

Lesson study with sharing and jumping tasks in online mathematics classrooms for rural area students

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Abstract

Due to the poor instruction process during the Covid-19 Pandemic, especially in mathematics, students frequently need help with data literacy. To overcome these obstacles, they must improve their thinking skills. This study aims to enhance the quality of mathematics instruction, especially students' thinking skills, by implementing Lesson Study to develop sharing and jumping tasks. This qualitative descriptive research was conducted at one of the senior high schools and universities in Manokwari, West Papua, with their students as the research subject. The lesson study was implemented in two cycles through instruction at school and lectures at the university. The lesson study consists of three processes: plan, do, and see. The hypothetical learning trajectory was developed at the lesson design stage and then tested at the teaching-learning stage. The open class results were then analyzed during the reflection step to redesign the sharing and jumping tasks. The success of the research was determined through field notes taken from teachers and students. The frequency distribution table is used as the topic matter. The findings revealed that students' thinking skills developed, indicating they were more interested than in the previous teaching and learning process. The learning process was more exciting and enhanced conceptual comprehension. Because learning was communicable, students were more satisfied. They were more engaged and required further thought to comprehend the topic matter. Also, they produce a variety of responses, which is only feasible if they are capable of critical thought.

Keywords: Lesson Study, Online Mathematics Classroom, Rural Area Students, Sharing and Jumping Task, Thinking Skills

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The primary obstacle to learning for Mathematics Education students at the University of Papua is a need for conceptual knowledge. Students need more data literacy abilities, particularly in the relation to Statistics. They can work on exam questions and assignments, but they frequently need to understand the purpose and role of the results obtained after the questions are solved (Tanujaya et al., 2018). They need to learn how or why the data is being used.

Data literacy is the ability of students to understand, find, collect, interpret, visualize, and support arguments using quantitative and qualitative data (Wolff et al., 2016). Meanwhile, Gould (2017) stated that the data-literate individual could identify, collect, evaluate, analyze, interpret, present, and protect data. In other words, data literacy is a student's capacity to acquire, present, understand, and make arguments based on the data. Meanwhile, several authors consider data literacy as overlapping with

other categories of literacy, including statistical literacy, information literacy, and digital literacy (Wolff et al., 2016; Prado & Marzal, 2013). Therefore, after conducting a literature study, Bonikowska et al. (2019) concluded that data-literate persons can comprehend information retrieved from data and summarize it into simple statistics, perform additional computations using these statistics, and utilize statistics to inform decisions.

Various factors produce students' inadequate data literacy ability, one of which is errors made throughout the teaching and learning processes, both in high school and college. Tanujaya et al. (2017) stated that teachers (lecturers also) often consistently deliver learning materials, beginning with explanations of concepts or definitions, followed by the presentation of sample questions, and ending with practice questions. Meanwhile, Tanujaya and Mumu (2021) convey that the questions are typically derived from textbooks or other sources of information, such as the internet. Teachers and lecturers rarely formulate their questions. Additionally, they did not modify the textbook questions. Therefore, their questions could be more varied and varied, so they cannot help students develop their critical thinking skills (Dewantara et al., 2015; Kusaeri & Aditomo, 2019).

On the other hand, textbooks are the primary learning resource when planning and implementing instruction. The textbook describes the least effort that students and teachers must make to enhance the efficiency and efficacy of learning (Pratama & Retnawati, 2018). As a result, students need to be more accustomed to being encouraged to use their critical and creative thinking skills during classroom activities (Kusaeri et al., 2019). Students memorize subject content presented by teachers and lecturers and need help comprehending its meaning. They memorize the provided formulas and processes and then apply them to solve the problem in practice questions and assignments. This learning cycle continues, resulting in students needing more critical and creative thinking abilities. They frequently think algorithmically and follow established procedures and habits. As a result, the importance of data literacy as a component of statistics instruction needs to be better understood (Tanujaya & Mumu, 2020). In other words, they need a higher level of data literacy.

Additionally, online learning during a pandemic has its own unique set of problems. Due to the restricted communication infrastructure, the limited availability of data packets, and the unstable quality of the internet network, effective learning is impossible (Giles et al., 2019). The government implemented a policy on emergency curriculum (Ariyanti & Santoso, 2020). Regrettably, implementing the emergency curriculum exacerbates existing problems in schools, institutions, and among students. Students need help comprehending the instruction (Tanujaya et al., 2021a). As a result, online instruction became meaningless during and even after the COVID-19 pandemic.

Instruction will be meaningful if students demonstrate a thorough understanding of the subject. Students will obtain meaningful learning if they carefully and accurately integrate newly acquired knowledge with previously acquired knowledge. Students can only integrate new knowledge if they memorize the stuff they are studying (Novak, 2002). Additionally, Vargas-Hernández and Vargas-González (2022) believe that learning will be meaningful if learners can construct new knowledge and apply it to solve problems.

There are numerous strategies and approaches for resolving these issues, including collaboration between teachers and lecturers. A learning community can facilitate collaboration between teachers and lecturers. Lesson Study for Learning Community (LSLC) is a Japanese learning community with collaborations between teachers and lecturers (Saito et al., 2014). It is envisaged that through LSLC, teachers and lecturers will collaborate to identify answers to difficulties in learning, both in the classroom and at the university level, as has been accomplished at Universitas Papua (Tanujaya & Mumu, 2020a)



and several others.

Learning problems that arise during the learning process will be adequately detected through collaboration between teachers and lecturers. Once discovered, the resulting solutions will also be better. The learning community will explore establishing a plan for resolving learning challenges. Several issues will be discussed, including the following: what is the main reason for students' poor data literacy skills? How do we resolve this issue? Can this problem be resolved by utilizing the Sharing and Jumping task? How do we develop Sharing and Jumping Tasks in mathematics instruction? Can integrating Sharing and Jumping Tasks into Lesson Study enhance the quality of student learning activities?

This study aims to analyze the effect of integrating lesson study into online mathematics classes on the development of sharing and jumping tasks during the covid-19 pandemic. The study will address the following research questions: how can students enrolling in introductory statistics courses improve their data literacy by developing their thinking skills?

METHODS

The quantitative method was used to conduct this research. This research aimed to investigate the effect of sharing and jumping tasks in a Lesson Study on students' thinking skills. Students with excellent skill abilities should improve their learning activities, increasing their data literacy.

The lesson study was conducted in a classroom activity at school and university. Elliott (2019) defines "lesson study" as the complete process of instructional development in which teachers collaboratively plan, observe, and evaluate research lessons. Meanwhile, according to Murata (2011), lesson study is characterized by its collaborative, classroom-based, and practice-oriented nature. Therefore, the model teacher is the primary actor in the learning process in Lesson Study.

