Jurnal Elemen Ayu Luviyanti Tanjung

by sky high

Submission date: 14-Jul-2022 03:31AM (UTC-0700)
Submission ID: 1867169820
File name: N_TESIS_AYU_LUVIYANTI_TANJUNG_06022682024010_AutoRecovered.docx (1.99M)
Word count: 5331
Character count: 29262

Jurnal Elemen, 8(1), 1-9, January 2022
https://doi.org/10.29408/jel.v8i1.XXXX

e- ISSN: 2442 - 4226

Check for updates

The development of PISA-like activities and problems using immunity context during pandemic

Ayu Luviyanti Tanjung[1], Zulkardi[2*], Ratu Ilma Indra Putri[3]

[1,2,3]Department of Mathematics Education, Sriwijaya University, South Sumatera, Indonesia

[*] Correspondence: zulkardi@unsri.ac.id

Abstract

This research is a type of development research with the main stages of preliminary and formative evaluation, which aims to develop PISA-like activities and problems that are valid and practical and potentially affect mathematical literacy skills using the context of immunity during a pandemic. This research also uses Inquiry-Based Learning (IBL) model in development and learning. This research is motivated by students' low mathematical literacy ability based on one of the types of international levels that Indonesia is participating in, namely PISA. The subjects in this study were eighth-grade students aged 13-15. This study's results were analyzed qualitatively based on the results of student answers during the field test. This study's techniques used in collecting data were walkthroughs, observations, interviews, and tests. The results of this study are 1 unit of sharing task, 1 unit of jumping task, and 3 evaluations of PISA like with the characteristics of the content used, name change and relationship, the context of immunity during the pandemic, which includes personal and social contexts, levels that are by the framework PISA 2022, namely levels 3,4, and 5, process competence, namely mathematical literacy skills, use of language that is following language standards, can be understood and interpreted well by students and provides diverse student responses. Thus, it can be concluded that the developed PISA-like activities and problems are valid and practical and potentially affect mathematical literacy skills and life skills in dealing with the pandemic.

Keywords: development research; immunity context; PISA-like activities and problems

Received: Date Month Year | Revised: Date Month Year
Accepted: Date Month Year | Published: Date Month Year

Introduction

Mathematical literacy is an individual's capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real world contexts (OECD, 2018). Based on data from the OECD, a mathematical literacy achievement score of 379 was obtained with an average of 489 (OECD, 2019) around 28% of students in Indonesia reached level 2, this shows that the literacy ability of Indonesian students is still low (Wahyu Utomo et al., 2020). The low achievement of mathematical literacy is because they are not accustomed to investigating situational problems, as a result students have difficulty solving mathematical problems (Putri & Zulkardi, 2018) plus it is still difficult to apply a pattern of reading fondness (Khotimah, 2018) even though mathematical literacy skills are very important because they can help someone to understand the role or use of mathematics in everyday life (OECD, 2017).

One thing that can be done to overcome this is to familiarize students with PISA model exercises. In addition, Dasaprawira et al. (2019) stated that Indonesian students are not used to solving PISA questions. By learning mathematics, students are expected not only to have the ability to count but to support logical reasoning, critical and communication skills to solve problems in everyday life (Asmara & Sari, 2021). Therefore, teachers are required to design contexts to solve problems using contexts related to the surrounding environment so that the context is close to life (Mardiyah et al., 2021) because using the PISA model math problems using context will help students in honing their mathematical literacy skills (Andari & Setianingsih, 2021).

There have been many studies with various contexts that examine the development of pisa-like questions, including soft tennis and volleyball in Asian Games activities (Jannah et al., 2019), soccer (Yansen et al., 2019) there are also several studies that use regional cultural contexts, such as Jambi (Charmila et al., 2016) and Bangka Belitung (Putra & Vebrian, 2019).

The development of contextual mathematics questions is certainly not limited to the cultural context of a region or society. Recent developments in community conditions such as the COVID-19 pandemic are very possible if used as a context for developing questions (Bakker & Wagner, 2020). Some previous studies used context of COVID-19 such as COVID-19 transmission map (Nusantara et al., 2021a), designing PISA like mathematics task (Nusantara et al., 2021b), designing PISA-like task on uncertainty and data (Zulkardi et al., 2021) and numeration with lesson study assisted by E-learning merdeka campus (Jayanti et al., 2021). Learning to use context enables students to find meaningful relationships between abstract ideas and practical applications in real-world contexts. This makes mathematics much more interesting and useful for all students (Mardiyah et al., 2021).

