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Students' Critical Thinking Skills in Solving PISA-Like Questions in the Context of the Jakabaring Palembang Tourism

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Abstract

The essence of the independent curriculum and Pancasila student profile requires teachers to adapt teaching materials to the PISA framework and invite students to think critically. For this reason, this qualitative descriptive research aimed to describe students' critical thinking skills in solving mathematical PISA-like questions on the quantity content in the context of the Jakabaring Palembang tourism using the Indonesian Realistic Mathematics Education (PMRI in Bahasa) approach. This research involved 36 under-15 students of a junior high school in Palembang. Data from observations, tests, and interviews were collected and analyzed qualitatively to measure students' critical thinking skills. The results of this study indicated that the students' critical thinking ability belonged to the moderate category, with a total of 22 students in this category. The highest scoring critical thinking indicator was interpretation (86.1%), while the lowest was analysis (13.8%). The former was dominant in students because when learning using the PMRI approach, students could model problems into their interpretations. Solving PISA-like questions could train students to develop the interpretation indicator of critical thinking skills and at the same time introduce the Palembang Jakabaring tourism.

Keywords: Critical Thinking Skills, PISA, Number, Jakabaring Palembang Tourism, PMRI

Abstrak

Hakikat kurikulum merdeka dan profil pelajar Pancasila menuntut guru menyesuaikan bahan ajar dengan kerangka PISA dan mengajak siswa berpikir kritis. Penelitian deskriptif kualitatif ini bertujuan untuk mendeskripsikan kemampuan berpikir kritis siswa dalam menyelesaikan soal-soal matematika tipe PISA pada materi bilangan dalam konteks wisata Jakabaring Palembang dengan menggunakan pendekatan Pendidikan Matematika Realistik Indonesia (PMRI). Penelitian ini melibatkan 36 siswa di bawah 15 tahun sebuah sekolah menengah pertama di Palembang. Data hasil observasi, tes, dan wawancara dikumpulkan dan dianalisis secara kualitatif untuk mengukur kemampuan berpikir kritis siswa. Hasil penelitian ini menunjukkan bahwa kemampuan berpikir kritis siswa tergolong dalam kategori sedang, dengan jumlah siswa pada kategori ini sebanyak 22 siswa. Persentase indikator berpikir kritis tertinggi pada interpretasi (86.1%), sedangkan persentase indikator terendah pada analisis (13.8%). Indikator pertama ini dominan muncul pada siswa karena ketika belajar dengan pendekatan PMRI, siswa dapat memodelkan masalah ke dalam pemahamannya. Penyelesaian soal-soal tipe PISA dapat melatih siswa mengembangkan indikator interpretasi kemampuan berpikir kritis sekaligus memperkenalkan wisata Palembang Jakabaring.

Kata kunci: Kemampuan Berpikir Kritis, PISA, Bilangan, Wisata Jakabaring Palembang, PMRI

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INTRODUCTION

The current era of globalization requires skills suitable for the 21st century, and students are required to adapt to the development of an increasingly advanced age (Nuraisa et al., 2019). Mathematics is also developing as a basic science in terms of a theory that can be widely applied in life (Naziroh et al., 2022). Education can be an essential benchmark for training students to compete in the progress of the times. Students must master the 6C skills-critical, collaborative, communicative,

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creative, citizenship, and character skills (MoEC, 2020a) to become competitive in the 21st century. One of the efforts that the government has made to achieve the 6C skills is to launch an independent curriculum.

The independent curriculum aims to produce millennials who can quickly understand the information or knowledge taught to them, rather than just remembering the materials provided, and utilize technologies when learning (Indarta et al., 2022). As stated by Malalina et al. (2021), the independent curriculum contains a Pancasila profile where teachers and students must work together to think critically by applying creativity and scientific reasoning and reflecting their thinking to the real world. Therefore, students need to be accustomed to thinking critically from an early age.

Critical thinking is the activity of analyzing and evaluating to improve thinking clearly (Mutakinati et al., 2018). Students who can think critically can determine which information is essential, irrelevant, or useless (Amin et al., 2020). Zulkardi and Kohar (2018) also argue that students who can think critically are able to work on higher-order thinking skills (HOTs) questions. In the Minimum Competency Assessment (MCA), HOTs questions aim to measure students' literacy and numeracy abilities. In numeracy content, there are the materials of number, measurement, geometry, algebra, data, and uncertainty (MoEC, 2020b). The number material is very much related to everyday life (Putra et al., 2016). Therefore, it makes a primary material in mathematics that students must understand.

However, Indonesia's 2018 Programme for International Student Assessment (PISA) results show that students only scored 379 in mathematics, which was still less than the PISA average mathematics score of 489 (OECD, 2019). This failure occurred because students were not used to solving contextual problems such as PISA problems and had limited higher-order thinking skills (Nusantara et al., 2021). Students were accustomed to working on questions only until the solutions were obtained and dropped the stage of interpreting the contexts according to the purposes of the questions (Charmila et al., 2016). Students who still have difficulty solving HOTs questions have relatively low critical thinking skills (Yansen et al., 2019). One of the factors that cause students' low thinking skills during the mathematics learning process is the application of teacher-centered learning, where students memorize formulas more than understanding concepts (Nusantara et al., 2020).

