

## ANALYSIS OF CRITICAL THINKING ABILITY IN LIVWORKSHEET ASSISTED COOPERATIVE LEARNING SETTINGS

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### Abstract

This research is motivated by students' mathematical critical thinking problems and monotonous learning activities. This research intends to characterize the learning results of students' mathematical critical thinking abilities in liveworksheet-assisted cooperative learning environments. This form of qualitative study is descriptive in nature. The participants of this study were thirty eighth-grade students from SMPN 2 Mataram's class VIII-I. This research used lesson plans, observation sheets, and assessments of critical thinking abilities. The findings of the research indicate that each level of cooperative learning aided by live worksheets may promote critical thinking among students. Results of students' critical thinking skills in Liveworksheet-assisted cooperative learning settings in the high category were 72.4%, the medium category was 9.7%, and the low category was 17.9%.

**Keywords:** Critical Thinking; Kooperatif Learning; Liveworksheet

### Abstrak

*Penelitian ini dilatarbelakangi dari permasalahan berpikir kritis matematis siswa dan kegiatan pembelajaran yang monoton. Penelitian ini bertujuan untuk mendeskripsikan hasil belajar dari kemampuan berpikir kritis matematis siswa pada setting pembelajaran kooperatif berbantuan liveworksheet. Jenis penelitian yang digunakan adalah penelitian deskriptif melalui pendekatan kualitatif. Subjek penelitian ini adalah siswa kelas VIII-I SMPN 2 Mataram yang terdiri dari 30 orang siswa. Instrument yang digunakan dalam penelitian ini adalah RPP, lembar observasi, dan tes kemampuan berpikir kritis. Hasil penelitian menunjukkan bahwa pada tiap tahapan pembelajaran kooperatif berbantuan liveworksheet dapat membantu mendorong siswa untuk berpikir kritis. Hasil dari kemampuan berpikir kritis siswa pada setting pembelajaran kooperatif berbantuan liveworksheet pada kategori tinggi sebesar 72,4%, kategori sedang sebesar 9,7%, dan kategori rendah sebesar 17,9%.*

**Kata kunci:** Berpikir Kritis; Liveworksheet; Pembelajaran Kooperatif



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### INTRODUCTION

Mathematics is one of the fundamental disciplines in the growth of science and technology in Indonesia throughout the 21st century, where science and technology are advancing quickly (Darmayanti, Baiduri, et al., 2022;

Inganah et al., 2023; Waite & McDonald, 2019). Critical thinking is an important talent for kids to acquire in the 21st century in order to cope with current events (Arisoy & Aybek, 2021; Güner & Gökçe, 2021; Sugianto et al., 2022). Students must possess the capacity to

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think critically in mathematics in order to develop a problem-solving technique and arrive at logical conclusions (Changwong et al., 2018; Marzuki et al., 2021; Sachdeva & Eggen, 2021).

In Indonesia, in general, mathematics learning places more emphasis on aspects of memorizing formulas, calculating, and applying simple concepts. The assessment given tends to only test the ability to remember, the ability to calculate formulas, or apply mathematical concepts to certain routine problems. So that it can reduce students' critical thinking skills (Adnyani, L. P. A. P. 2020; Darmayanti, Sugianto, et al., 2022). In mathematics lessons, students' critical thinking skills are still in the low category. This is shown by the results of (Guhn et al., 2014), where Indonesia is ranked 44 out of 49 participating countries where the average score obtained is 397. In general, students in Indonesia are only able to reach a low level, this means that students are only able to reach the stage of knowing yet to the critical thinking stage because the average student has not been able to find various kinds of solutions when working on a given problem (Ariawan, R., & Nufus, H. 2016; Ndiung et al., 2021).

One solution that teachers can do in dealing with these problems is through the use of E-LKPD. Web *Liveworksheet* is a web for developing LKPD. *Liveworksheet* is an electronic media that contains images, text, animation, and video so students don't get bored quickly (Khikmiyah, 2021). In developing the E-LKPD it can also be combined with learning models, one of which is the cooperative learning model. Through cooperative learning, teachers are expected to be able to motivate students to work well with each other (Eriksson et al., 2021; Manzano-León et al., 2021).

Several previous studies related to the application of LKPD-based cooperative learning can provide a significant increase in student learning outcomes (Sagita et al., 2020; Setiawati & Dantes, 2015).

Research related to the use of liveworksheets in several subjects has been carried out. Research by (Suharsono & Handayani, 2021) utilizes *liveworksheets* as a tool for evaluating student learning outcomes and is able to increase elementary school students' learning motivation. In addition, research by (Khikmiyah, 2021) stated that *liveworksheet -based learning* is capable of increasing students' independence, problem-solving abilities, and mathematical abstraction abilities.

