Jurnal Pendidikan

e-ISSN: 2443-3586 | p-ISSN: 1411-1942
Website http://jurnal.ut.ac.id/index.php/jp

Vol. 5, No. 2, 2024, 59 – 70
DOI: 10.33830/jp.v25i2.8412.2024

Pictorial Riddle Learning Model to Improve Critical Thinking Skills of Fifth-Grade Elementary School Students in Mathematics Learning

Lia Rosliawati[1)], Aan Yuliyanto[1*)], Daminah[1)] Ari Fujiarti[2)]
[1)] Pendidikan Guru Sekolah Dasar, Institut Pangeran Dharma Kusuma, Indramayu, Indonesia
[2)] Pendidikan Guru Sekolah Dasar, Universitas Pamulang, Tangerang Selatan, Indonesia
*Corresponding Author: aanyuliyanto16@gmail.com

Abstract: The research aims to see the improvement of Critical Thinking Skills through pictorial riddle learning. The research method used was classroom action research on mathematics and building cubes and blocks for 21 elementary school students in Pangandaran Regency. The instruments used are observation, tests, interviews, and documentation. This study adopted a quantitative data analysis method, including test sheets measuring students' critical thinking skills and teacher and student observation sheets. Based on the research results, it was found that There was an increase in students' Critical Thinking Skills by using the pictorial riddle learning model, as evidenced by the increase in students' motivation in the learning process, the courage to move forward, students' attention when the teacher explained, the courage to answer questions and student participation in the learning process. This can also be seen from cycle I, with an average score of 74.2 or as many as 10 students who completed out of 21 students with a percentage of (57.1%), then experienced an increase in cycle II with an average of 91.4 or as many as 18 of 21 students completed the percentage (85.7%). The N-Gain criterion value was 0.87>0.7 with high criteria. Thus, the Pictorial Riddle Learning Model can improve students' critical thinking skills in mathematics in elementary schools very well.

Keywords: Learning Model, Pictorial Riddle, Critical Thinking Skills.

INTRODUCTION

It is acknowledged that education is an intentional, deliberate endeavor to establish a learning environment that supports students' active development. The primary purpose of education is to help students develop spiritual potential, self-control, personality, intelligence, noble morals, and skills required by people, society, and the country. Ki Hajar Dewantara, Indonesia's national education figure, emphasized that education is an essential need in the growth of children, guiding the development of their natural potential toward optimal levels of security and happiness (Pristiwanti et al.,

2022).

Ki Hajar Dewantara, Indonesia's national education figure, described education as an essential need for children's growth. In its essence, education directs the development of all the natural potential possessed by children, so that they can achieve the most optimal level of security and happiness as individuals and members of society." (Pristiwanti et al., 2022). Education is a humanist process known as the humanization of the human individual. Therefore, it is very important to respect the human rights of every individual in the educational context. Students. In this way, they can become independent individuals, able to think critically, and have strong moral character. In the context of the importance of education for all individuals, teachers always strive to provide the best for their students so that they understand the material presented. The presence of a leadership spirit is crucial for a teacher because teacher competence has a significant impact on the learning process and achievement of students, including mathematics learning achievement.

Mathematics subjects at the elementary school level have a crucial role. The origins of the word "mathematics" come from the Greek, "mathemata", emphasizing the concept of "learned knowledge" (Isrok'atun, 2021). Mathematics learning goals that students must achieve, including understanding concepts, using reasoning, critical and creative problem solving, communicating ideas, and appreciating the usefulness of mathematics in everyday life (Yuliyanto et al., 2023).

In the context of critical thinking skills, critical thinking is a process aimed at facilitating our ability to make rational decisions so that we can act by the belief in the best truth according to our understanding (Yuliyanto, 2024). Critical thinking in a mathematical context entails the ability and attitude to combine past information, employ mathematical reasoning, and apply cognitive techniques to generalize, prove, or evaluate complicated mathematical situations in a reflective manner. Even though mathematics is one of the subjects taught at the elementary school level, the process of learning mathematics is often considered intimidating because of the perception that mathematics is a difficult subject (Abdullah, 2016).