The teacher collaborates with other teachers to design, conduct, and review instruction, known as Plan, Do, and See. In this study, 5 (five) teachers from a Senior High School in Manokwari, West Papua, Indonesia, collaborated with lecturers at the University of Papua to conduct the research. The teachers have a bachelor's degree in mathematics education. They possess greater than ten years of teaching experience.

Moreover, lesson study is a model for fostering the teaching profession through collaborative and sustainable learning assessments based on the principles of collegiality and mutual assistance to build a learning community. Therefore, during the planning stage, the model teacher delivers a lesson plan to discuss with other teachers. This discussion aims to construct a lesson plan in a hypothetical learning trajectory based on problems that were identified. The discussion concentrated on developing sharing and jumping tasks for Frequency Distribution Tables.

Before constructing the lesson plans, researchers and teachers identify problems in learning. Identifying problems is accomplished by relaying the numerous learning impediments teachers and lecturers' encounter. An analysis was carried out using fishbone analysis to determine the root causes of students' learning problems. Fishbone analysis is a helpful graphical technique for identifying and analyzing the most influential aspects of a problem.

The learning process (open class) occurs entirely online via Zoom's meeting platform. In schools, each open class was held for 60 minutes; on campus was held for 150 minutes. The observer used the observation sheet to collect data throughout the learning process. The observation sheet is a record of student activities during the instruction process. The observations' findings are then discussed during the reflection step. Thirty-three students at a senior high school from Manokwari and 60 students from the

University of Papua took part in the study.

In addition to observations, researchers collected data via questionnaires. Online questionnaires were sent to students to elicit feedback on their learning experiences during the study. In the instruction, students were asked to complete activities and express their ideas on using sharing and jumping tasks. Students' responses are summarized on a Likert scale, which includes five response options: strongly agree, agree, neutral, disagree, and strongly disagree (Tanujaya et al., 2022). After collecting the data, it was tabulated using descriptive statistics and presented as narratives and pie charts.

RESULTS AND DISCUSSION

Learning Problems Identification

The process of lesson design development begins with a discussion of problems encountered while learning mathematics. The issues mentioned were restricted to mathematics instruction during the Covid 19 pandemic, particularly online instruction. The discussion identifies numerous issues with learning mathematics. The subsequent investigation concentrated on the students' low data literacy competence. This issue affects both high school and university students. The results of the data analysis of the factors contributing to students' low data literacy are displayed in Figure 1.

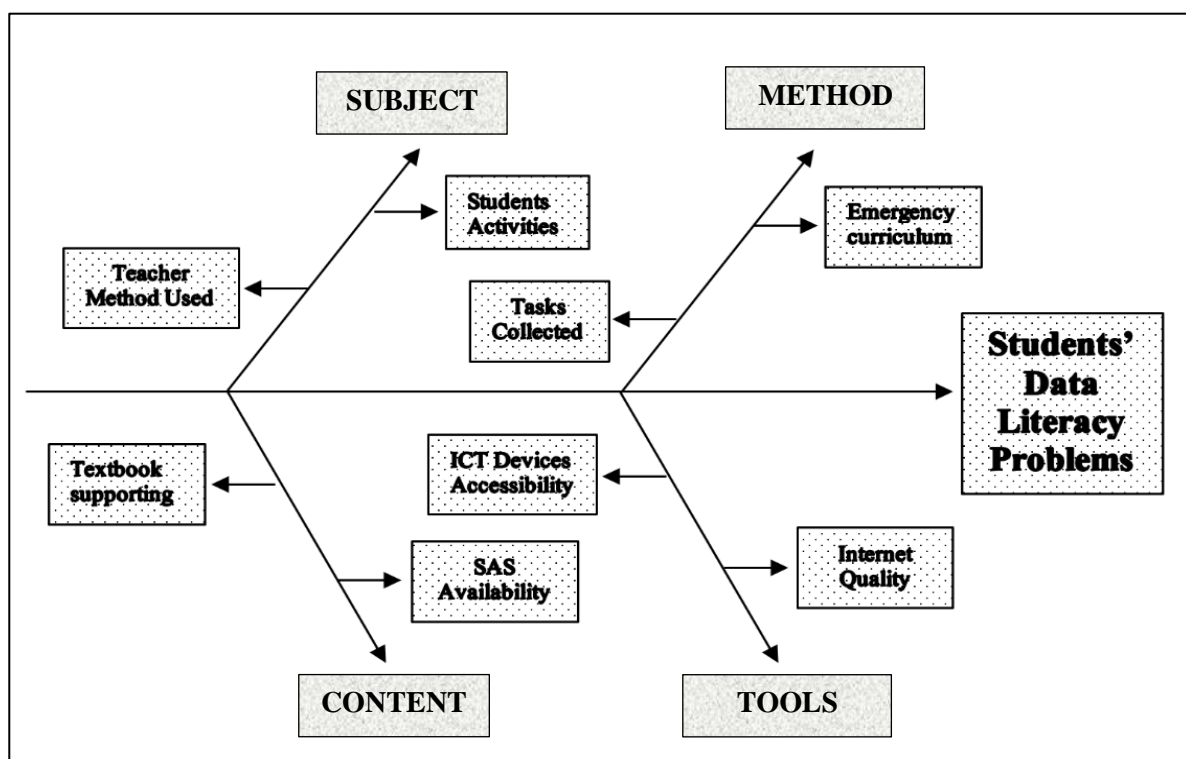


Figure 1. Analysis of the factors contributing to students' data literacy problems

Figure 1 shows that poor instruction causes students' low literacy. Students are passive participants in classroom activities. Many of them turned off the video during the lesson to avoid having their activities monitored. Only a few students who turned on the video noted what the teacher said (Figure 2). This issue emerged due to students' inability to access high-quality internet. Students participate in the learning process solely by listening to the teacher's voice and viewing videos. The

teacher is unable to monitor student behavior when they are learning. This situation also appears among students from several Indonesian locations, including Manokwari, West Papua (Tanujaya et al., 2021b), Madiun, East Java (Ariyanti & Santoso, 2020), and Aceh (Mailizar et al., 2021).

