Jurnal Pendidikan Matematika
Volume 17, No. 3, September 2023, pp. 279-296
P-ISSN: 1978-0044, E-ISSN: 2549-1040, DOI: https://doi.org/10.22342/jpm.17.3.20063.279-296
Website: https://ejournal.unsri.ac.id/index.php/jpm
Accredited by SINTA 2: http://sinta2.ristekdikti.go.id/journals/detail?id=1811

Developing PISA-like Mathematics Tasks in Musi Rawas Regency Contexts using Lesson Study

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Abstract

This study aims to produce valid and practical PISA-like mathematics tasks which potentially have an effect on students' problem-solving ability in the contexts of Lake Aur and pindang Musi Rawas dish. This study used the design research method consisting of preliminary and formative evaluation stages. In addition, the PISA-like mathematics tasks were also developed based on lesson study. The research subjects were ninth graders of SMPIT Annida Lubuklinggau. Data were collected using walkthrough, documentation, observation, and questionnaire techniques and analyzed qualitatively. This research produced a sharing task in the context of Lake Aur and a jumping task in the context of pindang Musi Rawas dish which were valid, practical, and potentially influential to students' mathematical ability in identifying and solving PISA-like mathematics tasks. The results show that the use of context and collaborative learning in solving PISA-like mathematics tasks made it easier for students to understand the questions and made the learning process more enjoyable. This was because the contexts of Lake Aur and pindang Musi Rawas dish were known and familiar to students in their daily lives and because the learning process involved students teaching each other.

Keywords: Design Research, Lesson Study, Musi Rawas Regency, PISA-like Mathematics Task

Abstrak

Penelitian ini bertujuan untuk menghasilkan soal matematika tipe PISA yang valid dan praktis yang berpotensi memberikan pengaruh terhadap kemampuan pemecahan masalah siswa pada konteks hidangan Danau Aur dan pindang Musi Rawas. Penelitian ini menggunakan metode penelitian *design research* yang terdiri dari tahap evaluasi pendahuluan dan formatif. Selain itu, soal matematika tipe PISA juga dikembangkan berdasarkan Lesson Study. Subjek penelitian adalah siswa kelas IX SMP IT Annida Lubuklinggau. Data dikumpulkan dengan teknik *walkthrough*, dokumentasi, observasi, dan angket dan dianalisis secara kualitatif. Penelitian ini menghasilkan *sharing task* dalam konteks Danau Aur dan *jumping task* dalam konteks hidangan pindang Musi Rawas yang valid, praktis, dan berpotensi berpengaruh terhadap kemampuan matematika siswa dalam mengidentifikasi dan menyelesaikan soal matematika tipe PISA. Hasilnya menunjukkan bahwa penggunaan pembelajaran konteks dan kolaboratif dalam menyelesaikan soal matematika tipe PISA memudahkan siswa memahami soal dan membuat proses pembelajaran lebih menyenangkan. Hal ini disebabkan karena konteks Danau Aur dan hidangan pindang Musi Rawas sudah dikenal dan akrab bagi siswa dalam kehidupan sehari-hari serta karena proses pembelajarannya melibatkan siswa saling mengajar.

Kata kunci: Desain Riset, *Lesson Study*, Kabupaten Musi Rawas, Soal Matematika Tipe PISA

How to Cite: Fauziah, A., & Pandra, V. (2023). Developing PISA-like mathematics tasks in Musi Rawas regency contexts using lesson study. *Jurnal Pendidikan Matematika*, *17*(3), 279-296.

INTRODUCTION

The Programme for International Student Assessment (PISA) is an international study of the learning outcomes of 15-year-old students in subjects including mathematics (OECD, 2019a). Mathematical literacy refers to students' mathematical abilities in formulating, using, and interpreting mathematics in various contexts (OECD, 2019a). Indonesia has never achieved good PISA results in mathematical literacy skills since its first participation in 2000, and neither has it experienced any

Received January 9, 2023; Revised May 29, 2023; Accepted September 13, 2023

significant increase to date (Zulkardi and Kohar, 2018). Indonesia even experienced a decline in 2018 (OECD, 2019b). In that year, Indonesia scored an average of 379 points in mathematical literacy skills, a decrease from its 2015 score of 386 points (MoEC, 2019). Most Indonesian students are unable to answer questions in complex situations and thus require mathematical modeling, thinking, and reasoning skills (Wijaya et al., 2014).

Among the causes of such poor performance is the lack of opportunities for Indonesian students to learn PISA tasks and develop familiarity with context-based questions (Selan et al., 2020; Mauli et al., 2023). This is the case in SMP IT Annida Lubuklinggau whose students have no prior knowledge of PISA questions and whose teachers lack both sufficient knowledge to design questions such as those questions used in PISA assessments (Siswono et al., 2016) and learning resources such as textbooks or other teaching materials that can be used to support students' learning to complete PISA tasks (Wijaya et al., 2015). Thus, it is important to familiarize students with PISA tasks and provide opportunities for teachers to learn how to design PISA-like tasks and develop teaching materials on their own right (Zulkardi and Kohar, 2018).

