Implementation of the Interactive Learning Model with Cooperative Setting (PISK) to Improve Mathematical Literacy and Learning Interest of Grade VIII Students

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Abstract

This study aims to investigate the effectiveness of the Interactive Learning Model with Cooperative Setting (Model Pembelajaran Interaktif Setting Kooperatif or PISK) in improving mathematical literacy and learning interest among Grade VIII students. The research was conducted using Classroom Action Research (CAR) over two cycles. The PISK model involves structured learning steps, including group collaboration, guided problem solving, class discussions, reflection, and assessment. The learning content focused on statistical concepts, particularly mean, median, and mode. Data were collected through observation sheets to monitor student engagement, questionnaires to assess learning interest, and written tests to evaluate mathematical literacy. The results showed a significant increase in both domains: the average mathematical literacy score improved from 40% in the pre-cycle to 78% in the second cycle, while learning interest rose from 56.5% to 82.3%. These findings indicate that the PISK model effectively supports both cognitive and affective aspects of mathematics learning.

Keywords: *Mathematical Literacy; Learning Interest; Interactive Learning Model with Cooperative Setting (PISK); Classroom Action Research; Statistics*

INTRODUCTION

The educational process involves the development of skills, knowledge, understanding, and values in individuals. In this process, knowledge is conveyed from educators or learning resources to students. This means that there is a transfer of knowledge from one entity to another in an effort to improve individual understanding and abilities (Yuniar, Prayito and Happy, 2024). In education, learning mathematics is very important. Mathematics is a fundamental discipline that has great significance, both in the context of everyday life and in the advancement of science and technology (Anwar, 2018). Mathematics is a fundamental discipline that plays an important role in everyday life and in the development of science and technology (NCTM, 2020). As one of the disciplines that exists at every level of education, mathematics is expected to develop students' abilities in terms of thinking. Therefore, mathematical abilities are needed by the nation's future generations to be able to open up a more productive, innovative, and beneficial future for the development of the nation so that it can be more advanced and competitive. Students who learn mathematics not only need calculation skills but also need the skills to think and reason mathematically in solving new problems and learning new ideas that

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students will encounter in the future. This is in line with the main objective of mathematics education, which is to equip students with a deep understanding of mathematical facts, concepts, principles, and operations. This understanding is expected to be applied flexibly, accurately, efficiently, and appropriately in solving various mathematical problems. Thus, mathematics learning does not only emphasize calculation, but also trains critical thinking and problem-solving skills in real life (Ministry of Education and Culture, 2020). The implications of this objective are closely related to mathematical literacy, because mathematical literacy not only includes understanding basic concepts, but also the ability to interpret and use these concepts in complex situations.

One of the important skills for students in the 21st century is mathematical literacy, which involves understanding mathematics in both quantitative and qualitative contexts (Kholifasari, Utami and Mariyam, 2020). One important cognitive skill for students to master is mathematical literacy (Hapsari, 2019). Mathematical literacy plays an important role in education because mathematics is one of the core elements in the curriculum at all levels of education. In line with the opinion of Hasanah, Wardono and Kartono (2016), mathematical literacy is a person's ability to formulate, use, and interpret mathematics in various situations. From this description, it is clear that mathematical literacy skills play a crucial role in helping students overcome challenges involving the application of mathematics in everyday life. The importance of mathematical literacy skills is not yet in line with mathematical literacy skills in Indonesia. In reality, the mathematical literacy skills of students in Indonesia are still low, reflecting the fact that students often have difficulty understanding abstract mathematical concepts, thereby hindering the application of this knowledge in life (Hadi et al. 2022). PISA 2022 data confirms this challenge:

Table 1. Indonesian Students' Mathematics Literacy Achievement vs. Global

Indicator	Indonesia	OECD Average	Gap
PISA 2022 Score	366	472	-106 poin
Students reaching minimum level	28%	76%	-48%

Source: OECD (2023);

Based on the 2022 PISA results, Indonesian students showed an increase in their rankings in mathematics, reading, and science literacy, each rising 5 positions compared to the previous results. However, despite the increase in rankings, Indonesia's average scores declined in all three areas. PISA classifies student abilities into several levels, with level 2 considered the basic competency level required to fully participate in modern society. There are 6 levels in the PISA classification. Previous trends show that most Indonesian students are at or below level 2. This indicates that many students still face challenges in achieving higher competencies in mathematical literacy.