One way to improve critical thinking skills is to familiarize students with PISA-like questions in a context that is familiar to them (Zulkardi et al., 2021). The use of contexts familiar to students in everyday life can be incorporated with the PMRI approach (Zulkardi & Putri, 2010; Anggraini & Zulkardi, 2020). According to Lisnani et al. (2020), the context of tourism is one of the contexts that students are familiar with. Many cultures in Indonesia can be a reference to help students learn mathematical concepts (Putri, 2015). Palembang tourism is an example of a familiar context that must be introduced to students to be explored mathematically so that they can see directly the materials presented in the learning process because tourism activities can provide wider opportunities for students to actively explore in person. Besides, tourism activities support the development of the characters and competencies included in the Pancasila student profile. The Palembang tourism context also supports

Sriwijaya University's excellence program as outlined in the GREEN-AGRO-ECO-EDU-TOURISM CAMPUS concept.

There have been many studies on PISA that use various contexts, such as the 2018 Asian Games (Putri & Zulkardi, 2020) and COVID-19 (Nusantara et al., 2020; Nusantara et al., 2021; Zulkardi et al., 2021). This research is related to previous research on student's critical thinking skills in solving PISA-like questions (Rosmalinda et al., 2021; Fauzi & Abidin, 2019) and critical thinking skills in the Jamu Gendong Kiringan village tour context (Pitaloka & Prasetyo, 2022). However, there is rarely research on students' critical thinking skills in solving PISA-like questions using the Palembang tourism context. Therefore, the researchers took an interest in describing students' critical thinking skills in solving PISA-like questions in the Jakabaring Palembang tourism context.

METHODS

This qualitative study used the PMRI approach to determine students' critical thinking skills in solving PISA-like math questions in the context of the Jakabaring Palembang tourism. In this study, there were 2 meetings; in the first meeting, students were given a learning treatment using the PMRI approach, and in the second, students were given several test questions. The participants in this study were 36 students aged 13–15 years at SMPN 26 Palembang. Data were collected using observations, test questions, and interviews. Interviews were conducted with three students of different abilities: high, medium, and low. The test questions consist of one item with three parts. The test questions have a level of difficulty equivalent to the analysis. Before being used for testing, all instruments were validated by validators, teachers, and students (as in Table 1).

Table 1. Suggestions from validators and students

Validators	Suggestions	Revision
PGRI Yogyakarta University lecturers, Muhammadiyah Lampung University lecturers, Sriwijaya University doctoral students, and teachers	1. The pictures of the questions should be more clarified 2. Adjust the scores to the difficulty levels of the questions 3. Use better grammar to cause no multiple interpretations 4. 5 times for 120 seconds or 120 seconds each?	1. The pictures in the questions have been clarified 2. The scores have been adjusted to the levels of difficulty of the questions 3. The grammar has been clarified so that multiple interpretations do not occur 4. 5 times, 120 seconds each
Students (One-to-one and small group)	1. The language in the questions has to be simplified 2. What does bicycles for 1 person, 2 people, and 3 people mean?	1. The language in the questions has simplified further 2. 1-seater, 2-seater, and 3-seater bicycles

After the questions were revised following the suggestions in Table 1, learning activities were carried out, where students worked on a student worksheet with the PMRI approach. During that time, observation activities were carried out to see directly, and record, student activities using the PMRI approach. Observations were carried out when students were studying to see what indicators appeared (Anggraini & Zulkardi, 2020). The test in this study aimed to measure students' critical thinking skills in solving PISA-like questions with numbers in the context of the Jakabaring Palembang tourism in a written form. Meanwhile, interviews were conducted after the test with the aim of confirming students' answers as supporting data for their critical thinking ability test results (Anggraini & Zulkardi, 2020). In the process, students were asked to give their opinions and to explain how to solve the problem based on critical thinking indicators (as in Table 2).

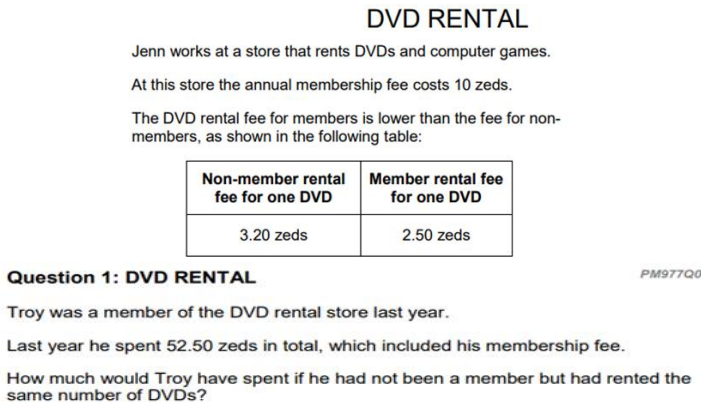
Table 2. Critical thinking skills indicators

Indicators	Descriptor
Interpretation	Able to identify important information from the given problem.
Analysis	Able to develop problem-solving plans.
Evaluation	Able to use the completion plan entirely and correctly.
Inference	Able to conclude the problems given.

The researchers used four of the students' critical thinking indicators developed by Facione (2020) in this study, namely, interpretation, analysis, evaluation, and inference, which are described in Table 2.