In addition to developing PISA tasks, Stacey (2011) also recommended developing learning using PISA tasks in class by socializing PISA and PISA tasks to teachers through training. Teachers can be given the opportunity to learn to design PISA-like tasks, so they are expected to be able to use them to conduct assessments on students. This is in accordance with the demands of the latest policy issued by the Minister of Education and Culture in 2020 regarding the Minimum Competency Assessment (MCA), where student graduation standards are no longer based on national exams but are seen from students' reading literacy and numeracy abilities (MoEC, 2021; Nusantara, 2021). This new policy is of course a particular difficulty for teachers who are not used to making student assessment questions using literacy and context. Thus, in the process of implementing the design results, the researcher will involve and collaborate with two mathematics teachers in schools to socialize PISA tasks and provide opportunities for teachers to learn to design PISA tasks. This collaboration process will be carried out using lesson study at each stage of design.

Many studies have been conducted regarding the development of PISA tasks in Indonesia. Some of them are related to contexts adapted to the sociocultural conditions of various regions in Indonesia, such as Aceh (Usnul et al., 2019), Karawang (Aini et al., 2019), Bangka (Dasaprawira et al., 2019), Bangka Belitung (Putra and Vebrian, 2019), Jambi (Charmila et al., 2016), Lampung (Putra et al., 2016), East Kalimantan (Prastyo and Salman, 2020), Banyumas and Cilacap (Dasaprawira, 2021), Palembang (Lestari & Putri, 2020), and Lubuklinggau (Elly & Rosalina, 2019). The use of context in PISA tasks is an important characteristic in measuring mathematical literacy skills (OECD, 2019b). Contexts can make questions more meaningful for students (Fauziah, et al, 2017), but a context can be meaningful for one student but not meaningful for other students (Zulkardi & Putri, 2006). Choosing contexts that are adapted to students will help students understand the questions and even pose a challenge for students' thinking abilities (Putri & Zulkardi, 2020). Based on this, the PISA tasks developed in this

study consist of questions that use the sociocultural contexts of Musi Rawas Regency, which are still rarely used in the development of PISA-like tasks. The PISA-like tasks developed cover the quantity content area and use the contexts of tourist destination (i.e., Lake Aur as a frequently visited tourist destination by people of Musi Rawas Regency and Lubuklinggau City) and signature dish (i.e., highly demanded pindang Musi Rawas dish) of Musi Rawas Regency.

In this study, some PISA-like mathematics tasks were developed using lesson study, a learning system that uses collaborative methods, where teachers plan, implement, observe, and reflect on learning towards a better teaching and learning process (Sato, 2014; Putri & Zulkardi, 2019). Lesson study consists of four stages, namely, plan, do, see and redesign (Sato, 2014). It uses the collaborative method, where tasks are divided into sharing and jumping tasks (Sato, 2014). Lesson study begins with researchers and teachers working together to plan and prepare lessons (plan). Then, a teacher directs the learning, while another teacher observes the class (do). The second teacher discusses and reflects on the results of his/her observation with the first teacher (see), and they finally re-plan the learning together in the case where some things need to be corrected based on their reflection (redesign). Lesson study has been used by several researchers in learning development and showed good results (Asari et al., 2018; Fauziah et al., 2020; Putri & Zulkardi, 2020). Thus, it was used in this study to design PISA-like mathematics tasks using the tourist destination and signature dish contexts of Musi Rawas Regecy to produce PISA-like tasks that are valid, practical, and potentially influential to students' ability to solve PISA-like mathematics tasks.

METHODS

This study was conducted using the design research method in two stages: preliminary stage and formative evaluation stage (Bakker, 2018). Additionally, the researcher also incorporated four stages of lesson study: plan, do, see, and redesign (Sato, 2014). The preliminary stage encompassed preparation, analysis of PISA-like mathematics tasks, analysis of sociocultural conditions in Musi Rawas Regency, and designing PISA-like mathematics tasks in the contexts of Musi Rawas Regency in collaboration between the researcher and the teachers at the school where this study was conducted. The researcher and the teachers collaborated in designing PISA-like mathematics tasks in the plan stage. Based on the analysis of the sociocultural conditions of Musi Rawas Regency, the researcher chose Lake Aur and pindang Musi Rawas dish as the contexts of the study as students of SMPIT Annida Lubuklinggau, who were the subjects of this study, were highly familiar with both. It turned out that these students had no prior knowledge of PISA tasks.

Following the designing of the tasks, prototyping was conducted involving formative evaluation that included self-evaluation, a one-to-one test, a small-group test, and a field test to see the validity, practicality, and potential impact of the designed PISA-like mathematics tasks (Tesmer, 1993). The resulting prototype 1 was then re-evaluated by the researcher (self-evaluation) and reviewed by two

expert validators. These two expert validators reviewed and validated prototype 1 based on the content, construct, and language. At the same time, prototype 1 was subjected to a one-to-one test on three students: one high-ability student, one medium-ability student, and one low-ability student. Information on students' abilities was obtained from the classroom teacher based on the learning outcomes obtained until this study was conducted. The one-to-one test aimed to see the readability of prototype 1 in the opinion of the students. Afterwards, a small-group test was carried out on six students to see the practicality of the prototype. The students involved in this test were different from those involved in the one-to-one test. They were selected to represent varying abilities.