To alter students' perceptions of problems in studying mathematics, teachers must encourage the growth of students' critical thinking by encouraging them to reflect on their abilities. As a facilitator, teachers are expected to be able to create an interesting learning environment to ensure the effectiveness of the learning process. However, unfortunately, many schools today tend to prioritize learning approaches that focus more on conveying information and material, rather than developing thinking skills and understanding concepts (Azid et al., 2022). Critical thinking abilities are particularly crucial for kids in today's global period of difficulties and rapid changes. Therefore, the development of critical thinking abilities must be an integral part of the curriculum, bearing in mind that the need for these abilities is reflected in growth that leads to critical and innovative thinking.

Teachers can utilize learning models that support the development of students' critical thinking. A learning model is a framework or structure that is used to organize a curriculum (long-term learning plan), create learning materials, and direct the learning process in the classroom or other educational setting. The adoption of proper learning models is critical to the effectiveness of the learning process, particularly in allowing students to quickly understand certain subjects (Sonjaya & Yuliyanto, 2022).

Mathematics is often a daunting subject for students therefore, it is important to look for learning approaches that can reduce this anxiety. One strategy that can be implemented is using the pictorial riddle learning model. This learning model uses pictures or illustrations to teach mathematical concepts visually and interestingly. With this approach, students can understand mathematics material more concretely and

enjoyably, to the learning preferences of elementary school students who tend to prefer learning through visuals. To form students who can think critically, teachers must facilitate the development of this ability. Importance of encouraging students to reflect on their abilities in learning mathematics (Pristiwanti et al., 2022). One effective approach is to use the pictorial riddle learning model. Pictorial riddles as images or illustrations created by teachers to trigger responses from students.(Bybee et al., 2006).

However, observations in the field show that many mathematics learning environments in elementary schools still rely on monotonous lecture methods without variations in learning models or supporting media (Pristiwanti et al., 2022). This problem was also found in the class where the research was conducted, that students' critical thinking skills were still low because students rarely honed their high-level thinking skills. The use of the pictorial riddle learning approach in basic mathematics education is vital for improving students' critical thinking skills (Sari & Kustijono, 2018). This research was conducted because students' critical thinking skills were still low and to see whether there was an increase in students' critical thinking skills after implementing the pictorial riddle learning model. The research questions asked are in line with the main objectives of this research as follows: How are elementary school students' critical thinking abilities before and after implementing the pictorial puzzle learning model in mathematics learning? And how do the critical thinking skills of students who learn using the pictorial riddle learning model improve?

RESEARCH METHODS

This research is classroom action research undertaken to describe and monitor the student learning process using the pictorial riddle learning model to improve students' critical thinking skills in fifth-grade mathematics courses at State Elementary School in Langkaplancar Pangandaran, West Java. Classroom research is a cyclical process that includes planning, implementation, observation, and reflection. The execution of this action study uses two cycles: the implementation stages are in the form of a cycle and are illustrated in a chart below (Saputra et al., 2021):

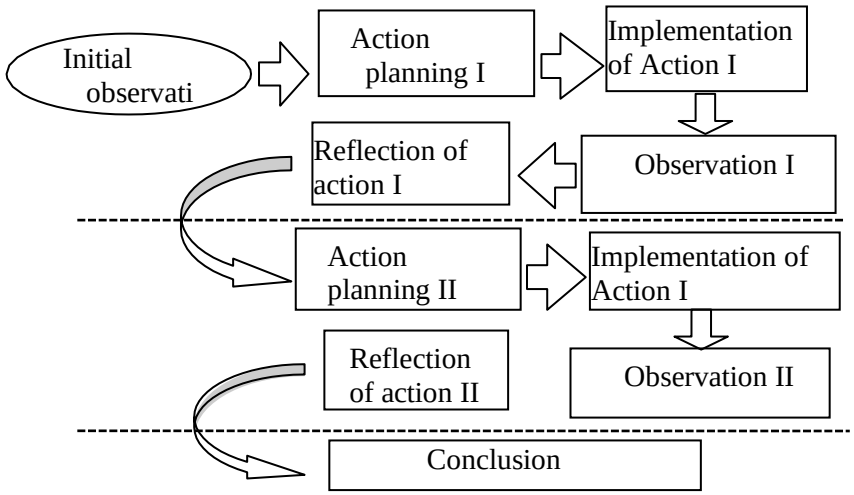

Figure 1. Kemmis & Mc Taggart Model Classroom Action Research Chart

The pictorial riddle learning technique is used to assess students' critical thinking skills. Indicators of student success include concentration, reason, and inference in strengthening critical thinking abilities, as defined by the Langkaplancar 2 Elementary

School's Minimum Completeness Criteria of 71. Students who achieve or exceed the Minimum Completeness Criteria score are considered successful, while students who score below the Minimum Completeness Criteria are considered unsuccessful.