RESULTS AND DISCUSSION

In this study, students were asked to solve one problem with three parts. The questions used are PISA-like questions on the quantity content that adopt the previous PISA questions to measure students' critical thinking skills (as in Figure 1).



DVD RENTAL

Jenn works at a store that rents DVDs and computer games.

At this store the annual membership fee costs 10 zeds.

The DVD rental fee for members is lower than the fee for non-members, as shown in the following table:

Non-member rental fee for one DVD	Member rental fee for one DVD
3.20 zeds	2.50 zeds

Question 1: DVD RENTAL PM977Q0

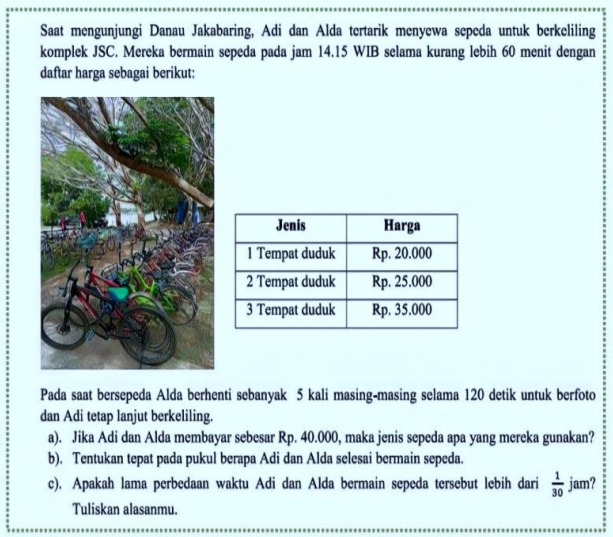
Troy was a member of the DVD rental store last year.

Last year he spent 52.50 zeds in total, which included his membership fee.

How much would Troy have spent if he had not been a member but had rented the same number of DVDs?

Figure 1. Original PISA item with DVD rental context

Figure 1 depicts the PISA questions adapted in this study, which used the number material. PISA-like questions were later made in 2012 with the context of the Jakabaring Palembang tourism (as in Figure 2). These questions have been validated by experts qualitatively.



Saat mengunjungi Danau Jakabaring, Adi dan Alda tertarik menyewa sepeda untuk berkeliling komplek JSC. Mereka bermain sepeda pada jam 14.15 WIB selama kurang lebih 60 menit dengan daftar harga sebagai berikut:

Jenis	Harga
1 Tempat duduk	Rp. 20.000
2 Tempat duduk	Rp. 25.000
3 Tempat duduk	Rp. 35.000

Pada saat bersepeda Alda berhenti sebanyak 5 kali masing-masing selama 120 detik untuk berfoto dan Adi tetap lanjut berkeliling.

a). Jika Adi dan Alda membayar sebesar Rp. 40.000, maka jenis sepeda apa yang mereka gunakan?

b). Tentukan tepat pada pukul berapa Adi dan Alda selesai bermain sepeda.

c). Apakah lama perbedaan waktu Adi dan Alda bermain sepeda tersebut lebih dari $\frac{1}{30}$ jam? Tuliskan alasanmu.

Translated into English:

While visiting Lake Jakabaring, Alda and Adi felt like renting bicycles to get around the JSC complex. They rode the bicycles at 14.15 Western Indonesian Time for approximately 60 minutes with the following price list:

Type	Price
1 seat	Rp20,000
2 seats	Rp25,000
3 seats	Rp35,000

While cycling, Alda stopped 5 times each for 120 seconds to take pictures and Adi continued to walk around.

a). If Alda and Adi paid Rp40.000, then what kind of bicycle did they use?

b). Precisely determine the times at which Adi and Alda finished cycling.

c). Was the time difference between Adi and Alda in riding the bicycles more than $\frac{1}{30}$ hour? Write down your reasons.

Figure 2. Quantity content test question

Figure 2 depicts a test item with a difficulty-level equivalent to the analysis. Students were asked to determine the type of bicycle to rent in question a. In question b, students were asked to count exactly at what times the visitors finished renting bicycles. After that, in question c, Students were asked to determine the length of time the two visitors took to finish renting the bicycles. The following are indicators of student's critical thinking skills that are adopted from Facione's work (2020) contained in the written test questions given (in Table 3):

Table 3. The frequencies of students meeting the indicators of critical thinking skills

Indicator	Question			Average Number of Students Who Met the Indicator	Percentage
	a	b	c		
1	32	30	30	31	86.1%
2	1	9	6	5	13.8%
3	23	13	12	16	36.1%
4	6	8	8	7	19.4%

Description:

Indicator 1: Interpretation

Indicator 2: Analysis

Indicator 3: Evaluation

Indicator 4: Inference

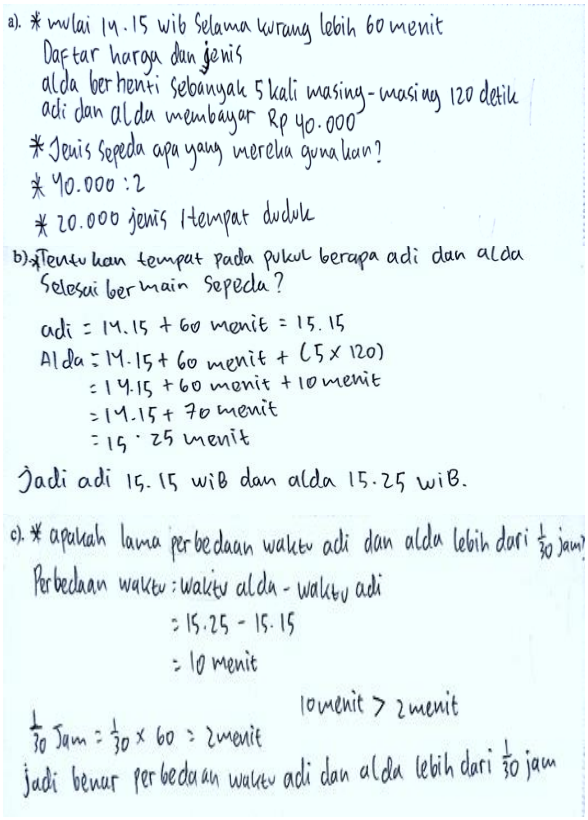
Based on Table 3, the average percentages of students meeting the interpretation, analysis, evaluation, and inference indicators were 86.1%, 13.8%, 36.1%, and 19.4%, respectively. After getting the frequency of students fulfilling the indicators of critical thinking skills, the researchers categorized to classify the abilities of the students based on Table 4.

Table 4. Category of students based on critical thinking skills (Pertiwi, 2018)

Category	Interval	Total Students
Very High	80-100	2
High	66-79	7
Middle	56-65	18
Low	40-55	5
Very Low	0-39	4

The researchers categorized to classify the abilities of the students based on the results of the written test of students' critical thinking skills in solving PISA-like questions as shown in Table 4, namely, very high (2 students), high ability (7 students), moderate ability (18 students), low ability (5 students) and very low (4 students). The average critical thinking ability of students in solving the PISA-like questions on the quantity content in the Palembang Jakabaring tourism context after the application of the PMRI approach was moderate or in the middle level. Here are some interesting student answers to discuss further. The MIL'S answer on PISA-like questions is presented in Figure 3.

MIL'S answer (high ability student)



Translated into English:

a) - Starting at 14.15 WIB for approximately 60 minutes
- Price list and types
- Alda stops 5 times each 120 seconds
- Adi and Alda pay IDR 40,000
- What type of bike do they use? **(Interpretation)**
- 40,000: 2 = 20,000 **(Evaluation)**
- Type 1 seat **(Inference)**

b) - Determine exactly at what time Adi and Alda finished cycling? **(Interpretation)**
- Adi = 14.15 WIB + 60 minutes = 15.15
- Alda = 14.15 WIB + 60 minutes + (5 × 120 seconds) = 14.15 WIB + 60 minutes + 10 minutes = 14.15 WIB + 70 minutes = 15.25 WIB **(Evaluation)**
- So, Adi 15.15 WIB and Alda 15.25 WIB **(Inference)**

c) - Is the time difference between Adi and Alda more than $\frac{1}{30}$ hour? **(Interpretation)**
- Time difference = Alda time-Adi time **(Analysis)**
- 15.25 WIB − 15.15 WIB = 10 minutes
- $\frac{1}{30}$ hours = $\frac{1}{30} \times 60 = 2$ minutes
- 10 minutes > 2 minutes **(Evaluation)**
- So it's true that the time difference between Adi and Alda is more than $\frac{1}{30}$ hours **(Inference)**

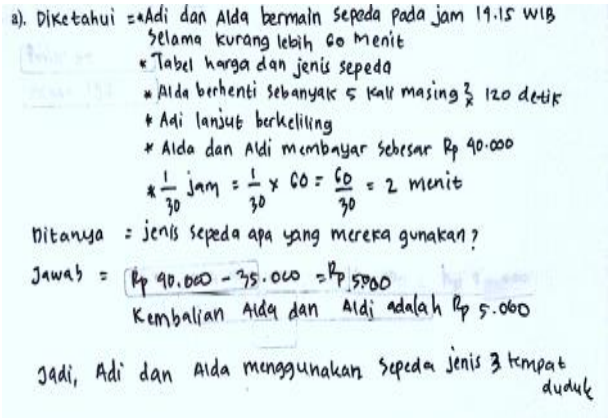
Figure 3. MIL's answer from the question

Based on his/her written test results depicted in Figure 3, MIL was categorized as a student with a high critical thinking ability. MIL was observed to be very active in group and class discussions during the learning process in the classroom. MIL could answer questions correctly and fulfill every indicator of critical thinking ability. MIL's analysis of parts a) and b) of the written test indicated that he could solve the problem given. S(he) could analyze the information provided in the questions in the answer column, work on the questions carefully and systematically, and conclude correctly. MIL's written test analysis in part c) also showed that he could solve the problem given. S(he) could analyze the information that was known about the problem, develop a plan for solving the problem, work on the problem carefully and systematically, and conclude correctly.