The next step was to subject the prototype to a field test on 30 ninth graders of SMPIT Annida Lubuklinggau to see its potential effect on students' mathematical abilities. Because the researcher also used lesson study in the development process, the field test was carried out using the open class system, which represented the do stage of lesson study. One mathematics teacher became a model teacher in the open class, and another teacher became an observer. Before the start of the class, the researcher gave directions to the model teacher and the observer about the stages involved and the tasks to be carried out by the model teacher and the observer. During the class, the model teacher only acted as a motivator and facilitator. The learning method used was a collaborative method, which required students to learn in collaboration with other students. Meanwhile, the observer's job was to pay attention to the student learning process and, if possible, focus on one student that they considered "interesting" to observe. After the class ended, the researcher and the teachers reflected on the class (see stage) and evaluated together whether the PISA-like mathematics tasks required a redesign.

Data were collected using walkthroughs, documentation, observation, questionnaire, and interview techniques. The data collected took the forms of student work, observation results, questionnaire results, and reflection results. The data were then analyzed using a qualitative method and then presented descriptively to describe the results of each development stage.

RESULTS AND DISCUSSION

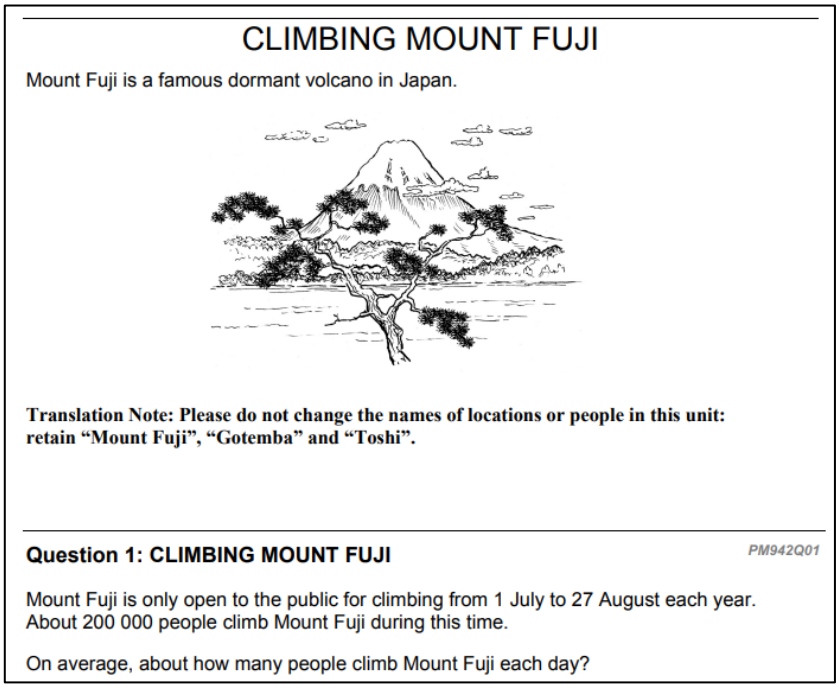
This research produced PISA-like mathematics tasks with two types of questions: the first one used the context of Lake Aur in a sharing task and the other used the context of pindang Musi Rawas dish in a jumping task.

Preliminary Stage

In the preliminary stage, the researcher, in collaboration with the teachers, reviewed previous studies on PISA, PISA tasks, and the development of PISA tasks. Then, they identified the sociocultural conditions in Musi Rawas Regency as a reference for selecting the contexts to be used in developing PISA-like mathematics tasks. Through these processes, Lake Aur and pindang Musi Rawas dish were chosen as contexts as they were familiar to students, both those from Lubuklinggau City and those from

Musi Rawas Regency, in their daily lives. In lesson study, the designing of PISA-like mathematics tasks by the researcher in collaboration with the teachers was carried out in the plan stage.

The question designed in the sharing task was adapted from a PISA 2012 question titled "Climbing Mount Fuji" as shown in Figure 1.



CLIMBING MOUNT FUJI

Mount Fuji is a famous dormant volcano in Japan.

Translation Note: Please do not change the names of locations or people in this unit: retain "Mount Fuji", "Gotemba" and "Toshi".

Question 1: CLIMBING MOUNT FUJI PM942Q01

Mount Fuji is only open to the public for climbing from 1 July to 27 August each year. About 200 000 people climb Mount Fuji during this time.

On average, about how many people climb Mount Fuji each day?

Figure 1. PISA 2012 questions in the climbing Mount Fuji context

One of the PISA questions in Climbing Mount Fuji (Figure 1) is a quantity content question asking the average number of people climbing Mount Fuji every day. This question was adapted by the researcher in developing a PISA-like question in the context of Lake Aur (see Figure 2).

