands. Standard C 1.1 Understand the diversity of number expressions, number systems, operations of numbers, results of the operations, properties of the operations, and the applications. With indicators in the form of fine sums of addition, subtraction, multiplication, division of cardinal numbers, and 0. Apart from that, for grade 5 with standard C 2.2 Understand and analyze geometric figures, properties of geometric figures, relationships between geometric figures, and geometric theorem and applications. With indicators in the form of Drawing a straight line or a segment of the line to be parallel to a given straight line or segment of line (including perpendicular lines, alternate angles, interior, and exterior angles on the same side of a transversal).

Tabel 1. Students Test Questions

	Question Format
Grade 3	6 Lek arranges his stamps in 7 pages of his stamp album. He puts 32 stamps on each page. How many stamps does he have?
Grade 5	3 The diagram shows two straight lines that cut a pair of parallel lines. Find all the unknown angles. 



The data analysis technique used by the author is based on the theory of Miles and Huberman (2014), the analysis consists of four activity flows that occur simultaneously, namely: data collection, data reduction, data presentation, and concluding/verification.

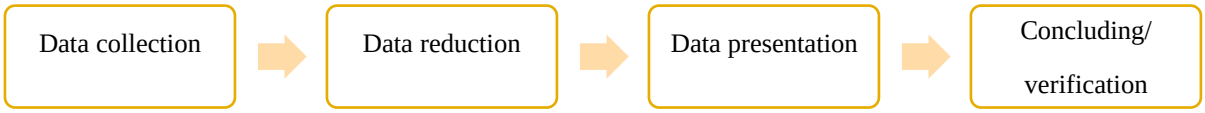


Figure 1. Data Analysis Technique

RESULT AND DISCUSSION

Based on the results of coordination with MUDS tutor teachers, researchers determined gradees 3 and 5 as the samples from which data would be taken. Almost all of the students in both gradees have quite good English language skills so that learning activities can run optimally. The results from observations of the learning system implemented still use the lecture method. Therefore, researchers took the initiative to use math stick (lidimatics) learning media in multiplication content in grade 3. Apart from that, in grade 5 the math content was in the form of lines and angles, this was explained in research (Tri et al., 2021) that there were students experiencing difficulties. In understanding the material about lines and angles, students felt that what was taught by the teacher lacked media to eliminate boredom during learning and made students inactive due to using the lecture method in teaching.

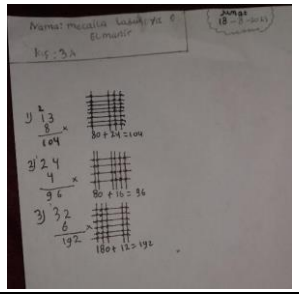
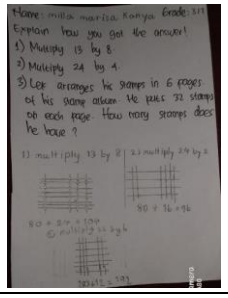
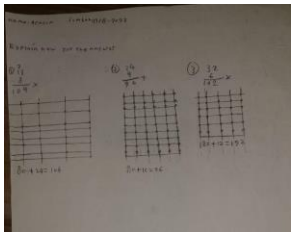
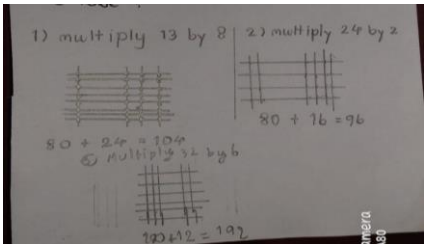
Figure 2. Math Stick Learning Media

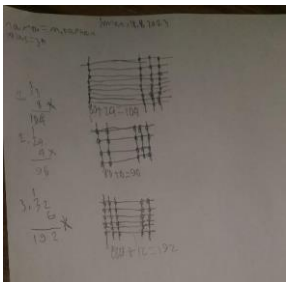
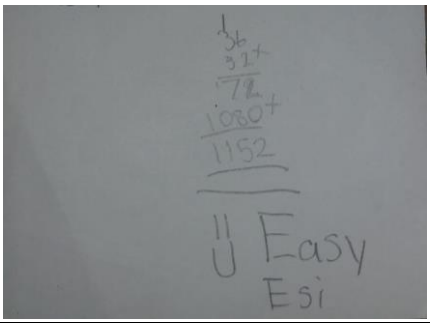
This media made from paper sticks is an alternative because sticks are a little rare to find around MUDS. However, students can understand how to use this media. The media that researchers teach to Thai students is learning media based on Indonesian culture. Researchers teach mathematics while introducing and relating it to the culture in Indonesia. The importance of using media in mathematics learning can minimize the occurrence of misconceptions. This is also explained by (Nur Ahzan et al., 2023) that the role of learning media is very determining in developing the potential that exists in individuals as learning subjects. Apart from that, media can also be used as a bridge to cultural introduction for students. Teaching tools that are integrated with local wisdom content also remind students of the importance of preserving the very diverse local wisdom values in Indonesia (Arisetyawan et al., 2021). The benefits obtained by using media are that the learning process becomes more exciting

and interactive, the amount of teaching time can be reduced, the quality of student learning can be improved, and students' understanding of attitudes can be improved (Arifin & Nugroho, 2023).