To collect data about students' critical thinking abilities, researchers adopted a quantitative approach. Quantitative data is obtained through tests each cycle, using a collection of written test questions consisting of 5 questions. Each correct answer is scored 20 points. The researcher then totaled up the students' scores and divided the results by the number of pupils in the class to calculate the average score. The formula used to calculate the average value is:

$$\bar{x}\frac{\sum x}{\sum y} \times 100$$

Information:
$\bar{x}$ = Average value
$\sum x$ = The total score of all students
$\sum y$ = The number of students

Based on the teaching and learning implementation instructions, the researcher considers that implementation planning using the pictorial riddle learning model in mathematics lessons about spatial shapes can be said to be successful and increases students' critical thinking abilities, if students can solve spatial geometric problems to meet critical thinking skills of at least 80%, the level of success in thinking skills Students' critical thinking is grouped into categories, which can be seen from Table 1.

Table 1. Classification of Students' Critical Thinking Ability Skills

Level of success (%)	Criteria
>80%	Very Good
60-80%	Good
40-59%	Moderate
20-39%	Low
<20%	Very Low

To calculate the percentage of learning success from students' critical thinking abilities, the following formula is used:

$$P=\frac{n}{N} \text{ x } 100\%$$

Information:
P = Percentage
n = Students who have completed their studies
N = The number of students

Normalize Gain is used with the following formula to measure the increase in critical thinking skills:

$$N - Gain \frac{Posttest - Pretest}{Ideal\ Maximum\ Score - Pretest}$$

Information:
N-gain : Normalize Gain
Posttest : Score after treatment
Pretest : Score before treatment
Ideal Maximum Score: Highest score of the entire group

The N-Gain criteria consists of if the N-Gain score is $0 \leq 0{,}30$ it is classified as low, if N-Gain $\geq 0{,}30$ it is classified as moderate, if N-Gain $\geq 0{,}70$ it is classified as high. Meanwhile, if N-Gain < 0 then it is considered a decrease.

RESULTS AND DISCUSSION

Students' Critical Thinking Skills After Implementing Pictorial Riddle

Cycle 1

This research was conducted in class V of Langkaplancar 2 State Elementary School, Pangandaran Regency, West Java, from February 27 to March 6, 2024. Using the pictorial riddle learning model, this research consists of two cycles, with each cycle involving a structured planning and action implementation stage.

1. Planning

In the first cycle, planning involves preparing the syllabus, Learning Implementation Plan, teaching materials, and evaluation instruments, as well as preparing learning materials and media.

2. Implementation

Implementation of the action includes three learning sessions with a duration of 2x35 minutes each session. Teachers use the pictorial riddle model with various activities, such as question and answer, Quizizz, and creating spatial figures. This activity is carried out in an interactive atmosphere and inspires students' enthusiasm for learning. The first cycle also focuses on using puzzle-shaped images as a tool to explain mathematical concepts. Students actively participate in a range of games, such as Quizizz and spatial modeling, all meant to increase their learning and critical thinking skills. All activities in the first cycle were completed with a combined reflection session to conclude the content that was examined. The entire learning process is supported by collaboration between teachers and students and is carried out in an interesting and fun atmosphere. This research provides an important contribution to understanding the effectiveness of the pictorial riddle learning model in improving students' critical thinking skills in mathematics learning

3. Observation

Based on the first cycle's pre-test and post-test data, it is clear that adopting the pictorial riddle learning paradigm increased student learning outcomes. Despite this, student learning outcomes remain below the research aim of 80%. From data analysis, the average post-test score in the first cycle reached 74.2, with a score range between 20 to 80. Even though 57.1% of students succeeded in achieving graduation, there were still 42.8% of students who had not reached the set graduation standards. It can be seen in Table 2.