Sharing Task: Danau Aur

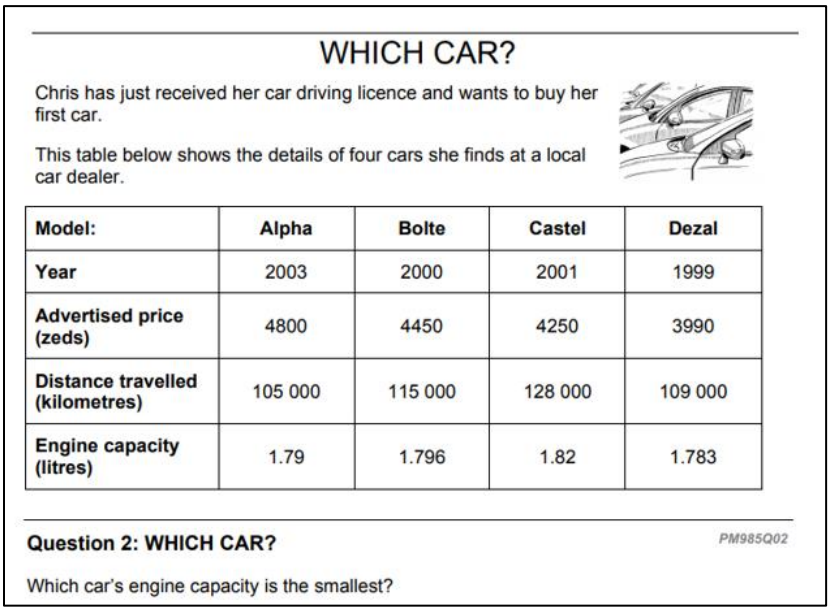
Lake Aur is in Sumber Harta Village, Sumber Harta District, Musi Rawas Regency. Lake Aur is one of the primary tourist destinations in Musi Rawas Regency that is crowded with visitors every day. According to data, 300 visitors visit Lake Aur per day on weekdays, and the number doubles on holidays. The entrance ticket is priced at Rp3.000/ person and Rp5.000/ person on weekdays and holidays, respectively.

a. Estimate the highest number of visitors to Lake Aur in one month. Provide your calculation that supports your answer.

b. Estimate the monthly income earned by the Lake Aur manager. Provide your calculation that supports your answer.

Figure 2. The PISA-like sharing task in the context of Lake Aur

Figure 2 shows the PISA-like questions designed by the researcher. This task was categorized by the researcher as a sharing task because the questions contained in the task were easy or of a low difficulty level (Asari, 2017). Meanwhile, the question in the jumping task was adapted from the PISA 2012 task titled "Which Car" (see Figure 3).



WHICH CAR?

Chris has just received her car driving licence and wants to buy her first car.

This table below shows the details of four cars she finds at a local car dealer.

Model:	Alpha	Bolte	Castel	Dezal
Year	2003	2000	2001	1999
Advertised price (zeds)	4800	4450	4250	3990
Distance travelled (kilometres)	105 000	115 000	128 000	109 000
Engine capacity (litres)	1.79	1.796	1.82	1.783

Question 2: WHICH CAR? PM985Q02

Which car's engine capacity is the smallest?

Figure 3. PISA 2012 questions in the which car context

The PISA question in Which Car in Figure 3 was adapted to develop a similar question in the context of pindang Musi Rawas dish asking students to choose which restaurant tourists should go to buy pindang Musi Rawas according to a table of pindang Musi Rawas dish prices (see Figure 4).

Jumping Task: Pindang Patin Musi Rawas

A group of 30 tourists from Bandung City want to have a taste of the signature dish of Musi Rawas Regency, namely, pindang Musi Rawas. This dish is made of cooked shark catfish soaked in gravy with a blend of sour, sweet, and spicy flavors. The tour guide recommends 3 restaurants for the reason of their tasty pindang Musi Rawas. Based on a survey at the 3 restaurants, the information below was obtained:

Restaurant	Content in 1 serving	Price	Information
A	1 piece of fish	Rp25,000	For every purchase of 3 servings, get 1 portion free
B	2 pieces of fish	Rp45,000	For every purchase of 4 servings, get 1 portion free
C	3 pieces of fish	Rp60,000	For every purchase of 5 servings, get 1 portion free

Which restaurant should the tourist group choose? Explain your reason.

Figure 4. The PISA-like sharing task in the context of Lake Aur

The PISA-like task in the context of pindang Musi Rawas dish provided in Figure 4 was categorized as a jumping task as the question contained was of a higher difficulty level than the questions in the Lake Aur context. A jumping task itself is defined as a task of a greater level of difficulty, where students need to help one another to solve it (Asari, 2017; Fauziah et al., 2022a).

Formative Evaluation

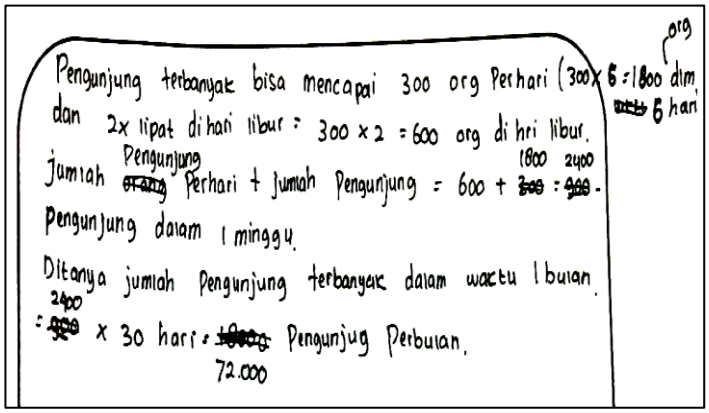
After the preliminary stage, the researcher self-evaluated the PISA-like mathematics tasks designed. In collaboration with teachers, the researcher analyzed and re-evaluated the questions to produce prototype 1 of the PISA-like mathematics tasks. Next, the researcher requested experts from Universitas Singaperbangsa Karawang and Universitas PGRI Silampari to validate prototype 1 and conducted a one-to-one test on three students of SMPIT Annida Lubuklinggau who represented different levels of ability to produce prototype 2 of the PISA-like mathematics tasks. Table 1 is the results of the expert validation and one-to-one test.