Another condition was also found in the results of the Final Summative Assessment for the 8th grade mathematics subject for the 2023/2024 academic year at a public junior high school in Yogyakarta, which showed that nearly 80% of students had not achieved the established Learning Objective Achievement Criteria (KKTP), namely a score of 70–87 in the "Achieved Mastery" category. In fact, the items presented in the assessment were designed to reflect general mathematical literacy content, which includes the ability to understand, apply, and reason about mathematical concepts in contexts relevant to real life. This fact shows that even though the assessment has been geared towards a mathematical literacy approach, most students still find it difficult to transfer their mathematical knowledge to more complex and contextual situations, thus requiring more targeted pedagogical intervention.

In other circumstances, facts show that students' mathematical literacy levels are still low, as indicated by research conducted by Aritonang and Safitri (2021) which found that the mathematical literacy levels of students at a Madrasah Aliyah in Medan were identified as very low in the results of observations conducted. Furthermore, based on research by Purnama and Suparman (2020), every student is expected to have the ability to solve problems presented in the form of story questions as part of mathematical literacy. Therefore, this skill is considered very important for students to master. However, in reality, most students have not fully mastered this competency. This is very concerning when viewed

from the importance of mathematics, which has benefits for facing challenges in the future. Meanwhile, based on the results of observations and analysis of teaching tools, it was found that in classroom learning, teachers tend to apply conventional learning methods that are dominated by the teacher. This causes students to quickly become bored and not pay attention during learning. Referring to the results of observations of several students, it was found that students had difficulty solving math problems that were different from the types of problems previously given by the teacher. Students simply accepted the problems without understanding them, and teachers also failed to create a meaningful atmosphere for students. In addition, students are not given sufficient opportunity to communicate their ideas in solving problems. Therefore, students need group learning, which is predicted to help them communicate their ideas.

Another finding that often arises during learning is students' initial assumption that mathematics is a subject that is not easy to understand, is not enjoyable, and has little relevance for the future. Researchers suspect that this is due to several factors, one of which is the quality of learning that has not fully brought out a basic understanding of concepts to interpret and use them in complex situations. This ability is one aspect of mathematical literacy. Improving the quality of learning in the classroom can be achieved through various efforts, one of which is by increasing students' interest in learning. A high interest in learning will have a positive impact on students' academic achievement, including in mathematics learning. In the learning process, interest is an aspect of psychology that will affect each individual when learning because it will create a sense of enjoyment and also encourage them to carry out activities without feeling forced (Muliani & Amsman, 2022). On the other hand, students' interest in learning mathematics is also a common problem found at various levels of education. Low interest in learning causes students to easily get bored, be less active, and not be enthusiastic in participating in the learning process. In fact, according to Slameto (2010), interest is one of the most influential internal factors on learning outcomes. Without strong interest, students' cognitive processes in understanding the material will be hampered.

However, in reality, many students tend to have no interest in learning mathematics. Mathematics is still often considered a difficult, scary, and monotonous subject, even though there are also many who enjoy this subject. Based on the results of observations and interviews conducted at a public junior high school in Yogyakarta, it was found that students' interest in learning mathematics is still low. Based on the results of preliminary observations, it was found that only a few students paid attention to the teacher's explanations, some were not focused, were not active in class, some students did not respond to the teacher's questions, and some did not do their assignments. During group discussions, some students were still passive, and only a few asked questions during the learning process. Thus, it can be said that students' interest in learning is still low, as seen from the observation results of 45.44%. The questionnaire also revealed that almost all students knew mathematics, half of them were interested in learning mathematics, and almost all students felt that mathematics was a difficult subject. This is in line with the results of a study by Sukada, Utami, and Merta (2013), which showed that the contribution to learning achievement was 11.28% because interest was still low.

Supported by the teachers' statements in the interviews conducted by the researcher, the students who were enthusiastic and liked mathematics were only those with good cognitive abilities and depended on the material provided. Students are also still not accustomed to asking questions about things they do not understand because they are afraid of making mistakes and lack confidence. Some students still do not do their homework for various reasons, and their participation and involvement in class is still not optimal. Teachers have tried to use learning engineering in such a way that it uses direct instruction. However, this has not been able to foster students' interest in learning mathematics. Teachers give assignments for students to practice using their textbooks, and teachers have not made optimal use of learning media, whether traditional or modern. Meanwhile, a good mathematics learning process is one that can attract students' interest so that the knowledge conveyed will be better accepted by students because, based on cognitive learning theory, the learning process should be prioritized over learning outcomes (Mahmudah et al., 2022).