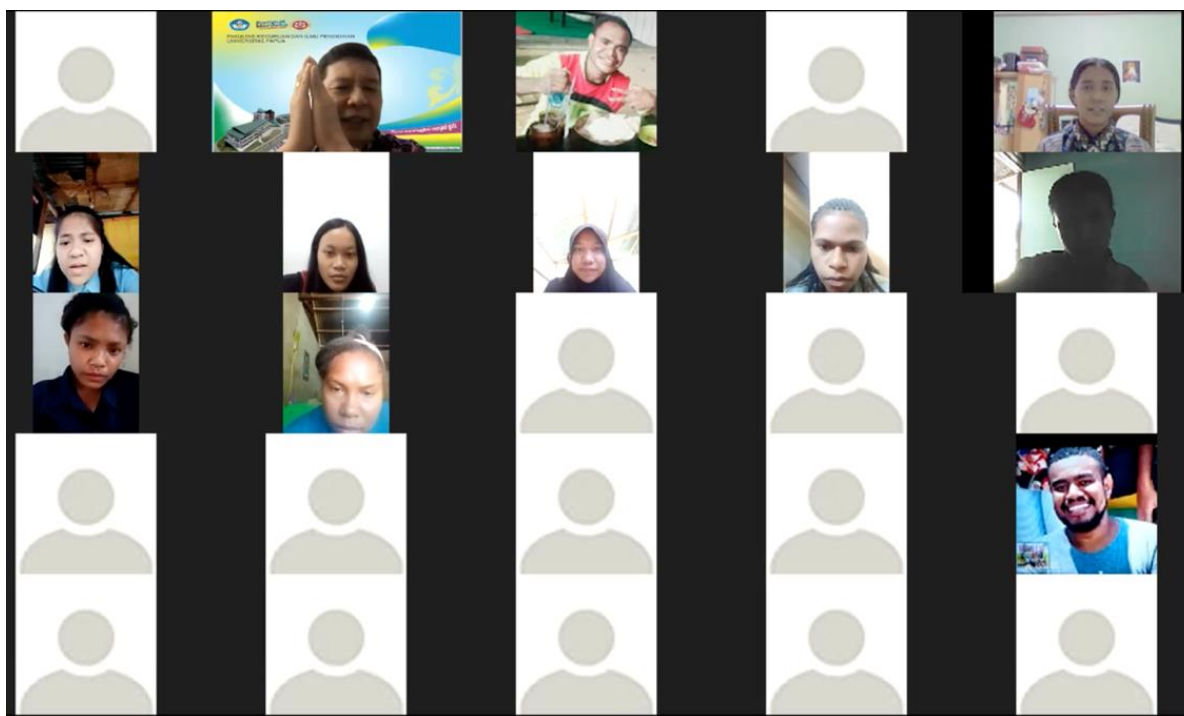


Figure 2. Student activity is not monitored when the video camera is turned off

As a result of the circumstance, they rarely ask questions, and only a few students respond to the teacher's inquiries. Teachers and lecturers are dominant in classroom activities, and the students listen only to what teachers and lecturers have to say. On the other hand, student activities in learning are positively associated with educational achievement. The more engaged students are in their classroom activities, the more fully they grasp the concepts being taught. In addition, it was mentioned that students who were not actively learning showed that they needed help understanding what they were learning.

This problem has been exacerbated when an emergency curriculum is implemented in online learning systems. Implementing the emergency curriculum is a provision set by the Indonesian government based on the Decree of the Minister of Education and Culture Number 719/P/2020. Due to limited learning time during the covid-19 pandemic, the teacher does not present all subject matter during the learning process. Additionally, the duration of learning is reduced. Typically, one hour of lessons takes 45 minutes; however, in the emergency curriculum, one section in the learning process takes 30 minutes. In other words, teachers can use only 66.67 percent of the maximum time allocation available for instructional purposes.

In order to overcome these problems, the teacher must present the subject matter thoroughly. Sometimes teachers assign students simple tasks as homework. Therefore, students use the textbook and student worksheet activities (SAS) to understand the concepts before doing assignments. SAS is an important learning tool in addition to textbooks. However, not all students have access to the SAS, which can aid in understanding the concepts.

Furthermore, although students have learned from textbooks and SAS, those who need help understanding the subject matter usually ask for both parents' explanations. Unfortunately, not all parents

have the competency and opportunity to assist students in comprehending the subject matter. To answer the questions given, students then ask the answers to their friends. There is a tendency for students to answer the questions correctly without understanding the problem.

As a result, the student's responses to the teacher's task are identical. Their work bears no resemblance to one another. They copy their friends' answers or obtain the answers from the Internet. This tendency makes it difficult for teachers to determine the level of student comprehension. Their answers are identical, but their comprehension of the material is not. Their scores are high but do not reflect their comprehension level.

On the other hand, teachers can assess students' level of comprehension via their responses. Assessment can be divided into three categories: assessment of learning (AoL), assessment for learning (AfL), and assessment as learning (AaL) (Tanujaya, 2017). AoL aims to measure, certify, and report the level of students' learning so that reasonable decisions on students' achievement can be made. In contrast, in AfL, teachers use assessment as an investigative tool to find out what their students know and can do as much as they can and what confusions, preconceptions, or gaps they might have. On the other hand, AaL focuses on students and emphasizes assessment as a process of metacognition (knowledge of one's thought processes) for students.

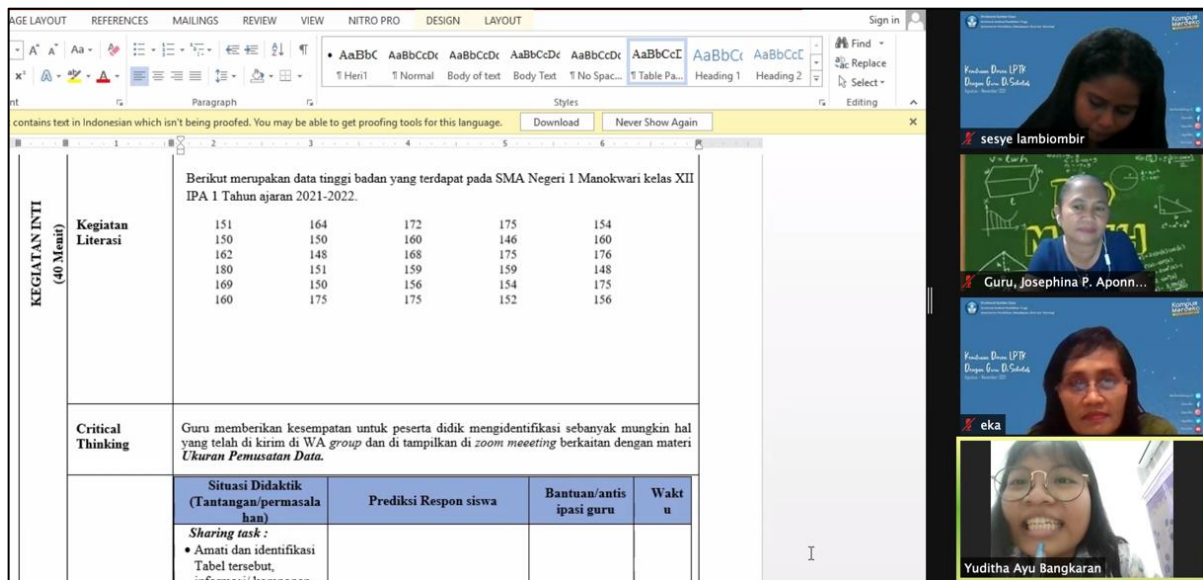
How, therefore, can we determine their degree of comprehension if their responses to the collected tasks are identical? How can they identify learning issues if they do not perform the activity to the best of their ability? In other words, the responses to tasks submitted by students do not reveal what they know or do not know. These issues can be resolved by integrating sharing and jumping tasks into lesson study-based learning.