R : *How did you get the results as written in part a)?*
MIL : *For part a) they rented two bicycles, each for one person. Because Alda stopped to take pictures and Adi continued cycling, they could not possibly be on the same bike.*
R : *For parts b) and c), how did you get the results as written?*
MIL : *For part b) I calculated Adi's finish time first because it only took adding up the start time and their estimated length of time cycling, which is 60 minutes. As for Alda, it was the same, but with the addition of Alda's photo time, which is 120 seconds × 5. For part c, I converted 1/30 hours into 2 minutes. After that, I subtracted Alda's finish time from Adi's finish time, which is 10 minutes. Then, I could conclude that 10 minutes is more than 2 minutes.*
R : *How could you conclude that it should be 120 seconds × 5?*
MIL : *In the question it is written "5 times each for 120 seconds", meaning 1 stop lasted for 120 seconds, so 120 seconds should be added up 5 times. To make it easier, I multiplied 120 by 5.*

From the results of the researcher's interview with MIL, MIL could identify important information from the given problem and develop a plan for solving the problem even though it is not written. He could directly use the correct completion plan and conclude the given problem. The IJ'S answer on PISA-like questions is presented in Figure 4.

IJ'S answer (middle ability student)

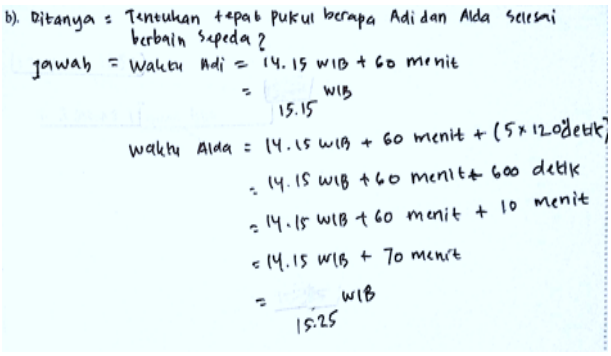


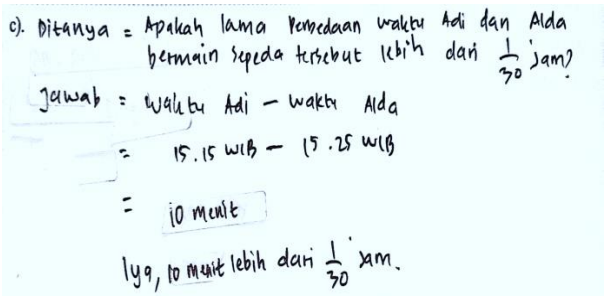
Translated into English:

a) Is known:
- Adi and Alda play bicycles at 14.15 WIB for approximately 60 minutes
- Table of prices and types of bicycles
- Alda stops 5 times each 120 seconds
- Adi continues to walk around
- Adi and Alda paid Rp 40,000
- $\frac{1}{30}$ hour = $\frac{1}{30} \times 60 = \frac{60}{30}$ = 2 minutes

Asked:
What type of bike do they use? **(Interpretation)**
Answer:
= Rp 40,000 - Rp 35,0000 = Rp 5,000,
Adi and Alda's change is Rp 5,000 **(Evaluation)**
So, Adi and Alda use a 3-seater type bike **(Inference)**

IJ'S answer (middle ability student)





Translated into English:

b) Asked:
What time did Adi and Alda finish? **(Interpretation)**
Answer:
Adi's time = 14.15 WIB + 60 minutes = 15.15. WIB
Alda's Time = Adi's Time + (5×120 seconds)
= 15.15 WIB + 600 seconds
= 15.15 WIB + 10 minutes
= 15.25 WIB **(Evaluation)**

c) Asked:
Is the time difference between Adi and Alda on the bike more than $\frac{1}{30}$ hour? **(Interpretation)**
Answer:
= Alda time - Adi time **(Analysis)**
= 15.25 WIB - 15.15 WIB
= 10 minutes **(Evaluation)**
Yes, 10 minutes is more than 1/30 hour **(Inference)**

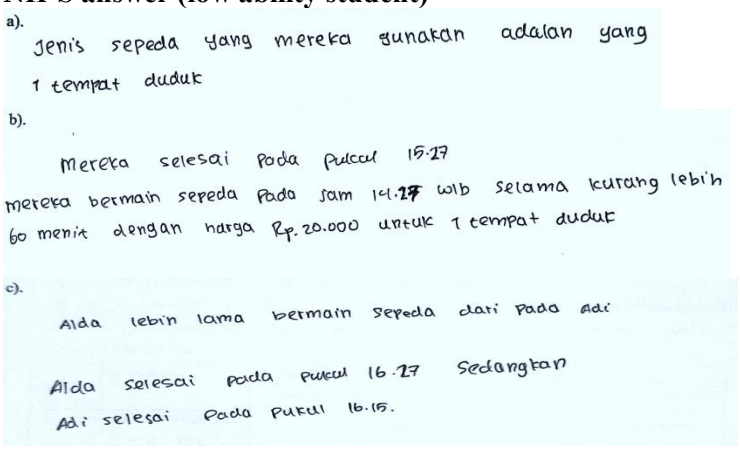
Figure 4. IJ's answer from the question

Based on his/her written test results in Figure 4, IJ was categorized as a student of moderate critical thinking ability. During the time of student observation in the classroom, IJ was also active in group discussions, but s(he) was less involved in class discussions during the learning process. IJ was quite capable of answering questions correctly and fulfilling the indicators of student's critical thinking skills. However, his/her answers to some questions were incorrect. The results of IJ's written test in part a) indicated that s(he) could identify important information and draw conclusions from the problem given. However, there was an error in his completion plan. His/her written test analysis in parts b) and c) indicated that s(he) could solve the problem given. S(he) could identify important information from the problem, develop plans for solving the problem, work on the problem carefully and systematically, and draw conclusions correctly.