Table 2. Recapitulation of Cycle I Pre-Cycle and Post-Test Results

Pre-cycle	Post-Test 1	The highest score	The Lowest Value	Criteria
40,9	74,2	80	20	Not Completed

This study demonstrates that the pictorial riddle learning paradigm can improve student learning outcomes. However, more efforts are required to meet the established targets. In this context, future research could focus on adjusting learning methods or increasing the support provided to students to increase learning effectiveness.

4. Reflection

From the results of the first cycle evaluation, it appears that there are still deficiencies in learning effectiveness, which may be influenced by students' lack of enthusiasm for learning. Further analysis needs to be carried out to revise the learning approach to improve the quality of learning in the next cycle. The first cycle reflection results advise enhancing learning activities in the second cycle to obtain a deeper

knowledge of the content and develop students' critical thinking skills. Even after the pictorial riddle learning model has been applied, there is still a gap between the aim of at least 80% in teacher and student activities and the outcomes of the second cycle posttest. As a result, further changes are required by optimizing the application of the learning model in the second cycle to obtain more adequate success in meeting learning objectives.

Cycle 2

The results of the cycle I reflection show that the adoption of the pictorial riddle learning model helps improve students' excitement for learning. However, it was found that students' focus tended to decrease over time, especially after some time of learning. To overcome this, teachers implement ice-breaking not only at the beginning of learning but also in the middle of learning so that students remain focused.

1. Planning

Learning in Cycle II continues to use the Cycle I model with adjustments to the ice-breaking method and creative learning materials. Procedures in Cycle II include identifying problems, preparing lesson plans and learning media, as well as preparing icebreakers and games.

2. Implementation

In cycle II, the learning procedure remains the same as cycle I, but with several adjustments to increase its effectiveness. Students continue to like the usage of the pictorial riddle learning paradigm, such as Quizizz, as well as the exercise of forming spatial shapes. However, to ensure more active student involvement, teachers use the mystery snakes and ladders game as one of the learning strategies. The results of cycle II demonstrate that overall learning is still effective. This is shown by the high level of student involvement, especially in the practical activities of building shapes and playing mystery snakes and ladders. The lesson ends with a summary of the material by students and a joint prayer, marking the closing of the learning cycle. Thus, it can be concluded that studying utilizing the pictorial riddle learning model, which includes numerous interactive and creative activities, can boost the efficacy of mathematics learning, particularly in the theme of creating space, at the Langkaplancar 2 Elementary School.

3. Observation

After implementing the pictorial riddle learning paradigm, there was a considerable increase in student learning outcomes, as seen by the post-test cycle I and cycle II results. According to the post-test data, the average student score climbed from 74.2 in cycle I to 91.4 in cycle II. This demonstrates that the majority of students met the required Minimum Completeness Criteria scores, as shown in Table 3.

Table 3. Recapitulation of Posttest I and Posttest Cycle II Results

Cycle I Posttest	Cycle 2 Posttest	The highest score	The Lowest Value	Mean	Criteria
74,2	91,4	100	60	85,7%	Completed

With a learning completion percentage of 85.7%, it can be determined that learning utilizing the pictorial riddle model was successful in meeting the specified goal of achieving a Minimum Completeness Criteria score of 71 and a minimum completion percentage of 80. Therefore, no improvements are needed in the next cycle, because learning has achieved the expected results. According to the results of the implementation and observation of learning at the Langkaplancar 2 Elementary School,

three children have not met the Minimum Completeness Criteria in studying mathematics on the theme of building space. Nevertheless, this research can be concluded as successful because it has achieved the research success target, namely achieving a minimum completion percentage of 80%. It can be seen in Table 4.

Table 4. Recapitulation of Pre-Cycle Results, Cycle I and Cycle II

No	Cycle	Students who have completed their studies	Percentage
1.	Pre-cycle	3 Students	14,2 %
2.	Cycle I Posttest	10 Students	47,6%
3.	Cycle 2 Posttest	18 Students	85,7%

The observation results indicated an increase from pre-cycle (pretest) to cycles I and II. In the pre-cycle, only 3 students (14.2%) obtained very good criteria, but in the second cycle, this jumped to 18 students (85.7%) who met these criteria. This shows a considerable improvement in the learning process and students' critical thinking ability from the start to the end of cycle II while employing the pictorial riddle approach. The researchers' activities were successful in boosting the learning process and students' critical thinking skills, as the average student score in cycle II reached 85.7%. Therefore, researchers do not need to continue to the next cycle, and research actions can be stopped. This demonstrates that the pictorial riddle learning paradigm is beneficial in increasing learning outcomes and students' critical thinking abilities in spatial material in mathematics education.