Table 1. Comments and sugestions from experts and students

Validation	Task	Comment and sugestions	Revision Decision
Experts	Sharing Task	The lake photo should be taken from above so that the lake become clearly visible in the photo. The dominant element of the current photo was a house on the lake bank.	The photo used was changed according to the suggestion.  www.google.com
	Jumping Task	The questions were in accordance with the PISA criteria.	
Students	Sharing Task	For the PISA-like sharing task questions, it was deemed necessary to add "/day" to the number of visitors to Lake Aur on weekdays.	The questions were revised according to the suggestion.
	Jumping Task	For the PISA-like mathematics task that used the context of pindang Musi Rawas dish, it was considered necessary to clarify whether students are asked to choose only one of the three recommended restaurants by revising the question.	The question was revised according to the suggestion: "Of the three restaurants above, which restaurant should the tourist group choose? Restaurant A, Restaurant B, or Restaurant C? Explain your reason."

The researcher revised the PISA-like questions based on comments from the experts and students in the expert validation and one-to-one test (See Table 1), respectively, and produced valid prototype 2. This shows that the PISA-like mathematics tasks developed contained state-of-the-art knowledge (content validation) and had various components that were connected to each other (construct validation) (Bakker, 2018). Prototype 2 was subjected to a small-group test to assess its practicality.

In the small-group test, students were asked to work on the questions and provide comments on them. The following is one of the works done by the students for the questions in the sharing task (See Figure 5).

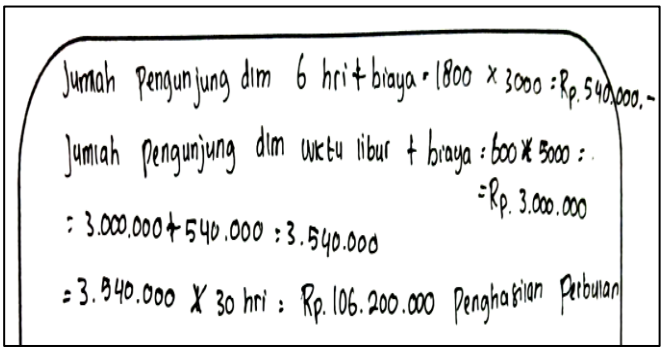


Translated to English:

The maximum number of visitors per day is 300 (300 × 6 = 1800 people in 6 days), and the number doubles on a holiday = 300 × 2 = 600.
Number of visitors per day + number of visitors = 600 + 1800 = 2,400 visitors in 1 week.
Asked: the number of visitors in one month.
= 2,400 × 30 days = 72,000 visitors per month.

Figure 5. An answer from the small-group test to the first question in the sharing task

It is clear from Figure 5 that the student's answer was incorrect. However, the student showcased a thought process in answering the question. The error lay in the concluding part, where the student multiplied the number of visitors in one week by 30 in reference to the number of days in one month. The researcher then asked the student for confirmation through an interview, in which case the student came to realize the error. The same error also occurred in the second question of the same task, where the student multiplied the income earned in a month by 30 in reference to the number of days in one month (see Figure 6).

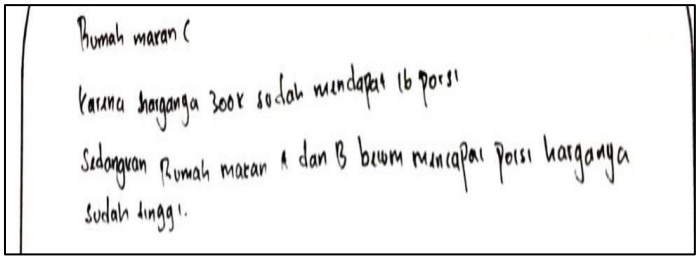


Translated to English:

Number of visitors in 6 days + cost = 1,800 × 3,000 = Rp540,000
Number of visitors on a holiday + cost = 600 × 5,000 = Rp3,000,000
= 3,000,000 + 540,000 = 3,540,000
= 3,540,000 × 30 days = Rp106.200.000 monthly income.

Figure 6. An answer from the small-group test to the second question in the sharing task

As for the PISA-like jumping task, none of the students were able to answer the question properly. All students answered that the tourist group should choose Restaurant C, but their reasons were incorrect. The students failed to carry out an in-depth, precise analysis to answer the question (see Figure 7).



Translated to English:

Restaurant C

Because with (money in an amount of) only 300k (the buyer could) get 6 servings.

As for Restaurants A and B, the same servings are priced high.

