IMPLEMENTATION OF THE COOPERATIVE CREATIVE PROBLEM SOLVING (CPS) MODEL USING INTERACTIVE LKPD TO IMPROVE LITERACY ABILITIES AND LEARNING INTEREST

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ABSTRACT
This study aims to analyze the effectiveness of the implementation of the Cooperative Creative Problem Solving (CPS) learning model assisted by interactive Student Worksheets (LKPD) in improving mathematical literacy skills and student learning interests at SMP Negeri 16 Serang City. The study used a quasi-experimental design with a non-equivalent control group design. The sample consisted of two classes, namely the experimental class (n = 40) which was given CPS learning with interactive LKPD based on Live Worksheet, and the control class (n = 40) which used conventional learning. Data were collected through a mathematical literacy test and a learning interest questionnaire administered before and after the learning process. The results of the data analysis showed that the experimental class achieved a significant increase in mathematical literacy skills with an average N-gain of 0.7873 (high category), while the control class only achieved 0.4644 (moderate category). Independent t-test analysis showed a significant difference between the two classes ($p < 0.05$). In addition, students' learning interest in the experimental class also increased with an average score of 86% (very strong category), higher than the control class at 70.75% (strong category). Thus, the CPS learning model assisted by interactive LKPD has proven effective in improving students' mathematical literacy skills and learning interests. Recommendations for educators are to implement this model widely with the support of digital media to support active and meaningful learning.
KATA KUNCI: *Cooperative Creative Problem Solving, Interactive Student Worksheets, Mathematical Literacy, Learning Interest, Live Worksheet, Mathematics Learning.*

INTRODUCTION

Education is a conscious effort to change individual attitudes and behavior through teaching and training to mature individuals. Learning is the teacher's facilitation of students' acquisition of knowledge and skills, as well as the formation of attitudes and beliefs. The goal of national education is to improve the quality of Indonesia's human resources to overcome ignorance and underdevelopment. (Armia *et al.*, 2021). Mathematics, as a basic science, is crucial because it develops logical, flexible, and precise thinking skills in solving everyday problems. However, students' mathematical literacy remains low, characterized by difficulty understanding concepts and applying them in real-world contexts. This is evident in low pretest results and difficulties with PISA-style questions and midterm exams. This situation is exacerbated by conventional and unengaging learning methods, resulting in low interest in learning mathematics. (Fricticarani et al., 2024; Kusuma & Hamidah, 2019; Lestari et al., 2024).

According to Dewi *et al.,* (2022) The current problem is that mathematics is still considered a difficult subject by most students, resulting in low interest in learning it. Consistent with previous research, students' low interest in learning mathematics is influenced by various factors. (Alayda et al., 2025; H. Hamidah et al., 2024; Handayani et al., 2025). Some of these include students' dislike of mathematics and boredom during lessons, caused by teachers' use of monotonous lecture methods. Furthermore, the learning process is disrupted by peer interference and a lack of understanding of basic mathematical concepts, particularly multiplication. Students also have difficulty understanding story problems because they are abstract and less relevant to their real-life experiences. Therefore, interest in learning significantly influences learning outcomes; students who are interested will be more enthusiastic and will solve problems well. Factors contributing to low interest include monotonous learning, peer interference, a lack of understanding of basic concepts, and abstract and irrelevant problems.

Based on the results of initial observations conducted by researchers at SMP Negeri 16 Kota Serang where in the process of learning mathematics in grade VII students lack good interest in learning because mathematics is considered a subject that is difficult to understand and difficult to understand, scary and less interesting, and mathematics lessons use numbers that always count and count, use too many formulas that must be memorized and must practice working on problems, in addition to the learning method is still conventional. The basic reason for researchers is to see students' interest in learning data presentation material because when compared with other materials, the lowest mathematical literacy results are in data presentation material. The lack of mathematical literacy is most dominantly experienced by students including the inability of students to understand questions and apply the right principles. Students only operate it directly without understanding how to solve it so that the results of students' answers tend to be less precise.

Data presentation is one of the subjects with the lowest mathematical literacy scores for students, so an appropriate learning model is needed to improve students' abilities and interest in learning. Creative Problem Solving (CPS) is an effective learning model because it encourages students to actively think creatively and seek various solutions to solve problems. (Rohana *et al.*, 2021). In relation to mathematics learning, according to Haylock and Thangata as quoted by Sari *et al.*, (2021) suggests that CPS is the willingness to be open to developing new ideas and considering a number of different approaches, or using different strategies to solve problems. The

main component of the CPS stages lies in the divergent phase, namely how students are required to find as many ideas or strategies as possible that can be used to solve the problems posed.

Furthermore, the use of appropriate learning media, such as interactive, technology-based Student Worksheets (LKPD) (for example, through the Liveworksheet and Canva for Education platforms), can increase student interest and participation in learning mathematics. Furthermore, Liveworksheets also offers a practical solution for students, allowing them to submit their work to instructors via the web. The benefit of the Liveworksheets application for students is that it can encourage more engaging learning, as it provides various entertainment that makes them more enthusiastic about learning. For teachers, this application can save time and reduce paper usage. (Harahap et al., 2022).