R : *What is asked in the question?*
IJ : *First, the question asks to determine the type of bicycle, the lengths of time Alda and Adi took riding bicycles, and the difference in the lengths of time taken by Alda and Adi.*
R : *So, how did you get the results as written?*
IJ : *For part a): they rented a three-seater bicycle, then got Rp5,000 in change because Rp40,000 – Rp35,000 = Rp5,000. In part b) I calculated Adi's finish time first by adding the starting time and the estimated length of time they took cycling. Then, I calculated Alda's time by adding up Adi's finish time with Alda's photo time, which is 120 seconds × 5. For part c): after changing $\frac{1}{30}$ hours to 2 minutes, I subtracted Alda's finish time from Adi's finish time, and I got 10 minutes as the result. I concluded that 10 minutes is more than 2 minutes.*
R : *As for part a), how did you conclude that they rented a three-seater bicycle while you stated that Alda stopped and Adi continued cycling?*
IJ : *I didn't really understand the known information on that part, so I thought they were on the same bike.*

From the results of the researcher's interview with IJ, IJ could identify important information from the given problem and develop a plan for solving the problem. Even though s(he) did not write it down, s(he) could directly use his completion plan correctly. IJ was mistaken in understanding the meaning of question a), so s(he) answered that Alda and Adi were on the same bicycle. IJ could make conclusions correctly for questions a) and c). The NH'S answer on PISA-like questions is presented in Figure 5.

NH'S answer (low ability student)



Translated into English:

a) The type of bike they use is the 1 seater one **(Inference)**

b) They finished at 15.27 WIB, they played bicycles at 14.15 WIB for approximately 60 minutes at a price of Rp. 20,000 for 1 seat **(Inference)**

c) Alda took longer to ride a bicycle than Adi, Alda finished at 16.27 WIB while Adi finished at 16.15 WIB **(Inference)**

Figure 5. NH's answer from the question

Based on NH's written test results in Figure 5, NH was categorized as a student of low critical thinking ability. During the time of observation in the classroom, s(he) was not active in both group and class discussions during the learning process. S(he) was poor in answering the questions and only fulfilled several indicators of student's critical thinking skills. Some of his/her answer was wrong, and some was right. His/her written test analysis in part a) showed that he could only conclude correctly from the problem given. It can be seen from the answers that s(he) only wrote conclusions without writing down the available information and how to solve the problem. His/her written test analysis in parts b) and c) indicated that s(he) could only conclude the problem given, but the conclusions were wrong. S(he) only wrote conclusions and dropped the available information and how to solve the problem.

R : *How did you get the results as written?*
NH : *For part a), each of Alda and Adi rented a one-seater bicycle. For part b), Alda's and Adi's finish times were the same, namely, at 15.27. For part c), Alda took longer to finish than Adi.*
R : *Can you explain how you got that conclusion?*
NH : *For part a): because it was known in the question that Alda stopped and Adi continued cycling, they rented a 1-seater bicycle each. As for parts b) and c), I did not understand how to find the answers, so I was just guessing, Miss.*

Based on the results of the interview with NH, it appeared that NH could only identify important information from the problem given and make some correct conclusions, but he had yet to be able to plan for solving the problem.

Based on the findings from the study, the analysis indicator of student's critical thinking skills emerged after the application of a PISA-like mathematic problems in the Jakabaring Palembang tourism context on the number material, in combination with the PMRI approach. In the following, an explanation of the indicators identified in this study is provided in more detail:

Interpretation

Based on the researchers' findings, the indicator of critical thinking skills that often appears is interpretation and it is found that students can answer the questions correctly according to what is asked or can understand the intent of the questions presented properly. As explained by Rosmalinda et al. (2021), students who can interpret can understand and express the meaning of a problem through the information contained in the problem. Some students did not write down important information on the problem, but it was revealed that they could understand the important information or the problem well through the interviews with them in person (Pertiwi, 2018).

Analysis

Based on the researchers' findings, an indicator of critical thinking skills that rarely appears is the analysis. The average student can still not relate information from the question, so the answer needs to be completed. As explained by the theory that has been put forward, analysis is the ability to identify and conclude the relationship between statements, questions, concepts, descriptions, or other forms (Fauzi & Abidin, 2019). The research results showed that most students only immediately wrote the solution to the problem without writing down the solution plan that would be used, even though during interviews, they could express their understanding of which solution plan to use (Nusantara et al., 2021). Students had difficulty determining relevant factors and consequently were unable to abstract patterns.

Evaluation

Based on the stage of evaluation of the research process, it was found that several students were already good at solving problems. However, many students still needed to learn how to use the solution plan properly. In conclusion, these students could use the right strategy to solve the problem and perform calculations correctly (Rosmalinda et al., 2021). This is as theoretically explained that evaluation is the ability to access the credibility of a statement/representation and to logically access the relationship between statements, descriptions, questions, and concepts (Pitaloka & Prasetyo, 2022). It was likely that students did not want to write down their process of finding the final answers to all the questions given by the teacher because they assumed that the evaluation indicator is the same as, or can be combined with, the analysis indicator (Yansen et al., 2019).