A suitable form of learning to improve Mathematical Understanding Ability (KPMM) and mathematical resilience includes the ability to motivate students to actively discuss and ask questions during the learning process (Lutfiyana et al., 2023). According to (Rohman et al., n.d.) mathematics has significant potential in helping students develop a variety of skills and attitudes that they will need in the future. Mathematical connections play a very important role in everyday life. Every student has a different learning style. Students who have a field-independent cognitive style can determine solutions to problems. Thus, mathematical connection abilities can help students in solving mathematical problems (Muhdiyanto et al., 2022). Based on the results in the field, the number of grade 3 students at SDN Sodong I is 30 students as well as grade 5 students. The number of students in each grade at MUDS is 25 students. Researchers took each answer from each grade of 3 students, students with high, medium, and low abilities. The test results above can be analyzed in that students answered these questions using two techniques. The first technique is the technique that is usually used (multiplication in layers) and the logic technique. Grade 3 students can understand questions presented in English, even though there are no English subjects at school. Researchers used 2 languages (Indonesian and English). The research at Sodong I Elementary School was carried out on Friday, August 18, 2023. Grade 3 students very quickly grasped the material that the researchers taught. It can be seen that students with high ability answered the questions in clear stages, students with medium ability could answer correctly, but the stages were less clear, and students with low ability were not neat in answering the questions. In everyday situations, many students often need to repeat their questions to the teacher so that they can understand the meaning of the question and give the right answer. Based on learning results, third-grade students stated that understanding these questions required quite an extra effort (Apriningtyas & Amalia, 2023).

Tabel 2. Comparison of Grade 3 Students' Answers

Category	SDN Sodong I - Indonesia	MUDS - Thailand
High level student abilities		
Medium level student abilities		

Low level student abilities		

The mathematical ability of grade 3 elementary school students has also been proven in previous research conducted by Pandra (2017) stating that the grade 3 mathematics learning outcomes test instrument developed had a reliability coefficient of 0.783 which shows that the mathematics test instrument provides good measurement results stable and consistent. Other research also notes that students in grade 2 can respond well when carrying out geometric reasoning using digital applets if the instructions are appropriate, and can communicate their thinking and reasoning (Lingefjärd & Ghosh, 2022).