Previous research has shown that learning with the CPS model can improve students' mathematical literacy skills better than conventional methods. Therefore, this study will implement the CPS cooperative learning model assisted by interactive LKPD to improve mathematical literacy skills and student learning interest at SMP Negeri 16 Kota Serang, especially on data presentation material, with the hope of making learning more interesting, students more active, and improving learning outcomes.

METHOD

The type of research applied in this study is quantitative research. According to Novitasari *et al.*, (2024) Quantitative research studies phenomena through a structured approach by collecting measurable data, then analyzing it using statistical techniques, mathematical methods, or computation. In this study, the researcher used a Quasi-experimental research type which is one of the types of quantitative research designs. The quasi-experimental form used is the Nonequivalent Pretest-Posttest Control Group Design type. where there are two groups, namely the experimental class that received treatment in the form of CPS learning assisted by interactive LKPD and the control class that used conventional learning. The population in this study were all seventh grade students of SMP Negeri 16 Kota Serang in the 2024/2025 academic year. The sample was selected using a simple random sampling technique, with two classes selected as samples. Class VII E with 40 students was designated as the experimental class, while class VII F, also with 40 students, was designated as the control class. Data collection techniques in this study consisted of a written test, in the form of descriptive questions given before and after treatment to measure students' mathematical literacy abilities. A questionnaire was used to measure students' learning interests. The questionnaire was distributed after treatment to both groups. Documentation was used as a data supplement to record learning activities during the research process.

The data analysis technique used in this study is the analysis of mathematical literacy comprehension skills in the form of (descriptive analysis, N-Gain Test, N-Gain Normality Test using Shapiro Wilk, N-Gain Homogeneity Test using Levene statistics, and N-Gain Two Average Equality Test).

RESULTS AND DISCUSSION

This study was conducted to test whether the increase in mathematical literacy skills of students who were given learning with the cooperative creative problem

solving model assisted by interactive LKPD was better than those who used conventional learning.

N-Gain Descriptive Analysis Results

Based on research conducted at SMP Negeri 16 Kota Serang in two seventh-grade classes with 40 students each, namely the experimental class and the control class. Before the learning, the average pretest score for students' mathematical literacy skills on data presentation material in the experimental class was 56.63, while in the control class it was lower, namely 49.38.

Table 1. Results of N-Gain Descriptive Analysis

	Experiment			Control		
	Pretest	Posttest	*N-Gain*	Pretest	Posttest	*N-Gain*
Minimum	35	75	0,50	35	50	0,30
Maximum	80	100	1,00	60	80	0,62
Mean	56,63	91,00	0,7873	49,38	73,13	0,4644
Std, Deviation	11,679	6,118	-	7,178	7,569	-

After implementing the Creative Problem Solving (CPS) learning model with the aid of interactive worksheets (LKPD) in the experimental class, there was a significant increase in the average posttest score to 91.00 (score 75–100). Meanwhile, the control class using the conventional method only increased to 73.13 (score 50–80).

Analysis using the N-Gain Score test showed that the experimental class achieved an average N-Gain of 0.7873 (medium to high category), while the control class only achieved 0.4644 (medium category). This indicates that learning with the CPS model assisted by interactive LKPD is more effective in improving students' mathematical literacy skills than conventional learning methods.

N-Gain Data Analysis Prerequisite Test Results

a. *N-Gain* Data Normality Test

The normality test in this study aims to determine whether the distribution of instrument data in the experimental class and the control class, both before and after treatment, follows a normal distribution pattern or not..

Table 2. Results of the N-Gain Data Normality Test

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df.	Sig.	Statistic	df.	Sig.
Class Experiment	,101	40	,200	,965	40	,247
Class Control	,112	40	,200	,961	40	,178

Based on the output results above, the significance value (Sig) for the pretest-posttest learning outcomes in the experimental class was 0.247 and in the control class was 0.178. Both values, in both the Kolmogorov-Smirnov and Shapiro-Wilk tests, were greater than 0.05. Thus, it can be concluded that the

pretest and posttest data in both the experimental and control classes were normally distributed. Since the pretest and posttest data were normally distributed, the analysis was continued with a homogeneity test.

b. *N-Gain* Homogeneity Test

The homogeneity test is conducted to determine whether the variance (diversity) of data from two or more groups is homogeneous (uniform) or heterogeneous (different). The results of the homogeneity test are presented as follows:

Table 3. Results of N-Gain Homogeneity Test

Levene Statistic	df1	df2	Sig.
3,354	1	78	,071

Based on the output above, a significance value (Sig) of 0.071 was obtained, which is greater than 0.05. This indicates that the variance of the pretest and posttest data in the experimental and control classes is the same or homogeneous.