Inference

Based on the results of the research at the inferring stage, it was found that some students had met the inference indicators, which meant being able to draw conclusions from answers that had been done correctly at the evaluation stage. This caused students to be unable to solve the given problem (Fauzi & Abidin, 2019). According to Rosmalinda et al. (2021), most students did not draw conclusions from the answers that they found and only arrived at the evaluation stage because they considered that the results obtained were sufficient to answer the questions; they were of the view that drawing conclusions was unnecessary.

Using the PMRI learning approach makes it easier for students to understand and learn new things (Anggraini & Zulkardi, 2020). According to Putra et al. (2016), PMRI can also help students improve higher-order thinking skills indirectly. This study's results align with previous research: in critical thinking skills, students had reached the assessment stage, which included selecting important/relevant information, reconnecting relevant information/codes/concepts, connecting with previous problems, and making conclusions (Nusantara et al., 2020).

Based on the data analysis that was carried out, it can be said that students had understood the test questions given. Students had gone through various stages: interpretation, analysis, evaluation, and inference. The most frequently occurring indicators is interpretation, which means that they could identify important information such as what was known and what was asked from the given problem (Pitaloka & Prasetyo, 2022). The indicator that appears the least frequently is analysis, which means that most of the students were still unable to develop strategies or problem-solving plans, as can be seen from their answer sheets that did not include their strategies or plans. However, during the observation, it was revealed that some students were able to do so, but they felt that it was enough to only write down the solution; additionally, they were not used to writing down their solution plan first (Pertiwi, 2018). Thus, the level of students' critical thinking skills in solving the PISA-like questions in the Jakabaring Sport City context can be classified as medium.

CONCLUSION

The critical thinking ability of junior high school students in solving PISA-like mathematics questions on the number material in the context of the Jakabaring Palembang tourism with the PMRI approach was in the moderate category. The indicator that often appeared was interpretation because students were used to writing down important information on questions during learning. Students' knowledge about tourist places in the city of Palembang could also be improved through working on the questions that used the Palembang Jakabaring context with the PMRI approach. However, this research has several drawbacks, including a lack of class hours, because learning was cut off from spiritual activities, and the use of relatively complicated questions.

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REFERENCES

Amin, A. M., Corebima, A. D., Zubaidah, S., & Mahanal, S. (2020). The correlation between metacognitive skills and critical thinking skills at the implementation of four different learning strategies in animal physiology lectures. *European Journal of Educational Research*, *9*(1), 143–163. https://doi.org/10.12973/eu-jer.9.1.143.

Anggraini, E. & Zulkardi, Z. (2020). Students' creative thinking ability in posing problems using an Indonesian realistic mathematics education approach [In Bahasa]. *Jurnal Elemen. 6*(2), 167–182. https://doi.org/10.29408/jel.v6i2.1857.

Charmila, N., Zulkardi, & Darmawijoyo. (2016). The development of the PISA model of mathematics problems using the Jambi context [In Bahasa]. *Jurnal Penelitian dan Evaluasi Pendidikan, 20*(2), 198-207. https://doi.org/10.21831/pep.v20i2.7444.

Facione. (2020). *Critical thinking: what it is and why it counts*. Measured Reasons and The California Academic Press, Millbrae, CA.

Fauzi, A. M., & Abidin, Z. (2019). Analysis of critical thinking skills of thinking-feeling personality types in solving PISA questions [In Bahasa]. *Suska Journal of Mathematics Education*, *5*(1), 1-8. http://dx.doi.org/10.24014/sjme.v5i1.6769.

Indarta, Y., Jalinus, N., Waskito, W., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). The relevance of the independent learning curriculum with the 21st century learning model in the development of the era of society 5.0 [In Bahasa]. *EDUKATIF: Jurnal Ilmu Pendidikan*, *4*(2), 3011-3024. https://doi.org/10.31004/edukatif.v4i2.2589.

Lisnani, L., Zulkardi, Z., Putri, R. I. I., & Somakim, S. (2020). Ethnomathematics: Introduction to flat shapes through the context of the South Sumatra State Museum Balaputera Dewa [In Bahasa]. *Mosharafa: Jurnal Pendidikan Matematika*, *9*(3), 359-370. https://doi.org/10.31980/mosharafa.v9i3.754.

Malalina, M., Putri, R. I. I., Zulkardi, Z., Inderawati, R., Kurniadi, E., Lisnani, L., & Septimiranti, D. (2021). Learning planning training for independent learning in seventh grade junior high schools in the context of finding treasure in the Musi River [In Bahasa]. *Jumat Pendidikan: Jurnal Pengabdian Masyarakat*, *2*(3), 148-153. Retrieved from https://ejournal.unwaha.ac.id/index.php/abdimaspen/article/view/2107.

MoEC. (2020a). *Learning skills in the 21st century are prepared to welcome Indonesia's demographic bonus [In Bahasa]*. Retrieved from https://dikti.kemdikbud.go.id/kabar-dikti/kabar/keterampilan-pembelajaran-pada-abad-21-disiapkan-untuk-sambut-bonus-demografi-indonesia/.