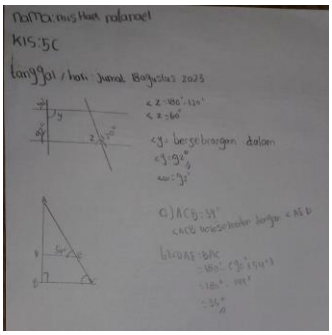
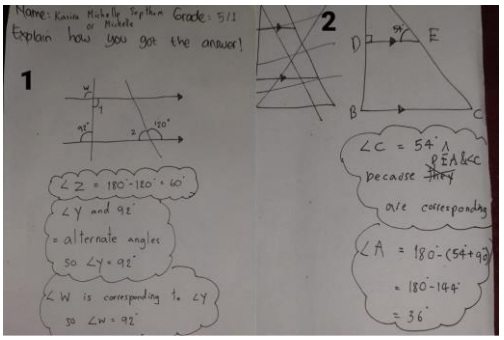
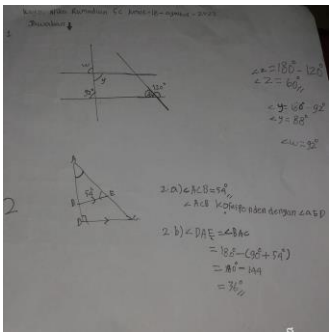
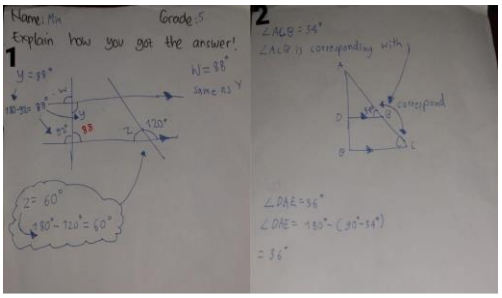
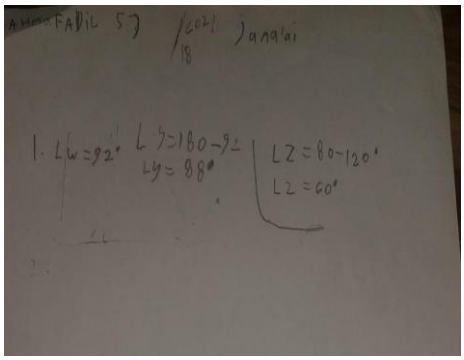
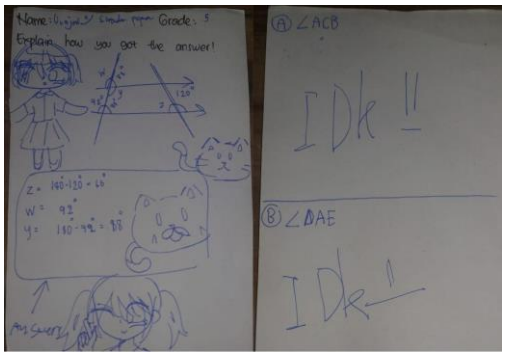
In contrast to students who have low ability, they tend not to be able to answer questions correctly and are reluctant to ask questions, not making more effort to find the answer. Students who have limited abilities still experience difficulties in identifying the formula that must be used to solve a problem, in line with research findings by Sulastri et al (2017), who noted that students who have low ability face challenges in formulating and using symbolic representations, as well as pictures. Students who use their brain capacity optimally can express their mathematical abilities through various methods of answering. This is in line with research conducted by Rahmasuri et al (2022) regarding indicators that are met for students who have a high level of ability in understanding mathematical concepts explained in writing, conveying mathematical ideas logically and clearly to teachers, friends and other individuals, and express mathematical ideas. These indicators include the use of mathematical language such as notation, terms and symbols to convey mathematical information, including the use of mathematical expressions such as formulas, charts, tables, graphs and models, as well as presenting conclusions regarding solutions to everyday problems. The positive influence of formative assessment on academic achievement is the provision of significant feedback regarding student knowledge as well as the identification of places of error or inappropriate understanding (Gagatsis et al., 2016).

Based on the test results, students can answer with only one technique. This is in line with research conducted by Hanany & Sumaji (2021) that the ability to think creatively in mathematics includes skills in putting forward innovative ideas, exploring new perspectives on problems, combining concepts that have been obtained into new innovations, and finding solutions, through the use of various approaches. The lidimatics technique still feels foreign to them so they prefer to use the multiplication technique in layers. Students with high ability can answer directly using the technique newly taught by the researcher, while students with moderate ability can only answer using the multiplication technique, and students with low ability answer less correctly. MUDS students predominantly use the multiplication method because they have been accustomed to using this multiplication method since elementary school. Students cannot receive new material or new techniques in just one meeting, students need continuous time until students can accept and get used to using several multiplication methods other than multiplication (Santy et al., 2023) Apart from that, students are also free to look for alternative answers to give the impression of being happy in learning (Gyanthi et al., 2023).

Students who have a preference for a visual learning style in mathematical communication are not always able to present information obtained from problems comprehensively in written form, and they also often have difficulty converting information into graphical representations to solve problems.

Even so, these students can still outline the steps for solving using the mathematical concepts they have, and they can draw the right conclusions (Abdillah et al., 2022).

Tabel 3. Comparison of Grade 5 Students' Answers

Category	SDN Sodong I - Indonesia	MUDS - Thailand
High level student abilities		
Medium level student abilities		
Low level student abilities		

Referring to the test results, students can answer using the steps explained by the researcher at the beginning of the lesson. Students with high abilities can answer correctly and in the correct stages. Students with medium ability can write the steps correctly, but the answers are not correct, while students with low ability cannot completely solve the questions and their writing is less appropriate. Although there are still conceptual errors in student number 1's answer. This cannot be denied, basically, they have never been taught this material. The results of interviews conducted with grade 5 teachers showed that material regarding Lines and Angles had never been taught before. However, this is not an obstacle for researchers and students who feel challenged to do test questions. Low creative thinking has an impact on students who will find it difficult and will not like studying mathematics. Schools need learning methods that involve students being active and thinking creatively in the learning process (Rulistiani et al., 2023).