However, none of these studies have implemented liveworksheet-assisted cooperative learning, especially in looking at students' critical thinking skills. This study is necessary because critical thinking is one of the aims of learning mathematics; hence, it is one of the skills or talents that students must possess. Thus, via cooperative learning aided by liveworksheets, it is anticipated that students' mathematical critical thinking abilities would be observed and developed.

## RESEARCH METHODS

Utilizing a qualitative methodology, descriptive research is used. This study was carried out at SMPN 2 Mataram. The reason for choosing SMPN 2 Mataram as a research location is because in learning mathematics they have not used the help of liveworksheet media. In addition, pupils' critical thinking abilities continue to be deficient, particularly when addressing word problems. The participants of this research is class VIII-I which consisted

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of 30 students. This research will be tested on SPLDV material. The instruments used in this study were lesson plans, observation sheets, and tests of critical thinking skills. Instrument validation is carried out using Aiken validity, with the following formula:

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

Information:

V = aiken validity

s = r – lo

lo = lowest validity rating score

c = the highest validity rating score

r = number given by the appraiser

The level of instrument validity can be seen in Table 1.

Table 1. Level of Validity

Validity Index	Category
$0,80 \leq V \leq 1,00$	Very Valid
$0,60 \leq V < 0,80$	Valid
$0,40 \leq V < 0,60$	Quite Valid
$0,20 \leq V < 0,40$	Less Valid
$0,00 \leq V < 0,20$	Invalid

Research data gathering approaches based on observation and assessments of critical thinking ability. Observations were taken on students' critical thinking abilities during cooperative aided liveworksheet learning tasks. Exam to measure the critical thinking abilities of pupils with regard to SPLDV subject. Table 2 lists the indications of critical thinking ability.

Table 2. Critical thinking indicators

Indicator	Information
Interpretation	Understand and dig up the information about the problem well.
Analysis	Changing the problem sentence into a mathematical model.

Indicator	Information
Evaluation	Carry out the correct strategy and calculations.
Inference	Presents the right conclusion.

Adaptation (Karim, 2015)

The data obtained will then be analyzed based on indicators of critical thinking skills. The test result data will then be calculated using the following formula:

$$\text{Nilai persentase} = \frac{\text{jumlah skor}}{\text{skor maks}} \times 100\% \quad (2)$$

The percentage value obtained is then converted into the category of critical thinking skills in Table 3.

Table 3. Categories of critical thinking ability

Interpretation (%)	Category
$75,5 < X \leq 100$	Tall
$60,5 < X \leq 75,5$	Currently
$0 < X \leq 60,5$	Low

Adaptation (Karim, 2015)

This study's data analysis approach consists of three stages: data reduction, data presentation, and conclusion drawing. This study's data reduction will concentrate on students' critical thinking abilities throughout the liveworksheet-assisted cooperative learning process. Presentation of data defines the data derived from the outcomes of observations and tests so they may be presented in a comprehensible manner. So as to be able to draw a conclusion from the observations and tests that have been conducted.

## RESULTS AND DISCUSSION

The results of observing students' critical thinking skills in cooperative learning settings assisted by liveworksheets are seen based on each

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stage of cooperative learning, namely: the preparation stage, the scaffolding stage, and the evaluation and awarding stage. In the preparatory stage, the liveworksheet-assisted cooperative learning process starts with presenting information from the teacher and providing motivation to students so that they are enthusiastic about participating in learning. From this stage, small groups of students begin to form, where students begin to carry out group discussions which ultimately encourage students' critical thinking skills, namely students begin to ask questions related to the material presented by the teacher.

Scaffolding stage, during the group discussion process, the teacher occasionally gives scaffolding to students so that students critical thinking skills develop. Scaffolding stage, during the group discussion process, the teacher occasionally gives scaffolding to students so that students critical thinking skills develop. At this stage, students critical thinking skills can be seen from the student's ability to identify ideas and/or concepts related to the material or problems given.

At the evaluation and awarding stage, the teacher only supervises all forms of activities and/or student activities during the discussion process. Where students critical thinking skills can be seen from how students during the discussion process convey their ideas and/or ideas in solving the problems given. Starting from students identifying all the information in the LKPD, analyzing, carrying out a settlement and carrying out the settlement to be able to draw conclusions from the problems given. This is in line with research conducted by Florentina & Leonard, (2017), Rohani et al., (2022) where in his research the results showed that

cooperative learning had a positive influence on critical thinking skills and in the learning process students became more courageous in expressing opinions or asking questions.