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To overcome the problem of literacy skills and optimize the quality of mathematics learning, it is necessary to renew the learning process. This renewal in learning can take the form of using the PISK learning model, which focuses on students' mathematical literacy. The PISK model is based on constructivism theory, which emphasizes that students build their own understanding through interaction with their environment and others. Based on research conducted by Simamora and Tranggono (2023), interactive learning contributes positively to improving students' literacy and numeracy skills, which is achieved through a learning approach that involves active exploration and contextual understanding of concepts.

It is important to increase students' interest in learning so that their learning outcomes improve. One of the efforts that can be made is through the right learning model. Based on the previous fact that students who are given direct learning still do not increase their interest in learning, there needs to be a change in the learning design. This is in line with research by Rahimi, et al. (2023) that to increase students' interest in the learning process, teachers need to use a variety of learning models in teaching. The effort that teachers need to make is to utilize higher quality and different learning models, not just lecture methods, in order to optimize the implementation of the Merdeka Curriculum (Hartatik, 2022).

One alternative solution offered in this case is to improve students' mathematical literacy and interest in learning by choosing one of the various available learning models. An effective learning model that can be chosen is the Cooperative Interactive Learning Model (PISK). The PISK model is based on constructivism theory, which emphasizes that students build their own understanding through interaction with their environment and others. Based on research conducted by Simamora and Tranggono (2023), interactive learning contributes positively to improving students' literacy and numeracy skills, which is achieved through a learning approach that involves active exploration and contextual understanding of concepts.

Research by Hake (1998) shows that interactive approaches increase student learning outcomes in mathematics by 48% compared to traditional approaches. Similar results were also found in research by Abdullahi, Adamu, and Sirajo (2023), which showed that interactive approaches in cooperative learning strategies significantly improve student mathematics performance compared to conventional learning methods. With this learning model, students not only gain a deeper understanding of mathematical concepts, but are also encouraged to actively engage in the learning process and are able to communicate their ideas effectively. These findings show that interactive learning, especially in a cooperative setting, has great potential in developing students' mathematical literacy skills more comprehensively. With this learning model, it is hoped that students will better understand the concepts in mathematics and that learning will become more meaningful, enabling students to communicate their ideas. In other aspects, it is also hoped that the PISK model can create a positive atmosphere in learning so that students can build their confidence and collaborate in learning mathematics.

According to Dalimunthe and Sembiring (2022), students' interest in learning will increase if learning is delivered through a contextual and interactive approach, because this approach helps students understand the relevance of mathematics in everyday life. When students feel that mathematics material is meaningful and useful, they tend to be more involved in the learning process and motivated to explore the concepts being studied. In this case, the PISK model is presented as a potential approach to improving students' mathematical literacy and interest in learning. Through collaborative activities, group discussions, and the use of interactive media, students are encouraged to actively build their own understanding in a fun and challenging learning environment. This process allows students to not only understand the material more deeply, but also feel that they have a role in learning, which ultimately strengthens their curiosity and interest in mathematics. Thus, PISK plays an important role in creating a learning experience that is not only cognitively meaningful but also optimally stimulates students' affective aspects.

Therefore, the purpose of this study is to evaluate the effectiveness of the PISK model in improving students' mathematical literacy and interest in learning. This study is expected to contribute to the development of innovative learning strategies that are culturally relevant and conceptually profound.

When students feel that mathematics material is meaningful and useful, they tend to be more involved in the learning process and motivated to explore the concepts being studied. In this case, the PISK model is presented as a potential approach to improving students' mathematical literacy and interest in learning. Through collaborative activities, group discussions, and the use of interactive media, students are encouraged to actively build their own understanding in a fun and challenging learning environment. This process allows students to not only understand the material more deeply, but also feel that they have a role in learning, which ultimately strengthens their curiosity and interest in mathematics. Thus, PISK plays an important role in creating a learning experience that is not only cognitively meaningful but also optimally stimulates students' affective aspects.