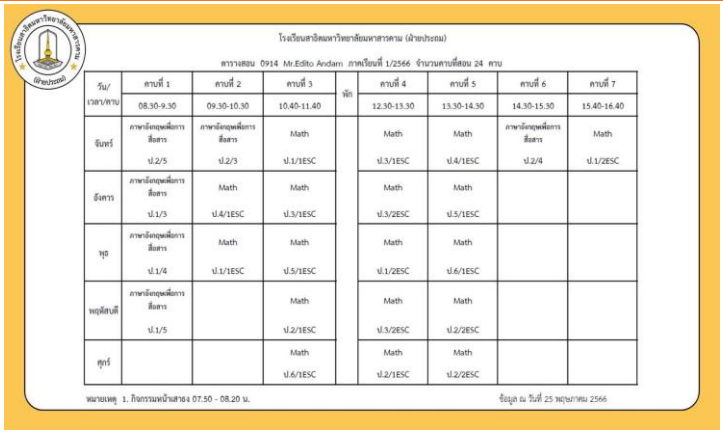
The researcher first explained the material and then distributed the question sheets to grade 5 students at SDN Sodong I. One of the students from grade 5 said:
"*This is middle school material*."

This sentence states that it is true that grade 5 elementary schools in Indonesia have not yet entered this material. The material they learn is about Fractions, Decimals, Percents, Flat Figures, Space Figures and Scales, whereas if you look at the content of grade 5 material at MUDS there are Fractions, Decimals, Lines and Angles, Percentages, Perimeter and Area, Measurement and Conversion of Units, Geometric Solids and Volumes, Constructing Rectangles and Parallel Lines, and Handling Data.

Grade 5 students do have above-average abilities. Students with high abilities can explain the stages of the process of how they find the answer. Students with moderate ability can explain the stages, but some answers are still not quite right. Meanwhile, students with low abilities cannot solve some of the questions given. This is proven by his learning style which prefers practicing questions rather than just listening to explanations from the teacher. This is different from grade 6 in the content of flat shapes, they do not gradeify triangles that are oriented downwards as triangles. There may be several reasons, such as they have rigid prototype thinking and/or lack experience in working with shape properties and examples other than prototypes. On the other hand, second-grade students can identify the main properties of triangles such as three sides and three vertices, differentiate triangles based on the length of their sides, and recognize triangles and circles (round objects) in three dimensions by describing them (Herheim, 2023).

Through observing the way students use mathematical representations in solving linear equation problems, it was found that the results of the representation varied, although there was a tendency towards a certain form. These findings can be used as a basis for developing further research or exploration regarding the use of various characteristics of mathematical representations (Ar et al., 2021) According to Syafri (2019), mathematical representation is the result of someone's thinking who conceptualizes ideas in a mathematical context in a certain way to find a solution. This fact shows that the majority of students experienced an improvement in their skills, from before the intervention to after. These improvements include their ability to construct story questions that can be solved, sometimes with multiple steps. In addition, students also demonstrated strong skills in connecting the story questions they created with the equations they chose. Using various contexts in problems encourages students' creativity, independence, and interest in formulating and solving problems, because students have the freedom to choose the appropriate problem context. Directing students to formulate semi-structured problems by providing pictures or other support as they develop equations creates a balance between giving students freedom in learning and ensuring they understand the material correctly. Lastly, giving students the freedom to create their problems based on their interests increases their sense of ownership in the learning process and allows teachers to observe students' learning progress (Bevan & Capraro, 2021). The mathematical thinking process of students who have an impulsive cognitive style at the stage of formulating problem-solving strategies involves expressing the intention to find the relationship between available data and the unknown, as well as identifying the formula to be used. Meanwhile, the mathematical thinking process of students with a reflective cognitive style includes problem-solving steps that are expressed correctly (Amaludin et al., 2023).

Based on the pictures above, it can be seen that each student has his way of solving problems or finding solutions to answers. By recognizing and explaining the different ways students formulate mathematical thinking, this spectrum of thinking can be a useful tool for avoiding negative views and moving to mathematics teaching methods that focus more on excellence in the learning process (Scheiner, 2023). Teachers recommend the importance of preparing more abundant material which is believed to be better able to attract students' interest through animation, depicting daily life situations, and allowing for active interaction between students (Güveli et al., 2021). The frecuency of learning for students in grades 3 and 5 at MUDS in English language mathematics is 2 times. Apart from that, they also studied mathematics in Thai twice. So in total, they study mathematics 4 times a week. This limitation makes it difficult for students to solve problems by thinking backward (Pebrianti et al., 2022).