4. Reflection

According to the results of implementation and observations at Langkaplancar 2 Elementary School, the usage of the pictorial riddle learning approach increased students' motivation and critical thinking skills when learning mathematics with geometric figures. Even though three students have still to complete the Minimum Completion Criteria, this research is judged successful because it met the research success target of 80%. Based on pre-cycle, cycle I, and cycle II observations, there was a considerable rise in the percentage of students who met very good criteria, with an increase from pre-cycle to cycle I of 33.4% and from cycle I to cycle II of 38.1%. The average student score in cycle II was 85.7, which exceeded the research success requirements. Thus, the research action is regarded as successful and does not need to be extended to the next cycle.

The analysis of the outcomes of this study demonstrates that the adoption of the pictorial riddle learning model has a good and significant impact on student's critical thinking skills. This demonstrates that selecting the appropriate learning model can make learning more fascinating, memorable, and pleasurable for students, as well as boost their focus, allowing learning content to be given more effectively. These findings are consistent with Surtriyanti et al., (2017) research, which revealed that the application of the pictorial riddle learning model in scientific learning about environmental conservation had a high influence on students' critical thinking skills. Even though the subjects of this study are different, the application of the pictorial riddle learning methodology is identical

Research Results by Kusmiati et al., (2021)show that the application of the pictorial riddle model (the key to success) in social studies learning can improve students' creative learning outcomes. The rise in learning outcomes is reflected by the decreasing number of students who acquire scores less than the Minimum Completion

Criteria. However, the population of students who get scores above the Minimum Completion Criteria and above has undergone a large increase. Overall, students are significantly more driven and passionate about completing apperception exercises, as well as engaged and innovative in problem-solving for learning projects. Given to the group during the teaching and learning process by the required criteria, this is obvious from the scores earned by students on learning outcomes/evaluation scores in pre-cycle activities, 64, in the first cycle, 68, and 72 in the second cycle activities.

Research conducted by Prathiwi & Utami, (2019)also supports these findings, showing that the analysis of students' critical thinking skills on colloidal materials using the picture puzzle investigation model at State Senior High School 12 Pekanbaru achieved good results with a percentage of 72.36%, which can be developed optimally. Furthermore, Aditia et al., (2019) demonstrates the usefulness of the pictorial riddle model in enhancing students' critical thinking skills, with a high percentage of each question indication. According to Purwanto, (2014) research, the pictorial riddle-type inquiry learning model with integration-interconnection content is beneficial in boosting students' critical thinking skills on temperature and heat material.

This research shows that the factor of increasing critical thinking skills from each cycle increases due to the habituation carried out by the teacher, where the teacher always encourages students to actively participate in class by asking questions and discussing the material to be discussed. This finding is consistent with the study by Firdausi et al., (2021), who claims that students' critical thinking skills can be increased by providing a learning environment that invites students to discuss, ask each other questions, and analyze the content.

Interviews with class V also emphasized the importance of the teacher's role in establishing sensitivity towards students, beginning with minor things like asking questions, asking each other questions and answers, and selecting a learning model that is suited to the content being taught. This has a great influence on learning activities and improves students' critical thinking skills.

> "*Asalkan mau berusaha pasti bisa, kalo nanti ada yang susah bisa tanya-tanya*" ("As long as you want to try, you can definitely do it, if something is difficult later, you can just ask.")
>
> (EM student interview, March 07, 2024)
>
> "*Gampang bisa kalo belajarnya seru*" ("It's easy to learn if it's fun to learn")
>
> (RN student interview, March 07, 2024)
>
> "*Kalau ada yang gak ngerti harus langsung bertanya, harus sering diskusi sama temen tapi kadang males kalo belajarnya membosankan*" (If someone doesn't understand, you have to ask directly, you have to often discuss it with friends, but sometimes you're lazy when learning is boring.")
>
> (RMA student interview, March 07, 2024)

Improving Students' Critical Thinking Abilities Through Pictorial Riddles

The Critical Thinking Skills Test is administered at the start (Pretest) and end (Posttest) of learning. The normalized Gain (N-Gain) demonstrates an increase in students' Critical Thinking Skills. Table 5 shows a recapitulation of pretest and post-test findings for critical thinking skills and N-Gain depending on learning.