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METHOD

The research method chosen was Classroom Action Research (CAR). Classroom action research is an approach used to improve the quality of learning through systematic steps (Rosidin, 2021). Therefore, the purpose of this study was to improve students' mathematical literacy and interest in learning through the application of the PISK model.

This research was conducted in one of the junior high schools in Yogyakarta in the first semester of 2023/2024. The objects of this study were students' mathematical literacy skills and interest in learning statistics. The subjects of this study were 30 eighth-grade students. The model applied in this study consisted of four stages, namely planning, implementation, observation, and reflection. Arikunto (2013, pp.17) explains that one cycle of PTK consists of four steps, namely: (1) planning, (2) implementation, (3) observation, and (4) reflection. The following is a general description of the Classroom Action Research (PTK) procedure that was carried out.

Figure 1 Flowchart of Classroom Action Research (CAR)
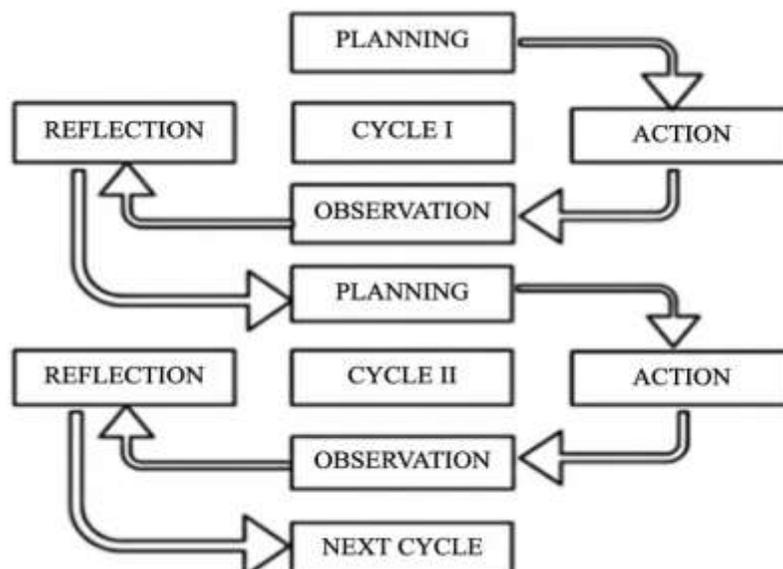
The cycle is stopped when the conditions of students in the research class show an improvement in mathematics literacy test results and student learning interest questionnaires. Data collection techniques involve tests, questionnaires, and observations. Observations are conducted to monitor student activities during the learning process, questionnaires are used to measure changes in students' affective aspects, namely learning interest, while tests are used to measure students' mathematics literacy skills.

Mathematical literacy refers to a person's ability to apply, formulate, and interpret mathematical concepts in various situations, which involves mathematical reasoning and the application of procedures, concepts, and facts to describe, predict, or illustrate events or phenomena. Solid mathematical literacy skills play an important role in shaping independent character. When students have strong mathematical literacy skills, they tend to be more skilled at solving mathematical problems independently. High levels of mathematical skill are often possessed by those who have good mathematical literacy skills (Makhmudah, 2018).

There are six achievement levels that indicate the level of mathematical literacy based on PISA, namely:

1. Level 1: Students have the ability to respond to questions from the problems presented, gather information, and act according to the context.

2. Level 2: When faced with a problem, students have the ability to identify the situation, formulate relevant formulas, and interpret the problem.

3. Level 3: Students have the ability to use appropriate strategies to solve problems and follow the correct steps.

4. Level 4: Students can operate effectively in real situations and relate them to the problems they face.

5. Level 5: Students' abilities are not only limited to handling complex situations to solve complicated problems, but also to their ability to choose appropriate strategies in the solution process.

6. Level 6: When facing problems, students use reasoning to make generalizations and communicate the solutions they find.

In this study, mathematical literacy is defined as a person's ability to design, use, and interpret mathematics in various contexts with mathematical steps, concepts, and facts to solve real-life problems. The following are the indicators of mathematical literacy used by researchers in this study.

Table 2. Indicators of Mathematical Literacy

Item	Indicator
1	Students are able to apply their knowledge to handle routine problems and solve problems with a general context.
2	Students can interpret problems and use them to find solutions using the appropriate formulas.
3	Students are able to apply their reasoning in solving various mathematical problems, make generalizations based on their findings, and formulate and communicate the results effectively.
4	Students are able to interact effectively with various mathematical models and apply their abilities in selecting and integrating various representations, then connecting them to real-world contexts
5	Using existing models, students can overcome complex situations and successfully solve difficult problems.
6	Students can follow procedures in solving problems and choose appropriate problem-solving strategies.