Figure 7. An answer from the small-group test to the first question in the jumping task

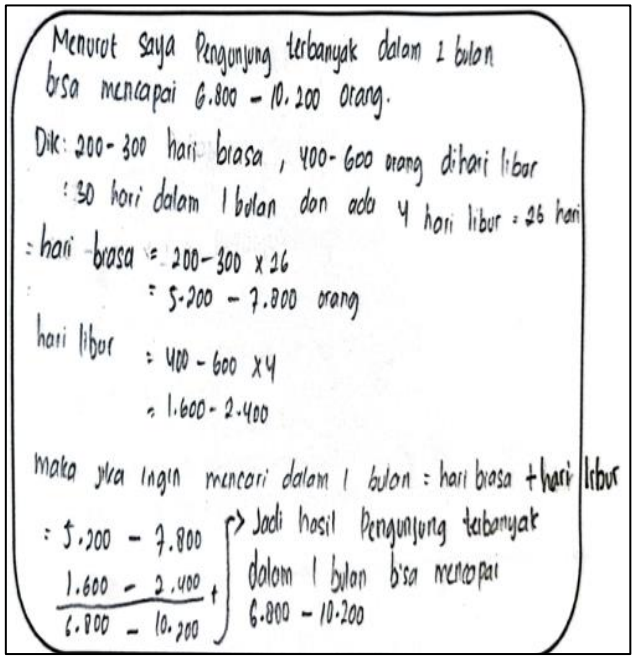
Based on Figure 7, the student made an error in predicting the number of servings, which led to an inaccurate answer. When the researcher asked for the student's confirmation, the student acknowledged such an error. Despite their errors in solving the PISA-like mathematics tasks, based on the results of interviews and questionnaire survey, the students, who were subjects in this study, stated that the PISA-like mathematics tasks developed by the researcher were understandable in terms of language and terminology, and the photographs used were also clear. Thus, the final prototype was considered to meet the practicality criteria for PISA-like mathematics tasks in the contexts of Lake Aur and pindang Musi Rawas dish. This means that the final prototype could be used by students under normal conditions (Bakker, 2018). The final prototype was subjected to a field test to assess its potential effect on students' mathematical ability in solving PISA-like mathematics tasks in the contexts of Lake Aur and pindang Musi Rawas dish. The field test in the formative evaluation stage was carried out simultaneously with the do stage of lesson study through an open class.

The open class began with a model teacher introducing what PISA tasks are and explaining the learning method that was to be used. The model teacher asked students if they had any difficulty working on a problem, and if they did, they could ask their friends for help by first saying “Please, teach me.” The model teacher then gave the students the PISA-like mathematics task in the context of Lake Aur, which was categorized as a sharing task or a low-level PISA-like mathematics task. The students should work on the task using a collaborative method, where they should collaborate with, and teach, each other in answering the questions (see Figure 8).

Figure 8. Students while working on the task collaboratively

As photographed in Figure 8, a student taught another student who was still having a difficult time solving the task. They would keep on discussing until the second student started to work on the task. This collaboration seemed to give meaning to the student learning process (Putri and Zulkardi, 2020; Fauziah & Putri, 2022b).

Most students were able to answer the PISA-like mathematics task in this sharing task category as this task was of difficulty level 2 or low difficulty level. This task covered a basic content area (Sato, 2004; Fatimah et al., 2018). Student answers to the questions in this task are presented in Figure 9 and Figure 10.



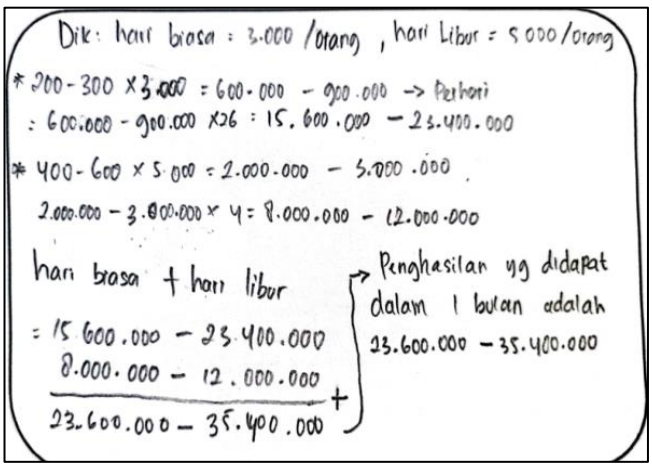
Translated to English:

In my opinion, the maximum number of visitors in 1 month can reach 6.800–10.200 people.
Known:
200 – 300 visitors on an ordinary day, 400 – 600 visitors on a holiday.
Of the 30 days in a month, 4 are holidays and 26 are ordinary days.
On ordinary days = 200 – 300 × 26
= 5,200 – 7,800 visitors
On holidays = 400 – 600 × 4
= 1,600 – 2,400
Then if you want to calculate (the number of visitors) in 1 month = ordinary days + holidays =
5,200 – 7,800
1,600 – 2.400 +
6,800 – 10,200
So, the results of the most visitors in 1 month can be achieved 6.800 - 10.200.

Figure 9. An answer from the field test to the first question of the sharing task

Based on Figure 9, the student calculated the number of visitors to Lake Aur in one month using the range of numbers of visitors per day. In other words, the student answered using the minimum and maximum numbers of visitors. Similarly, the student also used the range of numbers of visitors per day

to calculate the amount of income earned by the lake manager in one month (see Figure 10).