โรงเรียนสาธิตมหาวิทยาลัยมหาสารคาม (ฝ่ายประถม)

ตารางสอน 0914 Mr.Edito Andam ภาคเรียนที่ 1/2566 จำนวนคาบที่สอน 24 คาบ

วัน/เวลา/คาบ	คาบที่ 1	คาบที่ 2	คาบที่ 3	พัก	คาบที่ 4	คาบที่ 5	คาบที่ 6	คาบที่ 7
	08.30-9.30	09.30-10.30	10.40-11.40		12.30-13.30	13.30-14.30	14.30-15.30	15.40-16.40
จันทร์	ภาษาอังกฤษเพื่อการสื่อสาร ป.2/5	ภาษาอังกฤษเพื่อการสื่อสาร ป.2/3	Math ป.1/1ESC		Math ป.3/1ESC	Math ป.4/1ESC	ภาษาอังกฤษเพื่อการสื่อสาร ป.2/4	Math ป.1/2ESC
อังคาร	ภาษาอังกฤษเพื่อการสื่อสาร ป.1/3	Math ป.4/1ESC	Math ป.3/1ESC		Math ป.3/2ESC	Math ป.5/1ESC		
พุธ	ภาษาอังกฤษเพื่อการสื่อสาร ป.1/4	Math ป.1/1ESC	Math ป.5/1ESC		Math ป.1/2ESC	Math ป.6/1ESC		
พฤหัสบดี	ภาษาอังกฤษเพื่อการสื่อสาร ป.1/5		Math ป.2/1ESC		Math ป.3/2ESC	Math ป.2/2ESC		
ศุกร์			Math ป.6/1ESC		Math ป.2/1ESC	Math ป.2/2ESC		

หมายเหตุ 1. กิจกรรมหน้าเสาธง 07.50 - 08.20 น. ข้อมูล ณ วันที่ 25 พฤษภาคม 2566

Figure 3. Mathematics Schedule in MUDS – Thailand

Scientific knowledge shows that when the brain attempts to analyze material that is not stored properly, there are limitations that apply. However, since then, in many states, educational standards have continued to encourage young students to solve math problems using reasoning. In Indonesia, to be precise, SDN Sodong I grade 3 study mathematics two times a week and grade 5 three times a week. In various states, education officials have come under pressure, and often with success, from education experts who hold philosophical views that run counter to the repetitive exercises that cognitive science considers a necessary method for overcoming its limited memory capacity. As a result, the standards applied have not brought effective results based on test results (Hartman et al., 2023). In this study, the relationship between mathematics anxiety and mathematics performance was also analyzed. The results show that for elementary school students, there is a small but not significant positive correlation. A positive correlation indicates that the higher the level of mathematics anxiety, the mathematics achievement tends to increase, as explained by (Mitchell & George, 2022) Students' inquiry depends on the type of representation they use and progresses from a personal to a more institutional level as the teacher guides the development of their mathematical understanding. In the context of visual and concrete representations, students defend their arguments by using closer figures (Erbilgin & Gningue, 2023).

The importance of recognizing the role of mathematics in society is recognized by many groups, although the level of understanding of this can vary between individuals (Lopes, 2022). Along with this understanding, the application of philosophy in all aspects of learning, including mathematics, is considered an indirect step that can increase the effectiveness and efficiency of the teaching and learning process. In the learning context, a learning model is needed that can direct the steps or syntax in learning activities (Fairus et al., 2023).

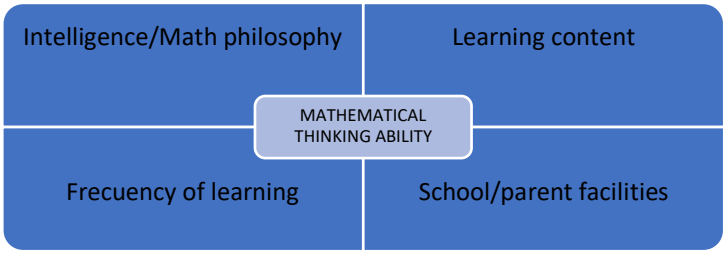


Figure 4. Factors Causing Differences in Answers

CONCLUSIONS AND SUGGESTIONS

Based on the results of the discussion above, each individual has different mathematical abilities that are integrated with their philosophy. This is caused by several factors including, mathematical ability intelligence, frecuency of learning mathematics, different learning content/materials, as well as school and parent facilities. Almost all of the 3rd-grade students at SDN Sodong I were able to answer

the test questions correctly and used 2 techniques (the technique commonly used and the lidimatics technique) while the 3rd-grade MUDS students only used one of the two techniques.