The tests used in this study were in the form of written tests or essays conducted at the end of the learning process. The questionnaire used a four-choice Likert scale, focusing on students' interest in learning, which included indicators of attention, perseverance, enthusiasm, and attitude towards mathematics. Meanwhile, observations used a structured observation sheet containing indicators of student activity in learning, such as asking questions, involvement in group discussions, and the ability to convey ideas verbally.

The data analysis technique for quantitative data was carried out using a comparative descriptive analysis technique, which clearly described the research results to understand the learning process using the PISK model. The results of the tests, questionnaires, and observations from cycle I and cycle II were compared to assess the improvement in students' mathematical literacy and learning interest.

RESULTS AND DISCUSSION

Interactive learning supports the development of problem-solving skills, which is part of mathematical literacy. For example, research by Hake (1998) shows that interactive approaches improve student learning outcomes in mathematics by 48% compared to traditional approaches. Furthermore, according to Ratumanan (2003), the PISK model has learning steps that are illustrated in the following phases.

1. Introduction

   a) The teacher organizes students into cooperative groups.

   b) The teacher conveys the learning objectives.

   c) The teacher distributes teaching materials and worksheets.

   d) The teacher tells students what they will do: solve problems, find formulas or principles, conduct investigations, or work on projects.

   e) The teacher conducts an apperception

2. Activities or problem solving

   a) The teacher explains the prerequisite material and other explanations deemed necessary for students to be able to carry out group activities smoothly.

   b) The teacher asks students to carry out the prepared activities (solving problems, discovering formulas or principles, conducting investigations, etc.).

   c) The teacher circulates around the classroom, observing and monitoring group activities to ensure they run smoothly and orderly, and providing assistance if any groups encounter difficulties.

   d) The teacher may ask open-ended questions before the class discussion.

3. Presentation and discussion

   a) The teacher asks one of the groups to present their work and discuss the results in class.

   b) The teacher leads the class discussion in such a way as to create a democratic academic atmosphere and freedom to ask questions and give answers.

   c) The teacher asks questions such as "What, why, and how" to improve students' understanding and thinking process in achieving learning objectives.

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4. Closing

    a) The teacher gives students the opportunity to review what they have learned, correct their notes, or reflect.

    b) The teacher guides students in making summaries.

    c) The teacher gives follow-up assignments (homework).

5. Assessment

    a) The teacher gives a prepared test to assess the extent of students' mastery of the material that has been learned.

    b) The teacher supervises students to work individually.

PTK was conducted in two cycles, each cycle consisting of two learning meetings, with each cycle lasting for one meeting session, each lasting for two hours of lessons. The description of each cycle is as follows.

1. Cycle I

    a) Planning

The researcher acted directly as a teacher who conducted classroom learning based on the PISK model steps in collaboration with subject teachers in planning the use of contextual learning content to improve students' mathematical literacy skills. In preparation, the researcher compiled several things, including teaching modules in accordance with the curriculum implemented in the school, learning materials, learning media, and worksheets for students during the learning process. In addition, a diagnostic test was administered to evaluate students' initial abilities. The material presented was data processing based on the local situation, namely data on farmers' harvests in the local area over seven days.

There were also observation sheets and student learning interest questionnaires that were distributed at the end of the cycle after two meetings had been held. In the first meeting, students were given statistical problems about mode and median. The following are some of the activities included in the plan.

        • Developing lesson plans according to the interactive-cooperative model.

        • Preparing teaching materials and student worksheets.

        • Designing end-of-cycle test questions.

        • Developing learning interest questionnaires and observation sheets.

The teacher designs the lesson so that students work in cooperative groups and solve problems together, then present their results.

    b) Implementation and observation

At this stage, learning is carried out according to the plan that has been prepared in advance. Learning is carried out in two meetings. The implementation of learning is carried out in the following sequence of steps.

1) Introduction: The first activity begins with the teacher greeting the students and inviting them to pray. The teacher also interacts with students to find out how they are doing and ensure that they are ready to start the lesson. The teacher presents a contextual problem based on data on the harvest of village farmers, then asks students to work in groups to analyze the data. Students are then divided into

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heterogeneous groups (based on ability), and the teacher explains the learning objectives and distributes teaching materials/worksheets.