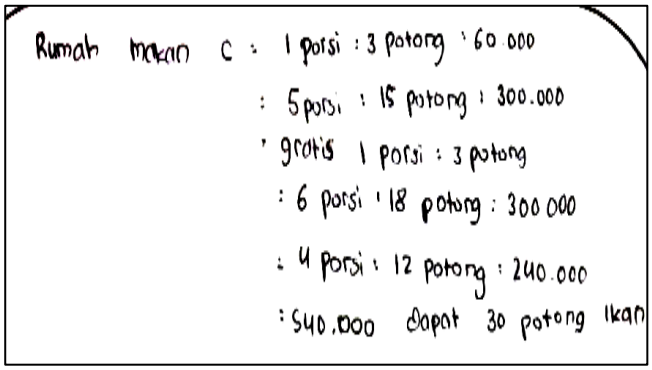
Translated to English:
Known: Ordinary day: 3,000/visitor,
Holiday: 5,000/visitor
200 – 300 × 3,000 = 600,000 – 900,000
= 600,000 – 900,000 × 26
= 15,600,000 – 23,400,000

400 – 600 × 4 = 8,000,000 – 12,000,000
Ordinary days + holidays
= 15,600,000 – 23,400,000
8,000,000 – 12,000,000 +
23,600,000 – 35,400,000

Figure 10. An answer from the field test to the second question to the sharing task

The student still answered the question using a range, even though the question only asked students to calculate the largest amount of income possible earned by the manager. That there were students failing to understand what the question meant by the highest number of visitors was a note to the researchers.

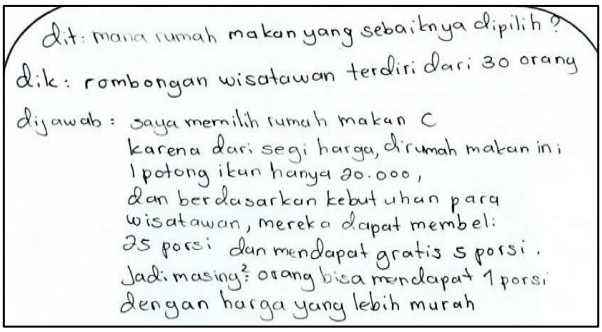
After completing the sharing tasks, students were given the jumping task which contained a PISA-like question in the context of pindang Musi Rawas dish. The students' collaborative process in solving the jumping task question was even more visible as a jumping task is more difficult than a sharing task (Asari, 2017; Fauziah et al., 2022a). A challenging problem will bring out differences in knowledge and perspectives between students and thus provide an opportunity for students to contribute ideas and perceptions to one another (Anwar et al., 2017). Although this difference in perceptions was observed when students were working on the sharing task, it grew even more prominent when they were working on the jumping task. The answers given by the students to the jumping task question were also more diverse, and not all of them were correct. The following are some of the answers given by the students.



Translated to English:
Restaurant C = 1 serving = 3 pieces = 60,000
= 5 servings = 15 pieces = 300,000
= free 1 serving = 3 pieces
= 6 servings = 18 pieces = 300,000
= 4 servings = 12 pieces = 240,000
= (with) 540,000 (the buyer)
gets 30 pieces of fish

Figure 11. Answer 1 from the field test to the question in the jumping task

As shown in Figure 11, the answer of a first student could be categorized as correct, and the reason was also correct. However, the students did not write down the calculations for the other restaurants, making their consideration to choose the restaurant of their preference less obvious.

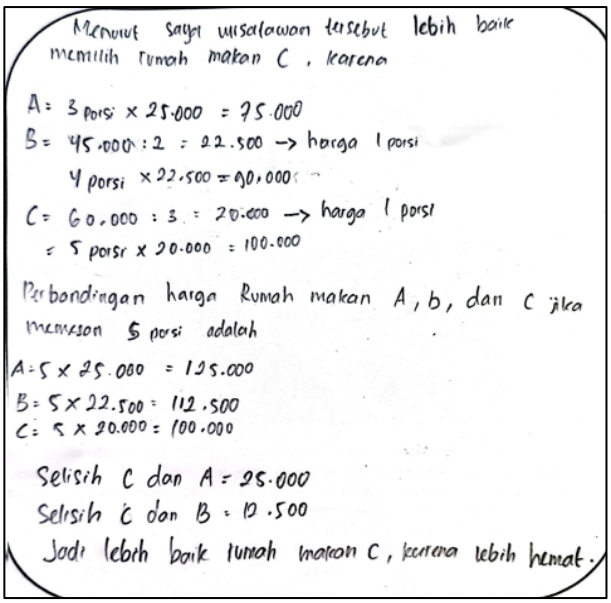


Translated to English:
Asked: Which restaurant to choose?
Known: the tourist group consists of 30 people.
Answer: I choose restaurant C because, in terms of pricing, the restaurant sells 1 piece of fish for only Rp20,000, and based on the needs of the tourists, they could buy 25 servings and get 5 more servings for free. In this way, each person gets 1 serving for a cheaper price.

Figure 12. Answer 2 from the field test to the question in the jumping task

As shown in Figure 12, a second student only wrote down the price of one serving at Restaurant C and left out the prices of one serving at the other restaurants. Therefore, their reason for choosing Restaurant C was not clear even though the answer was correct.

Meanwhile, based on Figure 13, a third student considered the prices at which 1 serving is sold at different restaurants, but they calculated the final prices if the buyer buys only 5 portions instead of calculating for the entire 30 tourists.