In addition, during the liveworksheet-assisted cooperative learning process students were shown to give a positive attitude where students showed a sense of enthusiasm and activeness in participating in learning. This is in line with (Chen, 2017) where learning carried out by utilizing computers or the like is effective in increasing student outcomes and interests and even having a positive influence on student attitudes during learning. The positive attitude shown by the students was their activeness when their learning activities were high and when they completed tests through the web *Liveworksheet* distributed by the teacher.

The results of students' mathematical critical thinking skills tests obtained by students were then grouped into 3 categories, namely high critical thinking skills, moderate critical thinking skills, and low critical thinking skills. The results of grouping students' mathematical critical thinking skills tests can be seen in Table 4. Students' scores on examinations of their mathematical critical thinking abilities were then classified into three categories: high critical thinking skills, moderate critical thinking skills, and poor critical thinking skills. Table 4 displays the results of categorizing students' mathematical critical thinking assessments.

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Table 4. Results of students' critical thinking ability

Category	The number of students	Percentage
Tall	17	72,4 %
Currently	3	9,7 %
Low	10	17,9 %

Table 4 shows that the number of students in class VIII-I who took the test was 30 students. The results of students' critical thinking skills with high critical thinking ability category were 17 students with a percentage of 72,4%, medium critical thinking ability category were 3 students with a percentage of 9,7%, and in the low critical thinking ability category were 10 students with percentage of 17,9%. Furthermore, to strengthen the test results, an interview test will be conducted.

Based on the explanation above, it was revealed that in cooperative learning settings assisted by liveworksheets it provides significant positive benefits to students' mathematical critical thinking abilities. This is also supported by the opinion of Sojayapan & Khlaisang (2018), Umam et al., (2019), Umam & Azhar, (2021) the findings of their study indicate that the usage of web-based instructional tools might not only increase students' critical thinking abilities, but also their enthusiasm for learning.

After getting the results of the students' critical thinking exam, three students will be chosen to represent each of the three categories of critical thinking ability: high, medium, and low. Figures 1, 2, and 3 show the results of exams measuring students' high, medium, and low levels of critical thinking abilities.

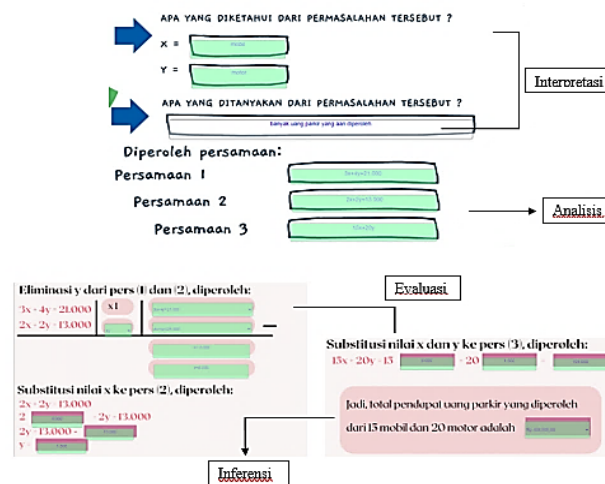


Figure 1. High critical thinking ability test result

Figure 1. shows that in the process of working on the questions that have been given, it can be seen that students with high critical thinking skills have no difficulty in working on the story problems given. S-01 students at the interpretation stage being able to write down what is known and asked from the

questions. At the analysis stage, students can write a mathematical model which will later be used to solve problems so that students can carry out the evaluation stage properly. At the inference, stage students can make conclusions well.



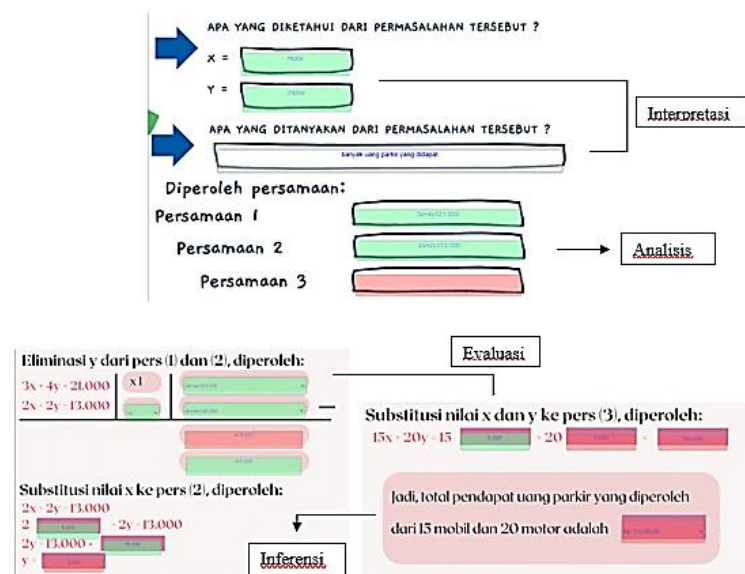


Figure 2. Moderate critical thinking ability tes results

Figure 2. shows that in the process of working on the questions that have been given, it can be seen that students with critical thinking skills are experiencing some difficulties in solving the questions given. S-02 students at the interpretation stage, students can write down what is known and asked correctly. In the analysis phase, students can make a

mathematical model (formula) that will be used even though there are still some mistakes. In the evaluation phase, students can complete the questions with the correct procedure according to the formula that has been planned but there are still errors in the calculation process. In the inference stage, students are still not able to write the conclusions of the problem correctly.