In the core part of the lesson, the teacher delivers the material using a projector. Based on observations, students have difficulty solving the problems given. The teacher divides the students into several groups based on their initial ability levels, consisting of low, medium, and high abilities. The teacher provides guidance and direction to students, encouraging them to think deeply and creatively in formulating strategies to solve problems.

2) Activities/Problem Solving: The teacher explains prerequisite material, such as how to organize data, before students begin group investigations to calculate the mean, median, and mode.

3) Presentation and Discussion: One group presents its results, while the other groups respond. The teacher facilitates a democratic class discussion.

Some students experienced slight difficulties in solving problems despite being given positive guidance and direction.

4) Closing: Students reflected on what they had learned, and the teacher guided them in summarizing the material.

At the end of the lesson, students were asked to formulate conclusions about that day's learning. As a result, even though students were given contextual problems, their average scores were still low.

5) Assessment: Formative tests were given to assess student understanding.

The results of the observation showed that most students still had difficulty:

• Identifying relevant information from the story questions,

• Determining the steps for data processing,

• Organizing arguments systematically.

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• Organizing arguments systematically.

In addition, some students still had difficulty identifying the data that needed to be calculated, and some were not yet actively participating in discussions. A total of 16 out of 30 students (55%) showed active participation. At this stage, student involvement in group discussions began to appear. A total of 16 out of 30 students (55%) actively discussed and expressed their opinions.

Evaluation results:

Average mathematics literacy score: 62% (from 40% in the pre-cycle),

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Interest in learning (questionnaire): 70.2% (from 56.5% in the pre-cycle).

c) Reflection

After completing the first cycle, a reflection was conducted on the learning process that had taken place. The reflection showed that the main obstacles for students were understanding the context of the problem and the use of unfamiliar statistical terms. Based on the learning achievements in cycle I, the next step was to continue cycle II in the next meeting. The researcher also made adjustments to improve the learning process with the PISK model in future meetings. The actions that could be taken were to design simpler questions that were closer to the students' experiences (e.g., market snack sales data) and to provide initial exercises in a classical manner before group learning.

2. Cycle II

a) Planning

The process applied in cycle II was not much different from the process carried out in cycle I, which consisted of four stages: planning, implementation, observation, and reflection. At the end of this cycle, students were also given a written test to assess their mathematical literacy skills. Planning focused on refining the design of cooperative activities. The problems raised were simplified and made more contextual, such as problems related to:

"Data on the number of buyers of traditional foods (gethuk, serabi, etc.) in the school canteen every day for a week."

Teachers also prepare additional information and scaffolding strategies, including:

• Thinking trigger questions (e.g., "What is the median?"),

• Group discussion before entering groups.

• More detailed step-by-step instructions on the worksheet,

• Open-ended questions before class discussion to stimulate students' thinking,

• Follow-up assignments to deepen understanding.

b) Implementation and observation

The learning process went more smoothly. Students seemed more prepared and active. Before group learning, the teacher conducted a classical apersepsi and explained a simple example.

The steps were carried out as follows:

1) Introduction: Students recalled the previous material and were divided into groups.

2) Activity: Students worked together to calculate the mean, median, and mode of the data provided. The teacher monitored and provided assistance when needed.

3) Presentation and Discussion: Two groups present their work. The discussion is more lively, and students are able to defend their calculations.

4) Closing: The teacher asks students to write personal reflections and guides them in making summaries.

5) Assessment: A final test is given individually.

Observations show an increase in participation. A total of 27 out of 30 students (90%) were active in the discussion and task completion process.

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Evaluation results:

Mathematical Literacy: 78%,

Interest in Learning: 82.3%.

c) Reflection

Reflection shows that the PISK model is able to encourage student engagement. With systematic guidance, students became more confident and cooperative. The use of contexts closely related to the students' immediate environment also improved their understanding of concepts because they were familiar with the data used.

Based on these findings, the researcher describes a summary of the results showing an increase in students' mathematical literacy, interest in learning, and involvement in learning.

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• Group discussion before entering groups.

• More detailed step-by-step instructions on the worksheet,

• Open-ended questions before class discussion to stimulate students' thinking,

• Follow-up assignments to deepen understanding.