Translated to English:
In my opinion, the tourists should choose Restaurant C, because
A = 3 × 25,000 = 75,000
B = 45,000 ÷ 2 = 22,500 → the price of 1 serving
4 servings × 22,500 = 90,000
C = 60,000 ÷ 3 = 20,000 → the price of 1 serving
5 servings × 20,000 = 100,000
The comparison of Restaurants A, B, and C if you order 5 servings:
A = 5 × 25,000 = 125,000
B = 5 × 22,500 = 112,500
C = 5 × 20,000 = 100,000
The difference between C and A = 25,000
The difference between C and B = 12,500
So, it's better to order from Restaurant C as it's more economical.

Figure 13. Answer 3 from the field test to the question in the jumping task

The various answers to the jumping task show that students' ability to solve problems that require critical and high-level thinking skills needs to be improved. Students must often practice with, and be accustomed to, tasks like the jumping task above for an improved ability (Putri and Zulkardi, 2019; Hobri et al., 2020).

The students were then given a questionnaire related to the learning process that had taken place. They were asked to share their opinions regarding the PISA-like mathematics tasks and the collaborative method used when they were working on the PISA-like mathematics tasks. The researcher asked for the students' confirmation regarding their responses to the questionnaire through interviews. Based on the questionnaire responses and interview results, most of the students were both enthusiastic about the PISA-like mathematics tasks and perplexed as the questions were difficult and required logic to solve. Regarding lesson study and collaborative method, the students found them helpful in making the learning process more enjoyable as they could teach and help each other in solving the PISA-type questions given by the researcher.

Following the completion of the open class, the researcher, together with the model teacher and the observer, reflected on the learning process that had taken place. This represented the see stage in lesson study. The model teacher felt that the students were more active in discussion thanks to the application of the collaborative method. The observer also found that the students had shown good character by willingly teaching those who were having a hard time understanding the tasks. This supports previous research finding that collaborative learning can foster good attitudes and culture in learning (Fauziah et al., 2022a), although some students were discovered to be too shy to ask their friends for help. Both the model teacher and the observer experienced novelty in the learning process as they had never applied PISA-type questions and the collaborative method to students before. They intended to use context in their assessment process in the class and build a collaborative learning culture in the classroom in the future.

Based on the results of the field test, the PISA-like mathematics tasks that used the contexts of Lake Aur and pindang Musi Rawas dish demonstrated the potential to influence students' ability to solve PISA tasks. As pointed out by Guskey (2016), this effect can be seen in how the students responded to, and learned to use, the PISA-like questions. The researchers figured out how the students responded to the PISA-like questions and lesson study through a questionnaire survey that was conducted after the learning process ended. Their responses are shown in Table 2.

Table 2. Students' responses to the questionnaire survey

Questions	Answers
Have you ever worked on PISA-like tasks before?	Never
How did you feel after completing the PISA-like tasks in the Musi Rawas contexts?	It was exciting although it was difficult.
Were the questions difficult to solve? If so, which parts were difficult?	They were quite difficult because they required logic to solve.
What impression did you get from participating in a learning process that used lesson study?	It was very fun although it was very hard too.
What do you think about students teaching each other during learning?	It helps to gain a better understanding because students teach each other.
Did collaborating with friends help you solve the PISA-like questions?	Yes

Table 2 shows that the student took pleasure in working on the PISA-like questions and engaging in collaborative learning. This was because the PISA-like questions used contexts that were known and familiar to them in their daily life. According to Widjaja (2013), the use of contexts, especially cultural ones, is very important to motivate students in learning mathematics. Increased student motivation will improve learning outcomes. Contexts can make questions more meaningful to students (Zulkardi and Putri, 2006; Fauziah et al., 2017). The results of this study support the evidence of the importance of using familiar contexts to improve a conducive mathematics learning atmosphere and students' mathematical abilities. Although the PISA-like tasks were developed using Musi Rawas contexts, they can still be used by students from other regions, especially those who have high abilities.

As for the collaborative method application in lesson study by the researchers, it also garnered a good response from students. Collaborative learning makes students excited and motivated and helps them solve the PISA-like questions, both in the sharing and jumping tasks. This is in line with what Putri and Zulkardi (2020) stated: collaborative learning and the right context can help students solve problems, make learning more meaningful (Fauziah & Putri, 2022b), help build students' confidence to solve math problems (Laal & Ghosdi, 2012), and foster students' critical thinking skills (Warsah et al., 2021).

CONCLUSION

This research produced valid and practical PISA-like mathematics tasks which have a potential effect on students' ability to solve PISA-like mathematics tasks using the contexts of Lake Aur (sharing task) and pindang Musi Rawas dish (jumping task). Students were able to work on the questions that were designed and found the process of completing the questions fun because it involved students teaching each other. The use of contexts that were familiar to students, sharing and jumping tasks, and the collaborative learning method in lesson study helped students improve their literacy skills and solve problems. However, it is important to give students more opportunities to practice with more PISA-like questions so that their ability to solve PISA-like questions becomes better.

ACKNOWLEDGMENTS

The research of this article was funded by PGRI Silampari University budget with an agreement on the implementation of activities no. 655/U.17/IV.1/2022 dated 16 September 2022.

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