Table 5. Recapitulation of Data on Results of Improving Students' Critical Thinking Skills

Test	Learning	$\bar{x}$ N-Gain	Criteria
N-Gain	*Pictorial Riddle*	0,87	High

Table 5, shows that adopting the pictorial riddle learning approach develops students' critical thinking skills with high criteria because the criterion value is 0.87>0.7. Below is a recapitulation of the increase in N-Gain for each student.

Table 6. Recapitulation of Improvement based on N-Gain for Each Student

No	Student's Initial Name	Score		Information	Gain	N-Gain	Criteria	Average N-Gain	Criteria
		Cycle I Posttest	Cycle 2 Posttest						
1.	AP	20	60	Not Completed	40	0,50	Moderate	0,87	High
2.	APS	40	100	Completed	60	1,00	High		
3.	AM	20	100	Completed	80	1,00	High		
4.	CM	20	80	Completed	60	0,75	High		
5.	EM	80	100	Completed	20	1,00	High		
6.	FM	20	100	Completed	80	1,00	High		
7.	HH	40	60	Not Completed	20	0,33	Moderate		
8.	INA	40	100	Completed	60	1,00	High		
9.	MAA	20	100	Completed	80	1,00	High		
10.	MAF	60	100	Completed	40	1,00	High		
11.	NOD	20	100	Completed	80	1,00	High		
12.	N	80	100	Completed	20	1,00	High		
13.	PR	20	60	Not Completed	40	0,50	Moderate		
14.	RN	60	80	Completed	20	0,50	Moderate		
15.	RSA	40	100	Completed	60	1,00	High		
16.	RY	80	100	Completed	20	1,00	High		
17.	RMA	60	100	Completed	40	1,00	High		
18.	RA	40	100	Completed	60	1,00	High		
19.	SRM	20	80	Completed	60	0,75	High		
20.	WNP	60	100	Completed	40	1,00	High		
21.	WT	20	100	Completed	80	1,00	High		
Total		860	1920						
Average		40,90%	914%						
Completed		3	18						
Not Completed		18	3						

From the information listed in Table 1 above, it is known that from a sample of 21 students, 18 students achieved the criteria for completing the critical thinking ability test results, while 3 students did not meet these criteria. In terms of N-Gain criteria, 17 students have high criteria and 4 students have medium criteria. On average, the N-Gain value is 0.87, which shows a significant increase from the previous value, with a value much higher than the threshold value of 0.07. The research on improving critical thinking skills was said to be successful because students' mastery in learning reached 85.7% with a research percentage target of 80%, so the research in the second cycle was said to be successful so there was no need to carry out re-research in the next cycle.

Critical thinking skills can be developed using learning models that include games and relevant interventions. In this classroom activity, students use the Pictorial Riddle paradigm to strengthen their critical thinking abilities. This learning methodology uses picture puzzles given in a learning environment, with the teacher asking questions about the picture

In each cycle I and II meeting, an explanation of the spatial building material is presented using image media in the form of a puzzle. In each meeting, there is an activity designed to improve students' critical thinking skills. The first meeting involved playing Quizizz, the second involved playing Snakes and Ladders, and the last was the practice of making spatial shapes and nets on spatial shapes. The steps in this learning involve presenting problems that invite students to solve puzzles, where the teacher explains geometric material using puzzle-shaped images. Students were divided into four groups and asked to play Quizizz. Each group that wishes to answer a question has to come forward and touch the answer image on the screen.

Apart from Quizizz, there is also a Snakes and Ladders game where students are divided into four groups. group. Apart from questions, there are also rewards or prizes given to groups that successfully move forward in the game.