Lesson Design using Sharing and Jumping Task

It is vital to design instruction effectively to overcome problems in learning mathematics online. The online-based lesson design allows for the rapid development of student learning activities. Students are designed to engage in active learning activities. They are supposed to be active thinkers and talk to each other, both with their teachers and friends.

As a result of the discussion, as shown in the discussion in [Figure 3](#), it was decided to use some tasks in the learning process. The tasks are questions that encourage student engagement in learning, including their ability to think critically. These questions are used to elicit student participation in the learning process. Sharing and jumping tasks are two types of questions that can be used.

Sharing tasks and jumping tasks could improve students' thinking skills. Putri and Zulkardi (2019) explain that sharing tasks were used at the beginning of mathematics lessons and were typically solved by students using Lower-Order Thinking Skills (LOTS). In contrast, jumping tasks were the focal point of instruction and frequently used HOTS-level problems in learning. Therefore, these tasks can be used to help students develop their higher-order thinking skills. However, the two types of tasks must be used sequentially in a mathematics lesson.



Translated in English

Core Activities (40 minutes)	Literacy Activities	<p>The following is height data for SMA Negeri 1 Manokwari Class XII IPA 1 for the 2021-2022 academic year.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td>151</td><td>164</td><td>172</td><td>175</td><td>154</td></tr> <tr><td>150</td><td>150</td><td>160</td><td>146</td><td>160</td></tr> <tr><td>162</td><td>148</td><td>168</td><td>175</td><td>176</td></tr> <tr><td>180</td><td>151</td><td>159</td><td>159</td><td>148</td></tr> <tr><td>169</td><td>150</td><td>156</td><td>154</td><td>175</td></tr> <tr><td>160</td><td>175</td><td>175</td><td>152</td><td>156</td></tr> </table>				151	164	172	175	154	150	150	160	146	160	162	148	168	175	176	180	151	159	159	148	169	150	156	154	175	160	175	175	152	156
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180	151	159	159	148																															
169	150	156	154	175																															
160	175	175	152	156																															
Critical Thinking	<p>The teacher provides an opportunity for students to identify as many things as possible that have been sent in the WA group and displayed in the zoom meeting related to material on the centered-data measurement.</p>																																		
	Didactic Situation (Challenges/ Problems)	Predication of students' response	Teacher assistance/ anticipation	Time																															
	Sharing task: <ul style="list-style-type: none"> Observe and identify the table, information/ components 																																		

Figure 3. Activities on designing of the lesson design

Table 1 contains examples of sharing and jumping tasks for learning about frequency tables. It indicates that to overcome the problems posed by the sharing and jumping tasks; students must engage in critical thought. They need a solution to execute directly. To address these problems, students require

conceptual understanding-based reasoning abilities. Students must first recognize the information the frequency distribution table provides. In addition, students must use inductive reasoning to answer the following question. Inductive reasoning is a technique for deriving generalizations from particular instances (Tanujaya et al., 2021a).

Table 1. The example of sharing and jumping tasks

Class Interval	Class Boundary	Frequency
5 - 8	4,5 – 8,5	2
9 – 12	8,5 – 12,5	4
13 – 16	12,5 – 16,5	3
17 – 20	16,5 – 20,5	7
21 – 24	20,5 – 24,5	9
25 - 28	24,5 – 28,5	12

The following are examples of sharing and jumping tasks developed for this study:

1. Observe and identify the Frequency Distribution Table to determine the information obtained.
2. What are the possible values for the class interval 5 - 8?
3. What are the data sets' Minimum, Maximum, and Range values?
4. How many cars consume less than 11 liters of gasoline?
5. How many cars consume more than 18 liters of gasoline?
6. Arrange your data for the Frequency Distribution Table.
7. If one number is left out, and the range is now 21, what are the minimum and maximum of the range?

Students must recognize, for instance, that in the class intervals 5–8, several numbers meet the criteria and are used as answers. Because there are two numbers in the class interval and five options, the student's response is not singular. The student's answers are maybe 5 & 5, 5 & 6, 5 & 7, 5 & 8, 6 & 6, 6 & 7, 6 & 8, 7 & 7, and 7 & 8.

Students can choose from nine possible answers, so the chances of them cheating on their friends' answers are getting smaller. Moreover, according to the perspectives of several experts, questions with many solutions might facilitate students' critical thinking (Resnick, 1987). Students' thinking skills will also improve if they are accustomed to solving problems involving many techniques or integrating multiple mathematical concepts (Putri & Zulkardi, 2019). The problems in sharing and jumping tasks are classified as higher-order Problems.

Higher-order problem is a question to be answered or a problem to be solved that cannot be done through the routine application of previously acquired knowledge (Newmann, 1990). However, it can be solved when expanded use of mind occurs that a person must interpret, analyze, or manipulate information. It is because the higher-order problem is characterized as non-algorithmic, complex, self-regulative, meaningful, and effortful and provides multiple solutions, nuanced judgments, multiple criteria, and uncertainty (Resnick, 1987).

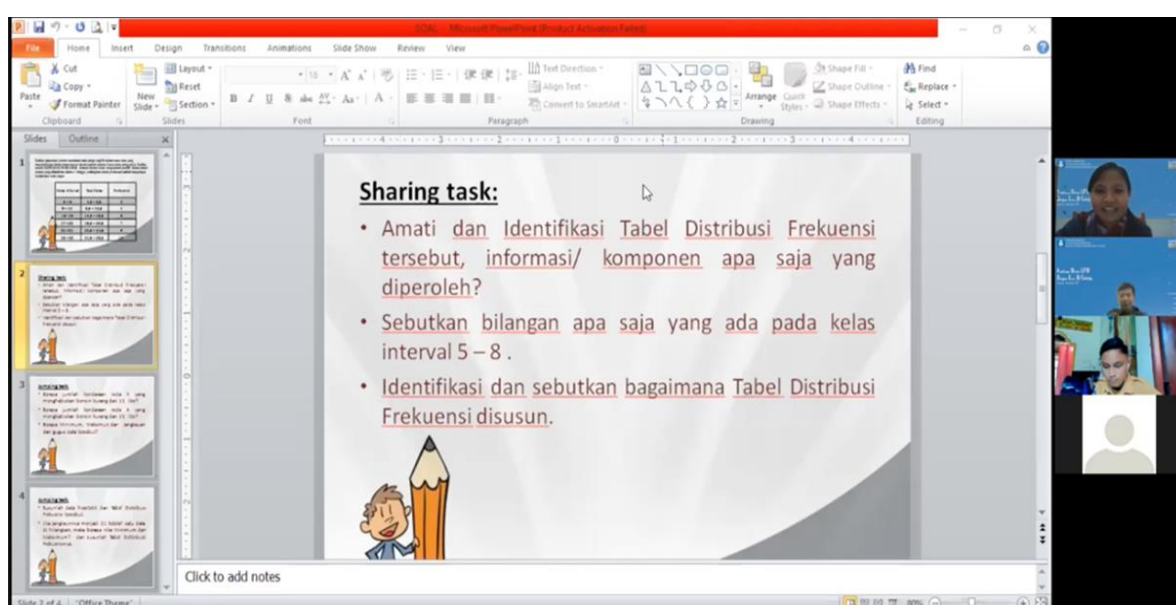
Similarly, the responses of students are to the other questions. If students have had to comprehend the material, they can answer the questions provided. On the other hand, these questions also guide students to understand the taught concepts. By completing these problems, students' comprehension of the Frequency Distribution Table subject matter will be enhanced.