MoEC. (2020b). *2020 minimum competency assessment question development design* [In Bahasa]. Retrieved from http://ppkn.unpkediri.ac.id/wp-content/uploads/2021/03/desain-pengembangan-soal-akm.pdf.

Mutakinati, L., Anwari, I., & Kumano, Y. (2018). Analysis of students' critical thinking skill of middle school through STEM education project-based learning. *Jurnal Pendidikan IPA Indonesia*, *7*(1), 54-65. https://doi.org/10.15294/jpii.v7i1.10495.

Naziroh, S., Arifin, S., & Paradesa, R. (2022). The effect of problem-based learning model on the mathematical reasoning ability of seventh grade students of SMP Muhammadiyah 8 Palembang [In Bahasa]. *Lentera Sriwijaya: Jurnal Ilmiah Pendidikan Matematika, 4*(1), 1-10. https://doi.org/10.36706/jls.v4i1.13780.

Nuraisa, D., Azizah, A. N., Nopitasari, D., & Maharani, S. (2019). Exploring students computational thinking based on self-regulated learning in the solution of linear program problem. *JIPM (Jurnal Ilmiah Pendidikan Matematika), 8*(1), 30-36. https://doi.org/10.25273/jipm.v8i1.4871.

Nusantara, D. S., Zulkardi, Z., & Putri, R. I. I. (2020). Designing PISA-like mathematics problem relating change and relationship using physical distancing context. *Journal of Physics, 1663*(1), 012004. https://doi.org/10.1088/1742-6596/1663/1/012004.

Nusantara, D. S., Zulkardi, Z., & Putri, R. I. I. (2021). Designing PISA-like mathematics task using a COVID-19 context (pisacomat). *Journal on Mathematics Education*, *12*(2), 349-364. http://doi.org/10.22342/jme.12.2.13181.349-364.

OECD. (2012). *PISA 2012 Released Items*. Retrieved from https://www.oecd.org/pisa/test/PISA%202012%20items%20for%20release_ENGLISH.pdf.

OECD. (2019). *PISA 2018 Assessment and analytical framework: science, reading, mathematics and financial literacy*. Paris: OECD. Retrieved from https://www.oecd.org/pisa/publications/PISA2018_CN_IDN.pdf.

Pertiwi, W. (2018). Analysis of mathematical critical thinking skills of vocational high school students on matrix material [In Bahasa]. *Jurnal Pendidikan Tambusai*, *2*(2), 821-831. https://doi.org/10.31004/jptam.v2i4.29.

Pitaloka, D. D. A., & Prasetyo, D. A. B. (2022). Ethnomathematical exploration of measuring and counting aspects of herbal medicine manufacturing activities in the tourism village of Jamu Gendong Kiringan [In Bahasa], Bantul, Yogyakarta. *Proceedings Sendika*, *8*(2). Retrieved from https://repository.usd.ac.id/44670/1/8694_1883-4423-1-PB.pdf.

Putra, Y. Y., Zulkardi, Z., & Hartono, Y. (2016). Development of PISA Level 4, 5, 6 math problems using the Lampung context [In Bahasa]. *Kreano: Jurnal Matematika Kreatif-Inovatif, 7*(1), 10-16. https://doi.org/10.15294/kreano.v7i1.4832.

Putri, R. I. I. (2015). Design Research: Exploration of Indonesian culture in learning mathematics [In Bahasa]. *Proceedings of the National Conference on Mathematics Education*, *6*.

Putri, R. I. I. & Zulkardi. (2020). Designing PISA-like mathematics task using Asian Games context. *Journal on Mathematics Education, 11*(1). 135-144. https://doi.org/10.22342/jme.11.1.9786.135-144.

Rosmalinda, N., Syahbana, A., & Nopriyanti, T. D. (2021). Analysis of the critical thinking skills of junior high school students in solving PISA type questions [In Bahasa]. *TRANSFORMASI: Jurnal Pendidikan Matematika dan Matematika*, *5*(1), 483-496. https://doi.org/10.36526/tr.v5i1.1185.

Yansen, D., Putri, R.I.I., Zulkardi, & Fatimah, S. (2019). Developing PISA-like mathematics problems on uncertainty and data using Asian Games football context. *Journal on Mathematics Education, 10*(1), 37-46. https://doi.org/10.22342/jme.10.1.5249.37-46.

Zulkardi, Z., & Putri, R. I. I. (2010). Development of blog support to help Indonesian mathematics students and teachers learn Indonesian Realistic Mathematics Education (IRME) [In Bahasa]. *Jurnal Inovasi Perekayasa Pendidikan (JIPP), 2*(1), 1-24. Retrieved from http://repositori.kemdikbud.go.id/203/1/Prof.Dr.Zulkardi__Dr.Ratuilma_HASIL_PERBAIKAN.pdf.

Zulkardi, Z., & Kohar, A. W. (2018). Designing PISA-like mathematics tasks in Indonesia: Experiences and challenges. *Journal of Physics, 947*(1), 012015. https://doi.org/10.1088/1742-6596/947/1/012015.

Zulkardi, Z., Nusantara, D. S., & Putri, R. I. I. (2021). Designing PISA-like task on uncertainty and data using Covid-19 context. *Journal of Physics*, *1722*(1), 012102. https://doi.org/10.1088/1742-6596/1722/1/012102.