Meanwhile, grade 5 students at SDN Sodong I were able to answer questions correctly, although there were some mistakes, while grade 5 MUDS students were able to answer questions correctly and there were students who were completely unable to solve the questions. The results of the analysis show that the majority of students show interest in mathematics, which is reflected in several ways. Most students recognize the relevance of mathematics in everyday life, especially in the context of basic mathematics. It can be concluded that many process steps can be followed depending on which philosophy is used to achieve a correct goal (1 + 1 = 100 - 98). Whether you want to use any methods, techniques, steps, or processes, the results will still be correct, if students use their mathematical thinking skills optimally.

REFERENCES

Abdillah, R., Susiswo, S., & Susanto, H. (2022). Komunikasi Matematis Siswa pada Materi Teorema Pythagoras Ditinjau dari Gaya Belajar Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 84–97. https://doi.org/10.31004/cendekia.v7i1.1871

Ahmad, G., 1∗, S., & Sudiana, R. (2023). *Analisis Kemampuan Pemahaman Matematis Siswa SMP Kelas VIII Berdasarkan Teori Pirie-Kieren*. https://doi.org/10.31004/cendekia.v7i3.2181

Alhadoor, Z. A. N., Aldbyani, A., & Alshammari, K. K. (2023). A meta-analysis on the effectiveness of strategies and programs used to address the mathematics learning difficulties. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(10), em2337. https://doi.org/10.29333/ejmste/13607

Amaludin, R., Esita, Z., Idhayani, N., Salma, S., Muhammadiyah Kendari, U., Ahmad Dahlan Kendari, J. K., & Tenggara, S. (2023). *Analisis Proses Berpikir Siswa dalam Pemecahan Masalah Matematik Ditinjau dari Perbedaan Gaya Kognitif*. https://doi.org/10.31004/cendekia.v7i2.1920

Apriningtyas, S., & Amalia, N. (2023). Reading and Viewing Ability of Third Grade Students in Elementary School. *International Journal of Elementary Education*, *7*(2), 263–272. https://doi.org/10.23887/ijee.v7i2.58628

Ar, A., Awaludin, R., Selvia, N., & Andrari, F. R. (2021). Mathematical Representation of Students in Solving Mathematic Problems Reviewed from Extrovert-Introvert Personality. *International Journal of Elementary Education*, *5*(2), 323–329. https://ejournal.undiksha.ac.id/index.php/IJEE

Arifin, Y. F., & Nugroho, Y. S. (2023). Website-Based Learning Media on Reading and Numeracy Content for Third Grade Elementary Schools. *International Journal of Elementary Education*, *7*(1), 36–42. https://doi.org/10.23887/ijee.v7i1.58269

Arisetyawan, A., Taher, T., & Fauzi, I. (2021). *K R E A N O Creative-Innovative Mathematics (education) Journal Integrating the Concept of Plane Figure and Baduy Local Wisdom as a Media Alternative of Mathematics Learning In Elementary Schools*. http://journal.unnes.ac.id/nju/index.php/kreano

Bevan, D., & Capraro, M. M. (2021). Posing Creative Problems: A Study of Elementary Students' Mathematics Understanding. *International Electronic Journal of Mathematics Education*, *16*(3), em0654. https://doi.org/10.29333/iejme/11109

Brewster, B. J. M., & Miller, T. (2020). Missed Opportunity in Mathematics Anxiety. *International Electronic Journal of Mathematics Education*, *15*(3), em0600. https://doi.org/10.29333/iejme/8405

Dewi, N. S., & Dasari, D. (2023). Systematic Literature Review: Kemampuan Pembuktian Matematis. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 240–254. https://doi.org/10.31004/cendekia.v7i1.1987

Dwi Rohmawati, A., & Fathoni, A. (2022). Improving Elementary School Student's Critical Thinking Skills through HOTS-Based Mathematics Question. *International Journal of Elementary Education*, *6*(3), 631–637. https://doi.org/10.23887/ijee.v6i4.55892

Erbilgin, E., & Gningue, S. M. (2023). Using the onto-semiotic approach to analyze novice algebra learners' meaning-making processes with different representations. *Educational Studies in Mathematics*. https://doi.org/10.1007/s10649-023-10247-8

Ernawati, E., & Firdaus, A. M. (2020). Analysis of mathematical ability to solve PISA questions on quantity content. *Math Didactic: Jurnal Pendidikan Matematika*, *6*(2), 212–225. https://doi.org/10.33654/math.v6i2.921

Fairus, F., Dewi, I., & Simamora, E. (2023). Keterkaitan Filsafat Matematika dengan Model Pembelajaran Berbasis IT. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 538–549. https://doi.org/10.31004/cendekia.v7i1.1921

Gagatsis, A., Deliyianni, E., Elia, I., Panaoura, A., & Michael-Chrysanthou, P. (2016). Fostering representational flexibility in the mathematical working space of rational numbers. *Bolema - Mathematics Education Bulletin*, *30*(54), 287–307. https://doi.org/10.1590/1980-4415v30n54a14

Gyanthi, I Gusti Ayu Tri Agustiana, & Dewe Gede Firstia. (2023). LAPS-HEURISTIC Learning Model Improves Mathematical Problem-Solving Ability. *International Journal of Elementary Education*, *7*(1), 169–177. https://doi.org/10.23887/ijee.v7i1.58407

Güveli, E., Bulut, D. B., & Güveli, H. (2021). Electronic Conceptual Change Texts Prepared About Fractions. In *TOJET: The Turkish Online Journal of Educational Technology* (Vol. 20).