The jumping task is a problem that only a small number of students in a class can solve. The questions on the jumping task are problems that require HOTS to solve (Putri & Zulkardi, 2019). HOTS are advanced thinking skills from cognitive abilities, such as remembering and understanding (Krathwohl, 2002). In other words, to solve the questions on the jumping task, students need a good understanding of the concept.

Open Class

In the open class, the model teacher initiates learning activities by providing motivation and preparing students to participate in learning actively. After carrying out learning activities in the preliminary stage, the model teacher briefly explained the Frequency Distribution Table. Moreover, the model teacher used sharing and jumping tasks to assess students' knowledge and increase students' comprehension of the topics being taught to strengthen students' understanding of the content (Figure 4).



Sharing task:

- Amati dan Identifikasi Tabel Distribusi Frekuensi tersebut, informasi/ komponen apa saja yang diperoleh?
- Sebutkan bilangan apa saja yang ada pada kelas interval 5 – 8 .
- Identifikasi dan sebutkan bagaimana Tabel Distribusi Frekuensi disusun.

Translated in English

Sharing task:

- Observe and identify the frequency distribution table, what are information/components obtained?
- Mention any numbers in the class interval 5-8.
- Identify and state how the frequency distribution table is structured.

Figure 4. Instruction activities on the first open class

Most students turned on their videos during the discussion to solve the presented problems, as shown in Figure 5. This phenomenon is a rare occurrence in the previous lesson. This situation also demonstrates their interest and positive reaction to the utilization of sharing and jumping tasks.

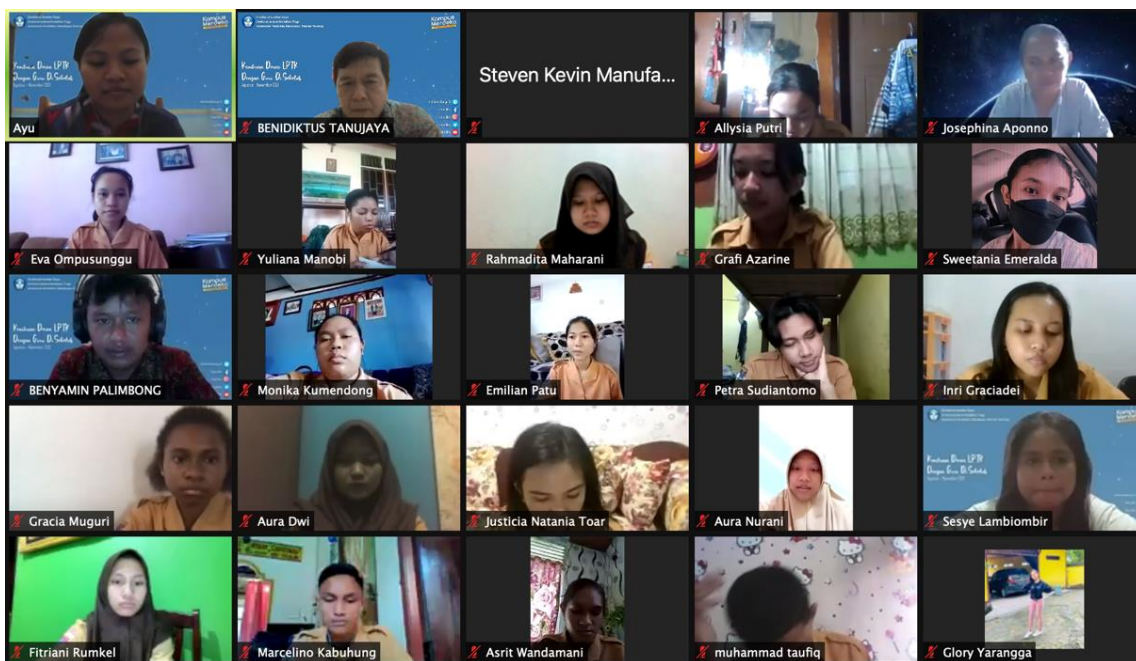


Figure 5. Photographic documentation of exemplary student and teacher activities during open class

In addition, they could provide direct responses to the given questions. For instance, Figure 6 depicts a student's presentation responding to posed questions.

Berikut ini merupakan Tabel Distribusi Frekuensi tentang jumlah BBM dalam Liter yang dihabiskan oleh kendaraan roda empat selama seminggu.

No	Kelas Interval	Tepi Kelas	Frekuensi
1	5 – 8	4,5 – 8,5	2
2	9 – 12	8,5 – 12,5	4
3	13 – 16	12,5 – 16,5	3
4	17 – 20	16,5 – 20,5	7
5	21 – 24	20,5 – 24,4	9
6	25 – 28	24,5 – 28,5	12

- Amati Tabel tersebut, informasi apa saja yang anda peroleh.
- Sebutkan bilangan apa saja yang ada pada kelas interval 5 – 8?
- Identifikasi dan sebutkan bagaimana Tabel Distribusi Frekuensi tersebut disusun.
- Berapa jumlah kendaraan roda 4 yang menghabiskan bensin kurang dari 11 liter ?

9 – 12 = 4
 13 – 16 = 3
 17 – 20 = 7
 21 – 24 = 9
 25 – 28 = 12

HIPOJETIK

5, 7
 9, 10, 11, 12
 13, 15, 16
 17 x3, 18 x2, 19, 20
 21 x2, 22 x2, 23 x2, 24 x3
 25 x2, 26 x4, 27 x5, 28

ATAU

5 x2
 9, 10, 12 x2
 14, 16 x2
 17 x4, 19, 20 x2
 21 x9
 26 x6, 27 x6

ATAU

Translated in English

The following is a frequency distribution table regarding the amount of fuel in liters consumed by four-wheeled vehicles during a week.