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Interest in Learning: 82.3%.

c) Reflection

Reflection shows that the PISK model is able to encourage student engagement. With systematic guidance, students became more confident and cooperative. The use of contexts closely related to the students' immediate environment also improved their understanding of concepts because they were familiar with the data used.

Based on these findings, the researcher describes a summary of the results showing an increase in students' mathematical literacy, interest in learning, and involvement in learning.

Table 3. Summary of Results

Component	Pre-cycle	Cycle I	Cycle II
Mathematical Literacy (%)	40	62	78
Interest In Learning (%)	56,5	70,2	82,3
Active Students (Number)	4	11	18

The use of the PISK model in statistics material showed an increase in students' mathematical literacy and learning interest. The results of the actions taken in this study were a pre-cycle average of 40%, which then increased by 12% in cycle I and 16% in cycle II. Thus, it can be seen that the PISK model can be applied in learning to improve students' mathematical literacy skills in circle material. Systematic, student-centered, and contextually-based learning steps strengthen students' understanding and interest in learning.

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CONCLUSION

Based on the results of the classroom action research conducted in two cycles, it can be concluded that the Cooperative Interactive Learning Setting (PISK) model is effective in improving students' mathematical literacy and interest in learning statistics (mean, median, and mode) at the junior high school level. The improvement occurred gradually from cycle to cycle, as shown by:

1) An increase in students' mathematical literacy from 40% in the pre-cycle to 62% in cycle I, and further increased to 78% in cycle II. This shows that PISK helps students understand statistical concepts through group work, discussion, and active problem solving.

2) Students' interest in learning also increased from 56.5% in the pre-cycle to 70.2% in cycle I, and reached 82.3% in cycle II. Students appeared more enthusiastic, participated actively in groups, and were more focused during lessons.

Student engagement in learning also increased significantly. In the pre-cycle, only 4 students were active, while in cycle II it increased to 27 students out of a total of 30 students. The implementation of this Classroom Action Research shows that the Cooperative Interactive Learning Model (PISK) is not only capable of creating a participatory learning atmosphere, but also encourages more comprehensive cognitive and affective involvement of students in mathematics learning, especially in statistics material.

Students who initially showed passive responses and confusion in dealing with data-based problems began to demonstrate analytical and systematic thinking skills after being actively involved in group discussions and class presentations. The cooperative mechanism in PISK provides space for students to process information through social interaction, build mutual understanding, and develop confidence in expressing their opinions.

In terms of affective aspects, there were also changes in attitude, marked by increased curiosity, enthusiasm, and willingness of students to complete tasks independently or in groups. The application of PISK stages such as apperception, goal setting, challenging group activities, and open discussions provided meaningful and non-monotonous learning experiences. These findings reinforce the view that learning models that provide space for students to be active participants in the learning process, rather than mere recipients of information, are effective. PISK is a relevant alternative solution for developing mathematical literacy while building students' interest in learning, provided that its implementation is accompanied by systematic and adaptive guidance tailored to the characteristics of the class.

REFERENCES

Abdullahi, M. A., Adamu, S. I., & Sirajo, M. (2023). The effect of interactive cooperative learning strategies on students' mathematics performance. Journal of Educational Research and Practice, 13(1), 24–35. https://doi.org/10.1177/XYZ1234567890

Anwar, N.T. (2018) 'Peran Kemampuan Literasi Matematis pada Pembelajaran Matematika Abad-21', PRISMA, Prosiding Seminar Nasional Matematika, 1, pp. 364–370.

Arikunto, S. (2013). Prosedur penelitian: Suatu pendekatan praktik (Revisi ed.). Jakarta: Rineka Cipta.

Aritonang, I. and Safitri, I. (2021) 'Pengaruh Blended Learning Terhadap Peningkatan Literasi Matematika Siswa', Jurnal Cendekia : Jurnal Pendidikan Matematika, 5(1), pp. 735–743. Available at: https://doi.org/10.31004/cendekia.v5i1.555.

Dalimunthe, A. R., & Sembiring, R. (2022). Pengaruh pendekatan pembelajaran kontekstual terhadap minat dan pemahaman siswa dalam matematika. Jurnal Pendidikan Matematika, 10(2), 98–107.