The last one is the practice of creating spatial structures and nets. Students were divided into four groups and asked to create spatial shapes using sticks, slim, cardboard boxes, and cardboard. The teacher gives instructions but does not provide examples, so students must follow the instructions given by the teacher in the manufacturing process. From the previous discussion, it was found that the N-Gain value was 0.87>0.07, indicating high criteria. This indicates that the Pictorial Riddle learning model can improve students' critical thinking skills. This finding is in line with research by Aditia et al., (2019), which shows that the experimental class produced an N-Gain value of 0.6, while the control class only had 0.25. This suggests that pictorial riddles are more successful than traditional learning.

Masitoh & Prabawanto, (2016) research supports these findings by demonstrating that the average N-Gain of students' critical thinking abilities in the experimental class is higher than in the control class. The average N-Gain score for the experimental class was 0.50, while the control class only received 0.15. According to Arantika et al., (2014) research, there are disparities in the results of critical thinking exams between students who are taught using the inquiry learning model with visual riddles and students who are taught using conventional learning models. The inquiry learning technique, aided by visual riddles, had a 29.10% impact on boosting students' critical thinking scores in eleventh-grade colloid content at State Senior High School 1 Sambas.

According to Sugiharti et al., (2019) research results, the experimental class has a higher average N-Gain score for critical thinking skills. The adoption of the 7E learning cycle model, which encourages students to actively search for and absorb the content themselves, has been proven to have a positive impact on strengthening students' critical thinking skills. Pictorial Riddle Learning Activities to Enhance Primary School Students' Critical Thinking Skills. Purwanto, (2014) study demonstrates that the growth in critical thinking abilities of experimental class students is higher than that of the control class, with the experimental class's N-gain (0.316) being in the medium category and the control class's N-gain (0.087) being in the low category.

CONCLUSION

The study's findings demonstrate that using the pictorial riddle learning approach can help fifth-grade students at State Elementary School 2 Langkaplancar improve their critical thinking skills in mathematics, particularly in spatial construction material. The learning process is carried out through two cycles with three meetings in each cycle. This research shows that there are positive changes in the student learning process as well as an increase in the value of learning outcomes after implementing the pictorial riddle learning model. Previously, students demonstrated unsatisfactory critical thinking skills

and learning scores below the Minimum Completeness Criteria. However, after implementing this learning paradigm, there was a considerable boost in students' critical thinking skills and the value of their learning. From observations of the learning process, it can be seen that students are increasingly motivated, dare to participate, and are more focused on the teacher's explanations. This is reflected in the increase in students' average scores from cycle I to cycle II. Thus, the application of the pictorial riddle learning model can be considered successful as expected. However, this study has several limitations, such as obstacles in generalizing the results, collecting representative data, and the risk of research bias. Nevertheless, the results of this study provide an important contribution to the understanding of the use of pictorial riddles in education and cognitive psychology.

REFERENCES

Abdullah, I. H. (2016). Berpikir Kritis Matematik. *Delta-Pi: Jurnal Matematika dan Pendidikan Matematika*, *2*(1), 66–75. https://doi.org/10.33387/dpi.v2i1.100

Aditia, M., Ruhiat, Y., & Wibowo, F. C. (2019). Penerapan Model Pictorial Riddle Pada Pembelajaran Fisika Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa. *Prosiding Seminar Nasional Pendidikan Fisika Untirta*, *2*(1), 194–201. https://jurnal.untirta.ac.id/index.php/sendikfi/index

Arantika, J., Sahputra, R., & Sartika, R. P. (2014). Pengaruh Inkuiri Berbantuan Pictorial Riddle Terhadap Kemampuan Berpikir Kritis Pada Materi Koloid Di SMA. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, *3*(10), 1–11. http://dx.doi.org/10.26418/jppk.v3i10.7532

Arikunto, S. (2012). *Penelitian Tindakan Kelas*. Bumi Aksara.