No	Interval Class	Boundary Class	Frequency
1	5 – 8	4.5 – 8.5	2
2	9 – 12	8.5 – 12.5	4
3	13 – 16	12.5 – 16.5	3
4	17 – 20	16.5 – 20.5	7
5	21 – 24	20.5 – 24.4	9
6	25 – 28	24.5 – 28.5	12

9 – 12 = 4
 13 – 16 = 3
 17 – 20 = 7
 21 – 24 = 9
 25 – 28 = 12

Hypothesis (Prediction)

5, 7
 9, 10, 11, 12
 13, 15, 16
 17 x3, 18 x2, 19, 20

<ol style="list-style-type: none"> 1. Observe the table; what information do you get? 2. What numbers are in the class interval 5-8? 3. Identify and state how the frequency distribution table is arranged. 4. How many 4-wheeled vehicles consume less than 11 liters of gasoline? 	<p>21 x2, 22 x2, 23 x2, 24 x3 25 x2, 26 x4, 27 x5, 28</p> <p>Or</p> <p>5 x2 9, 10, 12 x2 14, 16 x2 17 x4, 19, 20 x2 21 x9 26 x6, 27 x6</p> <p>Or</p>
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Figure 6. Students responds for sharing and jumping task on the second open class

Figure 6 shows the student responses, demonstrating that the students/student groups correctly understand the concept being evaluated. There are two distinct types of responses given by students. Both answers are the correct answer. This condition is because students can provide multiple possible responses. In addition, when directly questioned, they can provide alternative responses. Questions that have a variety of answers are an essential aspect of developing students' thinking skills. Students will become accustomed to having diverse responses, boosting their self-confidence.

For example, for the second question: "What are the possible values for the class interval 5 - 8?" and student responses, as shown in Figure 7.

<p>5, 7 9, 10, 11, 12 13, 15, 16 17 x3, 18 x2, 19, 20 21 x2, 22 x2, 23 x2, 24 x3 25 x2, 26 x4, 27 x5, 28</p>	or	<p>5 x2 9, 10, 12 x2 14, 16 x2 17 x4, 19, 20 x2 21 x9 26 x6, 27 x6</p>
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Figure 7. Students responds for the second question of jumping task

Using "OR" in Figure 7 denotes that students can provide alternative answers. In addition to that answer, they used the variable x. This fact shows that the Jumping task can develop their thinking skills, especially in giving the correct alternative answers. In other words, sharing and jumping tasks can develop students' thinking skills and data literacy.

Questions of this type are classified as HOT questions (Putri & Zulkardi, 2019; Tanujaya & Mumu, 2021; Gustiningsi et al., 2022). Moreover, Brookhart (2010) stated that higher-order questions could not be answered through simple recall or reading the text's information. Students are required to demonstrate advanced cognitive skills when answering higher-order problems. Students are encouraged to think beyond literal questions. Higher-order questions foster critical thinking, requiring students to apply, analyze, synthesize, and evaluate material instead of merely recalling facts.

Reflection

Reflection is the final step of the lesson study, serving as a continuation of observations that will be used to design future learning enhancements. Teachers demonstrated enthusiasm for redesigning lessons during this collaborative phase, as shown in Figure 8. They actively report on student learning activities without offering an opinion. All information they say is based on actual happenings. The following summary includes a selection of the teachers' observations.



Figure 8. Teacher discussions as reflection after the first open class for redesign lesson plan

At the beginning of the learning process, students find it challenging to understand the questions posed by the teacher. The teacher must repeat several times to clarify the question's meaning. Even in certain circumstances, teachers must employ multiple synonyms. The students were unable to comprehend the question's intended meaning. However, this circumstance only persisted for a short time. Some students assist their peers in explaining the given questions. This situation slows down the learning process considerably. Therefore, to address this issue in the next lesson, the model teacher must prepare some words or phrases to assist students in comprehending the topic at hand. Sentences for sharing and jumping tasks must be unambiguous and free of ambiguity but may contain multiple answers.

Their comprehension of the questions significantly influences students' ability to answer questions. According to several experts, students must first be able to read and comprehend questions before answering a question-based problem. For instance, Newmann (1990) stated that there are five sequential hierarchies that a person must take to solve a written mathematical problem. The five sequential steps are reading, comprehension, transformation, process skills, and encoding. Reading the problem and comprehending what was read are the first two steps for students to solve a problem (Clements, 1980). In addition, Praktikpong and Nakamura (2006) asserted that success in the first two phases (Reading and Comprehension) indicates that the student correctly understood the question in its mathematical context.

Moreover, learning activities are becoming more engaging as students collaborate. When a student offers a response, other students offer their opinions. They take turns responding because there are multiple answers to the questions posed. Additionally, if a student who wishes to present answers have communication issues or other technical difficulties, other students will assist him. Similarly, when a student's learning equipment does not support presenting the answer, other students will assist in presenting it. They appear enthusiastic and enjoy the alterations that accompany instruction. Typically, monotonous teaching-learning becomes more engaging. The teacher no longer speaks throughout the

lesson but serves as a moderator and facilitator. In the class, students are the subject and object of instruction.

Cooperation between students and teachers in the classroom will promote active learning. The participation of students in learning will increase knowledge exchange among them. Students deficient in knowledge will acquire knowledge. Students deficient in comprehension will acquire comprehension. Tanujaya and Mumu (2019) claim that the more active students are in learning activities, the more their attitudes change, namely their knowledge, attitudes, and learning skills. These modifications will affect the improvement of learning outcomes.

Student' Response to the Tasks

In addition to direct observation of student activities during classroom learning, questionnaire-based observations were also conducted. Observation using a questionnaire was designed to determine student responses to sharing and jumping tasks in learning.

Based on the student responses in Figures 9-14, most students responded positively to sharing and jumping tasks. Students generally report engaging in thinking activities, participating in class discussions, answering teacher questions, and responding to their peers' responses. These activities give them the impression that learning is more engaging and enjoyable. Additionally, they feel continually challenged to comprehend the material being taught.

In Figure 9, most students agree and strongly agree with the statement: "Sharing and Jumping Tasks require us to think before Answering, Asking, and Discussing." It showed that approximately 70.4% of students engage in thinking activities during the learning process. In the past, they rarely engaged in thinking when learning, including when completing assignments. In the past, students copied from friends, textbooks, and the internet to complete their assignments. On the other hand, mathematical thinking activities are essential in mathematics classes. According to Tanujaya and Mumu (2020b), mathematics students must think mathematically.