Hanany, F., & Sumaji, S. (2021). BERFIKIR KREATIF DALAM MATEMATIKA. JURNAL SILOGISME: Kajian Ilmu Matematika dan Pembelajarannya, 5(2), 77-83. doi:https://doi.org/10.24269/silogisme.v5i2.2888

Harahap, K., & Nurlaelah, E. (2023). Analisis Kompetensi Berpikir Kreatif Matematis Siswa SMP Kelas IX dalam Pembelajaran Matematika. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(2), 1427–1438. https://doi.org/10.31004/cendekia.v7i2.2129

Hartman, J. R., Hart, S., Nelson, E. A., & Kirschner, P. A. (2023). Designing mathematics standards in agreement with science. *International Electronic Journal of Mathematics Education*, *18*(3), em0739. https://doi.org/10.29333/iejme/13179

Herheim, R. (2023). On the origin, characteristics, and usefulness of instrumental and relational understanding. *Educational Studies in Mathematics*, *113*(3), 389–404. https://doi.org/10.1007/s10649-023-10225-0

Heron, M., & Palfreyman, D. M. (2021). Exploring Higher-Order Thinking in Higher Education Seminar Talk. *College Teaching*. https://doi.org/10.1080/87567555.2021.2018397

Lingefjärd, T., & Ghosh, J. (2022). Enhancing students mathematical thinking using applets. *Journal of Mathematics and Science Teacher*, *2*(2), em015. https://doi.org/10.29333/mathsciteacher/12318

Liu, J., Ma, Y., Sun, X., Zhu, Z., & Xu, Y. (2022). A Systematic Review of Higher-Order Thinking by Visualizing its Structure Through HistCite and CiteSpace Software. *Asia-Pacific Education Researcher*, *31*(6), 635–645. https://doi.org/10.1007/s40299-021-00614-5

Lopes, A. P. C. (2022). Aspects of attitudes towards mathematics in modeling activities: Usefulness, interest, and social roles of mathematics. *International Electronic Journal of Mathematics Education*, *17*(4), em0711. https://doi.org/10.29333/iejme/12394

Lutfiyana, L., Pujiastuti, E., & Kharisudin, I. (2023). Systematic Literature Review: Resiliensi Matematis dan Kemampuan Pemecahan Masalah Matematis. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(3), 2167–2177. https://doi.org/10.31004/cendekia.v7i3.2445

Marczewska, M., Weresa, M. A., & Lachowicz, M. (2023). Towards Creativity and Innovation in Universities: Study on Central and Eastern Europe. *Journal of the Knowledge Economy*. https://doi.org/10.1007/s13132-023-01139-6

Mefiana, S. A., Herman, T., & Hasanah, A. (2023). Pemahaman Matematis Siswa Ditinjau dari Daya Juang Produktif. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(3), 2368–2381. https://doi.org/10.31004/cendekia.v7i3.2552

Meng, G.M. (2022). Inside Out MATHS Workbook 4. Singapore: Sim Wee Chee

Meng, G.M. (2022). Inside Out MATHS Workbook 5. Singapore: Sim Wee Chee

Miles, H., & Huberman, A. M. S. (2014). Qualitative data analysis: A Methods Sourcebook.v

Mitchell, L., & George, L. (2022). Exploring mathematics anxiety among primary school students: Prevalence, mathematics performance and gender. *International Electronic Journal of Mathematics Education*, *17*(3), em0692. https://doi.org/10.29333/iejme/12073

Muhdiyanto, A. R., Hidayanto, E., & Chandra, T. D. (2022). Koneksi Matematis Siswa Bergaya Kognitif Field-Independent Pada Pemecahan Masalah. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(3), 2882–2894. https://doi.org/10.31004/cendekia.v6i3.1724

Nur Ahzan, Z., Wua Laja, Y. P., & Hijriani, L. (2023). Efektivitas Pengembangan Media Bahasa Pemrograman Open-Source dalam Penerapan Computational Thinking Mahasiswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(2), 1519–1532. https://doi.org/10.31004/cendekia.v7i2.2282

Nurfadhilah AM. Hindi, A., & HR, I. S. (2023). Student Thinking Process in Solving Mathematical Representation Problems. *Mathematics Education Journal*, *7*(1), 47–59. https://doi.org/10.22219/mej.v7i1.24830

Pandra. (2017). CORRESPONDENCE V.