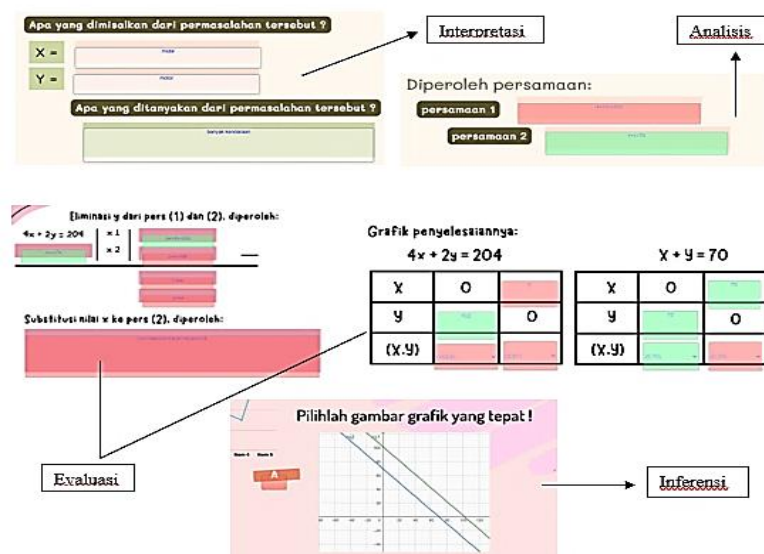


Figure 3. Low critical thinking ability test results

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Figure 3 shows that in working on the questions given, students with low critical thinking skills experience many obstacles as seen in the Figure 3. S-03 students at the interpretation stage, students can identify what is known and asked well. In the analysis phase, students still experience errors in determining the mathematical model (formula) to be used to solve the problem. In the evaluation stage, students complete the questions according to a predetermined formula but experience many errors in the calculation process. At the inference stage, students are still wrong in writing their conclusions.

From Figure 1, 2, and 3 it can be seen that at the interpretation stage, students at high, medium, or low critical abilities are able to understand the information and data contained in the questions. This is supported by several studies that have been conducted by Astiantari et al. (2022) and Faiziyah & Priyambodho (2022) are able to understand questions where students can write data or supporting information.

At the analysis stage, students with moderate and low critical thinking skills still experience difficulties causing errors to also occur at the evaluation and inference stages. The lack of students' ability to understand concepts or material provided is one of the factors causing students to often experience difficulties in the evaluation stage. This is in line with the research of Sianturi & Dewi (2022) which explains that students tend to have difficulty understanding questions in verbal form (story questions) resulting in students sometimes being confused about turning statements into mathematical models.

Errors experienced by students in each indicator of critical thinking can

result in errors in other indicators. This is because each indicator or each stage of the indicator of critical thinking ability is interrelated with one another. Such as errors at the student evaluation stage caused by student errors at the analysis stage. When an error occurs when analyzing it causes an error in the conclusions that will be presented because each stage is interrelated with one another. At the inference stage, most students are not used to writing conclusions from it.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the research presented above, the researcher concluded that at each stage of cooperative learning assisted by *liveworksheets* can help encourage students to think critically. At the preparatory stage, students dare to ask questions and express their opinions. In the scaffolding stage, through provocative questions from the teacher, students are better able to identify ideas and/or information from the material and problems provided. In the evaluation and awarding phase, students can carry out evaluations starting from identifying, analyzing, planning, carrying out settlements, and making conclusions. Students critical thinking abilities in cooperative learning settings assisted by *liveworksheets* showed that the results of students with the high critical thinking ability category were 17 students with a percentage of 72,4%, the critical thinking ability category while there were 3 students with a percentage of 9,7%, and in the low critical thinking ability category there were 10 students with a percentage of 17,9%. Thus, the use of cooperative learning settings assisted by *liveworksheets* can be used as an

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alternative in optimizing students' activeness and critical thinking abilities.

Suggestions for future researchers to be able to develop worksheets through web *liveworksheets* with different materials and at different levels of education to explore students' abilities.

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