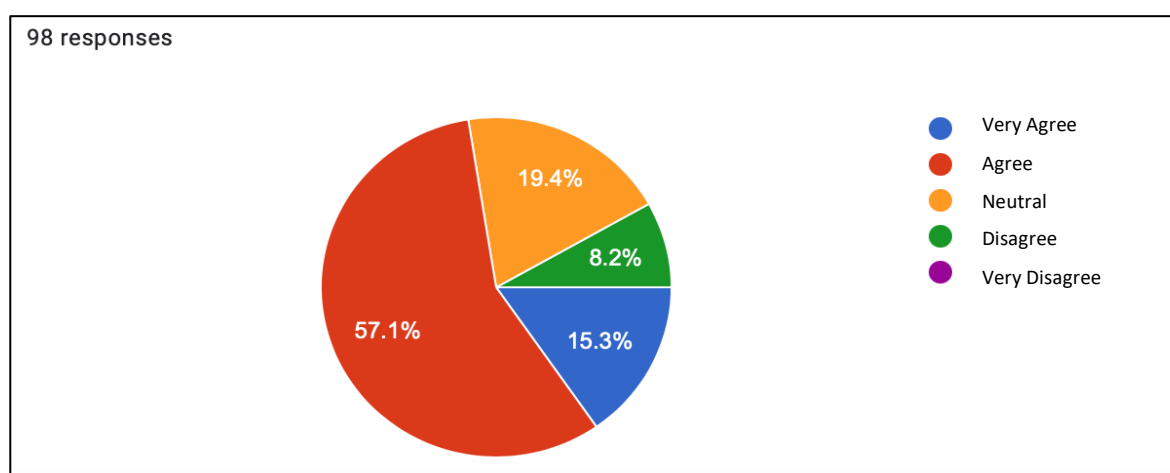


Figure 9. Students' response to statement: "Sharing and jumping tasks require us to think before answering, asking, and discussing"

Mathematical thinking is quite different from doing mathematics. Mathematical thinking is crucial in learning and teaching mathematics (Stacey, 2006). When students think mathematically, they actively engage in their mathematics learning, attempting to make sense of ideas and constructing connections among various facts, procedures, and concepts (Hwang & Ham, 2021; Hansen, 2022).

Moreover, effective mathematics learning officially starts with thinking activities in the learning process. Through engaging in thinking activities, students gain confidence to participate in their academic achievement actively. Their participation in the discussion makes learning engaging. This condition is apparent from the student responses in [Figures 10](#) and [11](#).

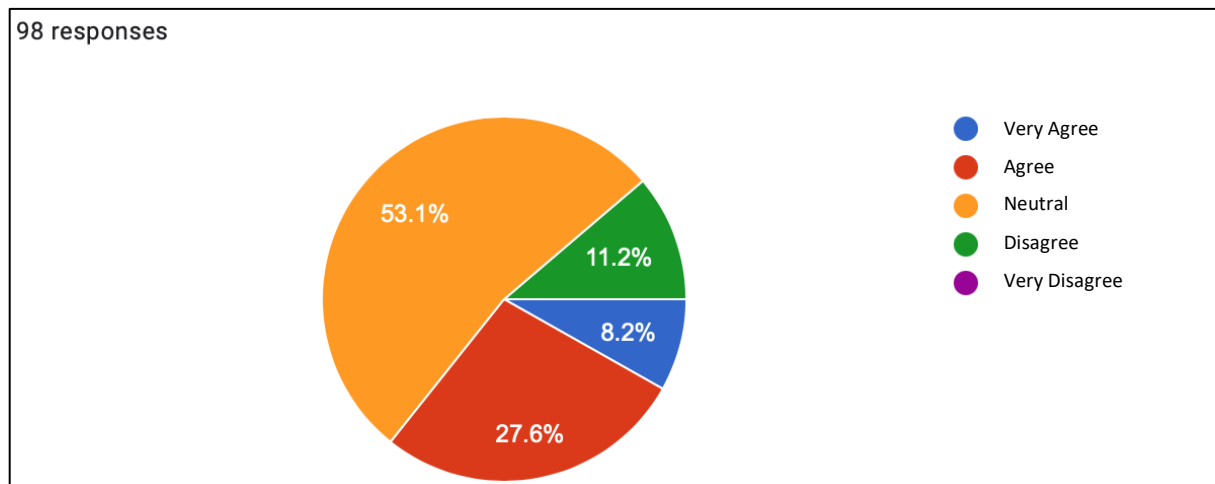


Figure 10. Student responses to the statement: "Sharing and jumping tasks enliven the discussion"

As evidenced by their assertion in [Figure 10](#), instruction becomes exciting and not tedious when students are engaged in it.

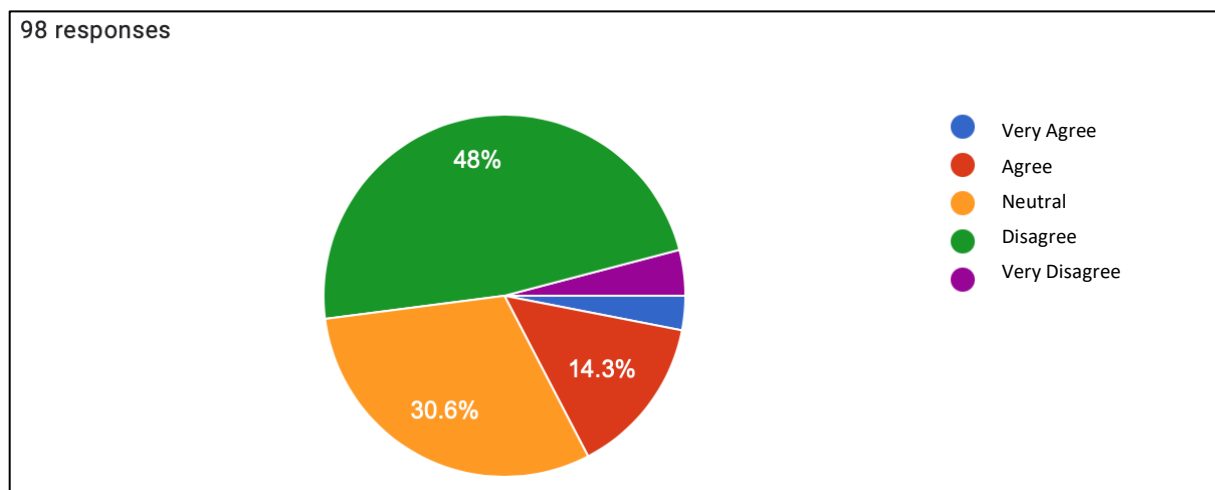


Figure 11. Student responses to the statement: "Sharing and jumping tasks add to the boredom of the lessons"

According to the students, sharing and jumping tasks increased their friends' interest in learning, as illustrated in [Figure 12](#).