Pasáčková, J. (2023). Online Courses of Mathematics for Entrance Exams. In *TOJET: The Turkish Online Journal of Educational Technology* (Vol. 22, Issue 1).

Pebrianti, A., Juandi, D., & Nurlaelah, E. (2022). Reversible Thinking Ability in Solving Mathematics Problems. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 163–173. https://doi.org/10.31004/cendekia.v7i1.1905

Radhy, Z. H. (2018). Application of Multiply Regression Linear Model and New Technology Method in Estimating Learning and Education of Students. *International Electronic Journal of Mathematics Education*, *14*(1). https://doi.org/10.12973/iejme/3978

Rahmasuri, A., Dwijayanti, I., & Wulandari, D. (2022). PROFIL KEMAMPUAN KOMUNIKASI MATEMATIS SISWA DITINJAU DARI SELF CONFIDENCE SISWA. JURNAL SILOGISME: Kajian Ilmu Matematika dan Pembelajarannya, 7(1), 38-47. doi:https://doi.org/10.24269/silogisme.v7i1.3267

Rifai, Muhammad. 2011. Politik Pendidikan Nasional. Yogyakarta:Ar Ruzz Media

Risaldi, R., Susiswo, S., & Irawati, S. (2023). Berpikir Kreatif Siswa SMP dalam Memecahkan Masalah Matematika Berdasarkan Gender. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(3), 2437–2451. https://doi.org/10.31004/cendekia.v7i3.2479

Rohman, A. A., Sholihah, N., & Maslihah, S. (n.d.). *ANALISIS KEMAMPUAN PEMECAHAN MASALAH MATEMATIKA BERDASARKAN DISPOSISI MATEMATIS PESERTA DIDIK DAN GENDER KELAS VII*.

Rulistiani, V. U., Asyura, I., Kamali, A. S., & Linda, L. (2023). Pengaruh Metode Brainstorming Terhadap Keterampilan Berpikir Kreatif. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(2), 1366–1378. https://doi.org/10.31004/cendekia.v7i2.1784

Santy, A., Ramadoni, R., & Jufri, L. H. (2023). Investigasi Metode Perkalian Dua Bilangan untuk Siswa Kelas VII SMPN 1 Koto Baru Kabupaten Dharmasraya. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *7*(1), 714–727. https://doi.org/10.31004/cendekia.v7i1.1755

Scheiner, T. (2023). Shifting the ways prospective teachers frame and notice student mathematical thinking: from deficits to strengths. *Educational Studies in Mathematics*. https://doi.org/10.1007/s10649-023-10235-y

Sdn, D. I., Sari, B., Dati Salsabilah, I., Rahman Hakim, Z., Taufik, M., Guru, P., Dasar, S., Sultan, U., & Tirtayasa, A. (n.d.). *PROSES PENANAMAN KARAKTER GEMAR MEMBACA PADA SISWA KELAS III MELALUI PELAKSAAAN PROGRAM LITERASI*.

Siregar, N. C., Rosli, R., & Nite, S. (2023). Students' interest in Science, Technology, Engineering, and Mathematics (STEM) based on parental education and gender factors. *International Electronic Journal of Mathematics Education*, *18*(2), em0736. https://doi.org/10.29333/iejme/13060

Sulastri, S., Marwan, M., & Duskri, M. (2017). Kemampuan representasi matematis siswa SMP melalui pendekatan pendidikan matematika realistik. Beta: Jurnal Tadris Matematika, 10(1), 51–69. https://doi.org/10.20414/betajtm.v10i1.101

Supriadi, S. (n.d.). *Inovasi dan Miskonsepsi Penyampaian Materi Matematika SD*.

Syafri, F. S. (2019). Kemampuan Representasi Matematis dan Kemampuan Pembuktian Matematika. Jurnal Edumath, 3(1), 49–55.

Tri, A., Yanindah, C., & Ratu, N. (2021). *Pengembagan E-Modul SUGAR Berbasis Android*.

Zhang, H. (2023). A Simulated Situational Assessment System for Evaluating Pre-Service Teachers' Information Teaching Ability. In *TOJET: The Turkish Online Journal of Educational Technology* (Vol. 22, Issue 1). https://orcid.org/0000-0002-6796-6219