Azid, N., Ali, R. M., El Khuluqo, I., Purwanto, S. E., & Susanti, E. N. (2022). Higher order thinking skills, school-based assessment and students' mathematics achievement: Understanding teachers' thoughts. *International Journal of Evaluation and Research in Education*, *11*(1), 290–302. https://doi.org/10.11591/ijere.v11i1.22030

Bybee, R. W., Taylor, J. A., Gardner, A., Scotter, P. V, Powell, J. C., Westbrook, A., & Andes, N. (2006). The BSCS 5E Instructional Model: Origins and Effectiveness. *Colorado Springs, Co*, *3*, 1–89. https://fremonths.org/ourpages/auto/2008/5/11/1210522036057/bscs5efullreport2006.pdf

Firdausi, B. W., Warsono, & Yermiandhoko, Y. (2021). Peningkatan Kemampuan Berpikir Kritis Pada Siswa Sekolah Dasar. *Jurnal MUDARRISUNA: Media Kajian Pendidikan Agama Islam*, *11*(2), 229–243. http://dx.doi.org/10.22373/jm.v11i2.8001

Isrok'atun. (2021). *Memahami Konsep Dasar Matematika untuk PGSD*. Bumi Aksara.

Kusmiati, E., Chabibah, N., & Khoiri Rizkiah, M. (2021). Penerapan Model Pictorial Riddle Dalam Meningkatkan Kreativitas Belajar Siswa Pada Pembelajaran IPS. *Jurnal Tahsinia*, *2*(2), 114–123. https://doi.org/10.57171/jt.v2i2.298

Masitoh, I., & Prabawanto, S. (2016). Peningkatan Pemahaman Konsep Matematika dan Kemampuan Berfikir Kritis Matematis Siswa Kelas V Sekolah Dasar Melalui Pembelajaran Eksloratif. *EduHumaniora | Jurnal Pendidikan Dasar Kampus Cibiru*, *7*(2), 186. https://doi.org/10.17509/eh.v7i2.2709

Prathiwi, A., & Utami, L. (2019). Analisis Kemampuan Berfikir Kritis Siswa Menengah Atas Menggunakan Model Inquiry Pictorial Riddle. *Journal of The Indonesian Society of Integrated Chemistry, 11*(2), 64–72. https://doi.org/10.22437/jisic.v11i2.7569

Pristiwanti, D., Badariah, B., Hidayat, S., & Dewi, R. S. (2022). Pengertian Pendidikan. *Jurnal Pendidikan dan Konseling*, *4*(6), 7911–7915. https://doi.org/10.33387/bioedu.v6i2.7305

Purwanto. (2014). *Evaluasi Hasil Belajar*. Pustaka Pelajar.
Saputra, N., Zanthy, Sylviana, L., Gradini, E., Jahring, Rif'an, A., & Ardian. (2021). *Penelitian Tindakan Kelas*. Yayasan Penerbit Muhammad Zaini.
Sari, Y., & Kustijono, R. (2018). Keefektifan Metode Pictorial Riddle untuk Melatihkan Keterampilan Berpikir Kritis. *Prosiding Seminar Nasional Fisika (SNF)*, 43–48. https://fisika.fmipa.unesa.ac.id/proceedings/index.php/snf/article/view/62/53
Sonjaya, D. N., & Yuliyanto, A. (2022). Open-Ended Approach To Improving Mathematics Creative Thinking Skills of Elementary School Students. *MathNesia: Journal of Math Education*, *1*(1), 24–32. https://mathnesia.org/index.php/mns/article/view/5/4
Sugiharti, S. D., Supriadi, N., & Andriani, S. (2019). Efektivitas Model Learning Cycle 7e Berbantuan E-Modul Untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik SMP. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *8*(1), 41–48. https://doi.org/10.24127/ajpm.v8i1.1573
Surtriyanti, E., Panjaitan, R. L., Sudin, A., & Study, C. T. (2017). Pengaruh Metode Pembelajaran Pictorial Riddle Terhadap Keterampilan Berpikir Kritis Siswa SD Pada Materi Pelestarian Lingkungan. *Jurnal Pena Ilmiah*, *2*(1), 331–340. https://ejournal.upi.edu/index.php/penailmiah/article/view/10668/6578
Yuliyanto, A. (2024). *Sikap dan Potensi Peserta Didik serta Indikator Pengukurannya*. Eureka Media Aksara.
Yuliyanto, A., Farikhin, I., Sofiasyari, I., & Rogibah, R. (2023). *Model-Model Pembelajaran untuk Sekolah Dasar* (A. A. Rochim (ed.)). CV. Eureka Media Aksara.