c. Results of the Similarity Test of Two N-Gain Averages

The equality of two means test aims to determine whether there is a difference in the means between two paired samples. Based on previous data that has been proven to be normally distributed and have homogeneous variance, the equality of two means test was conducted using the independent sample t-test method with the assumption of equal variance. The test results are presented as follows:

Table 4. Results of the Test of Equality of Two N-Gain Means

Class	*Sig.* Based on Mean	Information
Class Experimen And Control	0,000	H$_0$ rejected

Based on Table 24, it is known that the significance value (Sig. 2-tailed) is 0.000 < 0.05. This indicates that H$_0$ is rejected and H$_1$ is accepted. Thus, it can be concluded that there is a significant difference in the posttest results of mathematical literacy skills between the experimental class and the control class. This means that the application of the creative problem solving (CPS) learning model assisted by interactive LKPD has a significant influence on improving students' mathematical literacy skills when compared with the use of conventional learning models.

d. Likert Scale Test Results

After knowing the results of the mathematical literacy test, the next step is to analyze the student learning interest questionnaire. This questionnaire is structured using a Likert scale, where each statement is measured by the respondent's level of agreement, ranging from strongly disagree to strongly agree, each of which is assigned a specific score.

Table 5. Results of Likert Scale Test

Information	Posttest Average
Experiment	86% Very strong
Control	70,75% Strong

Based on the results of the Likert scale test after the implementation of the learning, the average interest of students who were given learning with the creative problem solving (CPS) model assisted by interactive LKPD was better than those who used conventional learning. In terms of feelings of enjoyment, the average percentage of the control class reached 67%, while the experimental class increased to 81%. In terms of interest, the control class obtained an average of 68%, while the experimental class reached 86%. In terms of attention, the control class obtained an average of 74%, while the experimental class reached 89%. As for the aspect of student engagement, the control class recorded an average of 74%, while the experimental class obtained 88%. Overall, the average learning interest after learning increased to 70.75% in the control class and 86% in the experimental class.

DISCUSSION

This research was conducted involving two classes, namely class VII E as the experimental class and class VII F as the control class, each consisting of 40 students, resulting in a total sample of 80 students. The experimental class implemented the Creative Problem Solving (CPS) learning model combined with the use of interactive Student Worksheets (LKPD), while the control class used conventional learning methods.

The CPS model used follows six systematic stages quoted from Andin *et al.*, (2023), that is:

1. *Objective Finding* : Students are divided into groups to discuss problems and formulate creative goals to be achieved.

2. *Fact Finding* : Students collect relevant facts and information related to the objectives with the guidance of the teacher who records and directs student reflection on important facts.

3. *Problem Finding* : Students are encouraged to redefine problems in order to better understand the root of the problem and find more appropriate solutions.

4. *Idea Finding* : Every idea or thought is submitted and documented without judgment during this stage, so that maximum creativity and number of ideas can be achieved.

5. *Solution Finding* : Potential ideas are evaluated together using certain criteria to produce the best solution.

6. *Acceptance Finding* : Students develop an action plan to implement the chosen solution, anticipate obstacles, and reflect on the process and results.

Through this approach, students are expected to be more active, creative, and directly involved in the mathematics learning process, especially in data presentation material.

The results of the study revealed that the mathematical literacy skills of students in the experimental class increased significantly compared to students in the control class. This is evident from the higher average posttest scores in the experimental class. Students were able to solve problems based on mathematical literacy indicators ranging from remembering, understanding, applying, to analyzing well and logically, both through visual representations such as bar charts and written explanations. For example, students in the experimental class were able to create bar charts well and provide structured narrative answers, while students in the control class were still unable to do so perfectly.

The use of interactive student worksheets (LKPD) has been shown to increase student motivation and interest in learning. Digitally designed and interactive LKPD facilitate student engagement in learning and encourage them to utilize various information sources optimally, creating a more engaging and communicative classroom atmosphere. Students become more enthusiastic, actively participate, and are accustomed to working together through group discussions and projects that they present as part of learning evaluations. As with previous research, interactive media designed and presented in digital format helps students deepen their understanding of the material being studied. (Hamidah et al., 2024; Handayani et al., 2024; Sulistiawati et al., 2024).

Student learning interest in the experimental class increased, as indicated by the questionnaire results, which showed a significant difference compared to the control class. Students were not only more interested in learning mathematics but also trained in communication, collaboration, and complex problem-solving skills. The implementation of CPS helped them develop an open attitude towards various ideas and creative approaches to problem-solving. This finding aligns with previous research that revealed that student interest and learning outcomes in the experimental class were higher than in the control class. (I. Hamidah & Citra, 2021).

Overall, this study demonstrates that the Creative Problem Solving learning model assisted by interactive LKPD is effective in improving two main aspects, namely mathematical literacy skills and student learning interest. This is because the approach does not only transfer material passively, but also activates active and creative student participation, encouraging them to become independent learners who are able to use various strategies in solving real-life problems. Interactive and collaborative learning can create a conducive learning atmosphere so that student learning outcomes improve significantly compared to conventional learning.

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