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Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. American Journal of Physics, 66(1), 64–74. https://doi.org/10.1119/1.18809

Hasanah, U., Wardono and Kartono (2016) 'Keefektifan Pembelajaran Murder Berpendekatan Pmri Dengan Asesmen Kinerja Pada Pencapaian Kemampuan Literasi Matematika Siswa SMP', Ujme, 5(2), pp. 101–108. Available at: http://journal.unnes.ac.id/sju/index.php/ujme.

Hapsari, T. (2019) 'Literasi Matematis Siswa', Euclid, 6(1), p. 84. Available at: https://doi.org/10.33603/e.v6i1.1885.

Hartatik, H. (2022). Implementasi kurikulum merdeka: Tantangan dan strategi pembelajaran. Jurnal Pendidikan Inovatif, 9(2), 112–120.

Kementerian Pendidikan dan Kebudayaan. (2020). Panduan pembelajaran matematika dalam Kurikulum 2013. Jakarta: Direktorat Jenderal Pendidikan Dasar dan Menengah.

Kholifasari, R., Utami, C. and Mariyam, M. (2020) 'Analisis Kemampuan Literasi Matematis Siswa Ditinjau Dari Karakter Kemandirian Belajar Materi Aljabar', Jurnal Derivat: Jurnal Matematika dan Pendidikan Matematika, 7(2), pp. 117–125. Available at: https://doi.org/10.31316/j.derivat.v7i2.1057.

Mahmudah, S., Sulaiman, M., & Nurjanah, E. (2022). Pengaruh model pembelajaran dan media terhadap hasil belajar matematika berdasarkan teori belajar kognitif. Jurnal Pendidikan Matematika, 6(1), 45–55. https://doi.org/10.25273/jpm.v6i1.8009

Makhmudah, S. (2018) 'Analisis literasi matematika terhadap kemampuan berpikir kritis matematika dan pendidikan karakter mandiri', Prisma, Prosiding Seminar Nasional Matematika, 1, pp. 318– 325.

Muliani, M., & Amsman, A. (2022). Pengaruh minat belajar terhadap hasil belajar matematika siswa SMP. Jurnal Pendidikan dan Pembelajaran Matematika, 13(1), 25–34.

Purnama, D., & Suparman. (2020). Peningkatan kemampuan menyelesaikan soal cerita matematika melalui pembelajaran berbasis masalah. Jurnal Ilmiah Pendidikan Matematika, 8(2), 156–165. https://doi.org/10.25273/jipm.v8i2.6219

Rahimi, R., Ramadhan, F., & Ningsih, S. (2023). Keefektifan variasi model pembelajaran terhadap minat dan hasil belajar siswa. Jurnal Inovasi Pendidikan dan Pembelajaran, 7(1), 78–88.

Ratumanan, T. G. 2003. Pengembangan Model Pembelajaran Interaktif Seting Kooperatif (PISK) dan Pengaruhnya Terhadap Hasil Belajar Matematika Siswa SLTP di Kota Ambon, (Disertasi tidak diterbitkan). Universitas Negeri Surabaya.

Simamora, R. E., & Tranggono, M. (2023). Pengaruh pembelajaran interaktif terhadap kemampuan literasi dan numerasi siswa SMP. Jurnal Pendidikan Matematika dan Sains, 11(2), 134–145. https://doi.org/10.21009/jpms.112.2023

Slameto. (2010). Belajar dan faktor-faktor yang mempengaruhinya. Jakarta: Rineka Cipta.

Sukada, I. W., Utami, I. G. A. L. P., & Merta, I. G. A. D. (2013). Pengaruh minat belajar dan kebiasaan belajar terhadap hasil belajar matematika siswa kelas VIII SMP Negeri 3 Denpasar. E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Program Studi Pendidikan Matematika, 3(1), 1–10.

National Council of Teachers of Mathematics. (2020). Catalyzing change in early childhood and elementary mathematics: Initiating critical conversations. NCTM.

OECD. (2023). PISA 2022 results: What students know and can do. OECD Publishing. https://doi.org/10.1787/6d1f42e0-en

Yuniar, D. A., Prayito, M., & Happy, N. (2024). Sumber pembelajaran geometri transformasi berdasarkan pendekatan etnomatematika. Journal on Education, 6(3), 16453–16465. Available at: https://www.jonedu.org/index.php/joe/article/view/5507%0Ahttps://www.jonedu.org/index.php/joe/article/download/5507/4437.

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