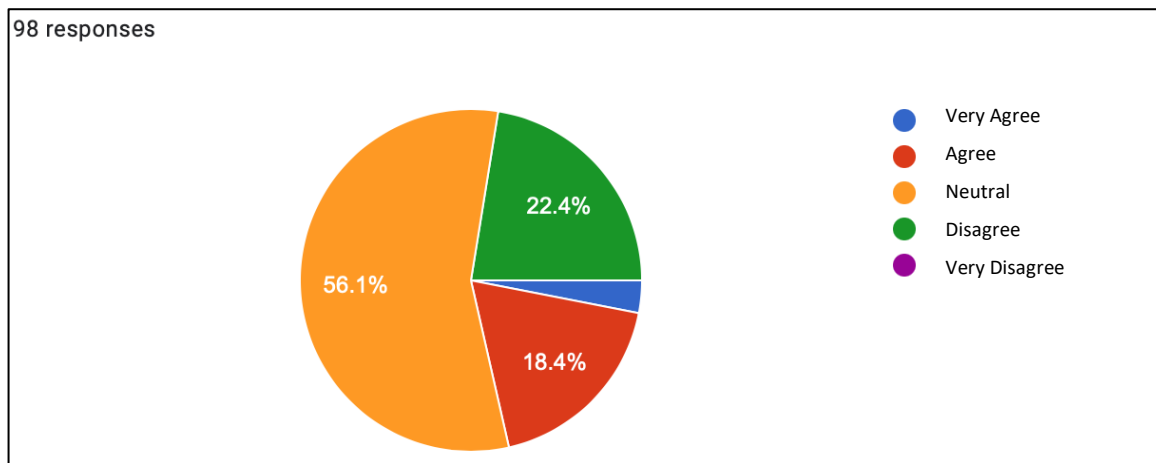


Figure 12. Student responses to the statement “Sharing and jumping tasks increase a friend's enthusiasm for learning”

Their enthusiasm for learning influences students' comprehension of the concepts being taught.

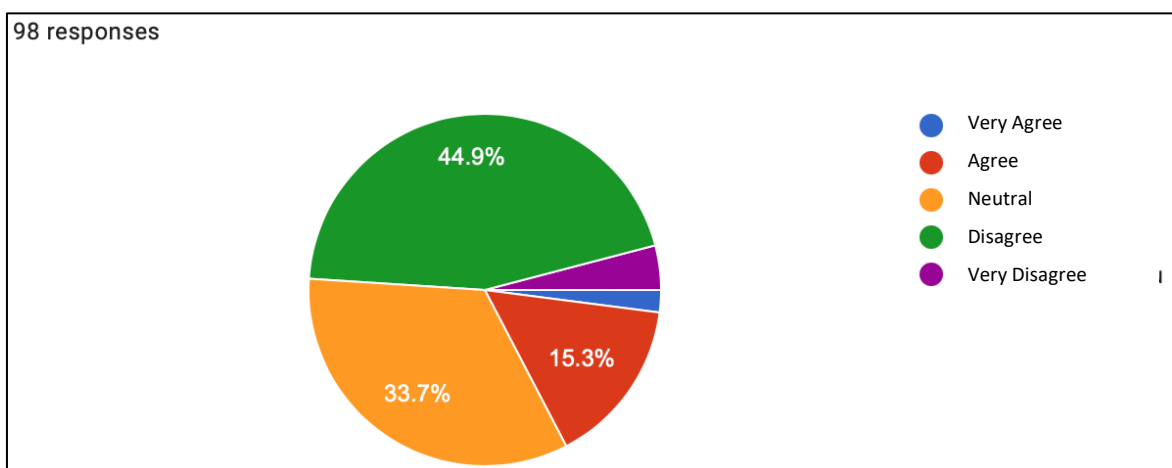


Figure 13. Student responses to the statement: “Sharing and jumping tasks exacerbate the difficulty of comprehending lessons”

Most students agreed that the sharing and jumping task reduced the difficulty of comprehending the lesson (Figure 13) and improved their comprehension of the topic (Figure 14).

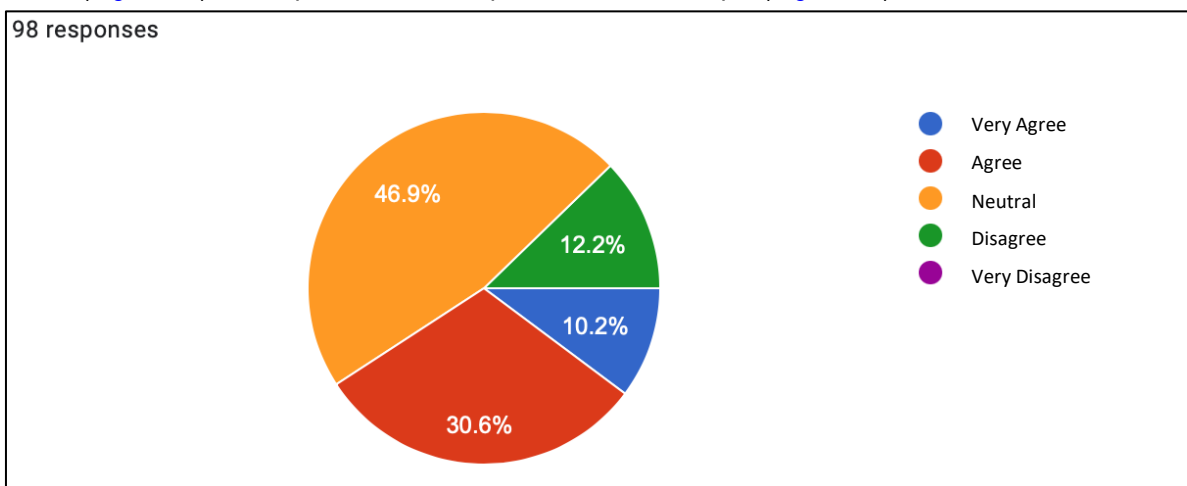


Figure 14. Student responses to the statement: “Sharing and jumping tasks assist us in gaining a better understanding of the subjects”

The success of implementing Sharing and Jumping tasks in learning has been widely reported in various fields of study, such as Science (Fatimah et al., 2018; Ogegbo et al., 2019), Mathematics (Gustiningsi et al., 2022), and other lessons (Noer et al., 2019; Shi & Cheng, 2021). Increased student problem-solving skills contributed to this accomplishment (Hobri et al., 2020). Moreover, Căprioară (2015) explains that problem-solving is an essential aspect of learning that requires a student's cognitive abilities. The higher the level of thinking skills, the higher the problem-solving capacity.

CONCLUSION

Integrating lesson study using sharing and jumping tasks into mathematics instruction can enhance the quality of learning, particularly students' thinking skills. Students frequently engage in thinking activities prior to engaging in learning activities. Before asking a question, providing an answer, or responding to the questions and answers of fellow students, they always reflect on it. Instruction in mathematics classrooms becomes more engaging and less tedious. They become increasingly eager to learn the concepts being taught. In addition, they are also more often in control of instruction. The role of the teacher is limited to facilitator and moderator. Their engagement in learning influences their comprehension of the concepts being taught. While trying to perform sharing and jumping tasks, students construct their conceptual understanding.

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