In addition to the use of context, an innovative learning model is needed to make mathematics more interesting, namely a student-centered learning model. One of the appropriate learning models to be applied in the learning process is the Inquiry Based Learning (IBL) learning model, because in this model learning not only emphasizes the acquisition or discovery of answers, but also encourages students' curiosity in conducting searches, and developments. further study and analysis (Abidin, 2020; Kencana Sari et al., 2019). The application of the inquiry model in learning activities will make students more active and dare

to ask questions about material that has not been understood which encourages students to think critically and analytically (Ramdani et al., 2021). Students are allowed to design anything they want, and inquiry supports them to identify every factor related to the problem they have to solve (Garrison & Vaughan, 2013) so that they apply the knowledge they have and try to find out the knowledge they need and can develop thinking skills (Putra et al., 2016; Rahmatsyah, 2022; Wahyudi et al., 2019) then poured ideas to solve the developed PISA-like activities and questions so that they could have a potential effect on maximum mathematical literacy skills. The inquiry learning model is believed able to influence skills (Ramdani et al., 2021) and improve learning activities and students' cognitive learning outcomes (Sanjaya, 2016).

The IBL model also has a significant influence on scientific attitudes, namely the curiosity of students in accordance with the statement (Dobber et al., 2017; Veloo et al., 2013).However, until now no one has used PISA problems using the Inquiry-Based Learning (IBL) model with the context of the immunity during the pandemic. This research aimed to develop valid and practical PISA-like activities and questions using immunity contexts that potentially affected mathematical literacy skills.

Methods

This research is a design research type of development study which was carried out in two stages, namely the preliminary stage and the prototyping stage (formative evaluation) which included one-to-one and expert reviews, small group, and field tests (Bakker, 2018). This study aims to develop PISA model math activities and problems with immunity contexts that are valid and practical and potentially affected mathematical literacy skills. At the preparation stage, several analyzes were carried out, namely analysis of research subjects, curriculum analysis, context analysis, and making instruments. Furthermore, the researcher also reviewed the PISA 2022 framework and some literature on development research that had been made related to research that would be planned to be used as an initial prototype draft. This research employed inquiry-based learning (IBL) in several stages. The stages of the inquiry model are; orientation, formulating problems, hypotheses, data, testing hypotheses, and then getting conclusions.

In the formative evaluation stage, the first stage was the researcher evaluating and reviewing the initial prototype draft with validation by fellow master students based on the PISA 2022 framework both in terms of content, constructs, and language to be used as prototype I drafts. Prototype I developed from the results of self-evaluation later given to the expert in the expert review stage. Along with the expert review, a one-to-one validation stage was also carried out by three students, each with high, medium, and low abilities who were not included in the research subjects. At the expert review stage, the product that has been produced from the first prototype is consulted with experts for validation. Expert validation uses a study in terms of content, construct and language. The expert review validation process is carried out in two ways, namely through focus group discussions (via zoom) and by mail/email (mails review). Validation through focus group discussion via zoom with two lectures in the Mathematics Education Faculty of Sriwijaya University, doctoral students at Sriwijaya University, several master students at Sriwijaya University and junior high school's teachers. Validation by mail

review with a lecturer who have conducted research related to the development of PISA problem.

Based on the walkthrough of the expert review assessment, it can be concluded that the prototype developed is classified as good (valid), although improvements are still needed based on the suggestions and responses of the validator. The results or findings obtained at the expert review and one-to-one stages are taken into consideration in revising prototype I. After prototype I is revised, prototype II will be produced. Prototype II was then tested at the small group stage. In the small group stage, six students were selected which were divided into 2 groups to discuss in solving the questions in prototype II and asked to provide comments on the questions that had been done to see the practicality of the questions. Comments and findings at the small group stage and the validity of the criteria were taken into consideration in revising Prototype II.

Furthermore, prototype III will be produced from the revised results on prototype II which will be used in the field test phase which focuses on the potential effect of the questions that the researchers developed on mathematical literacy skills. The data collection techniques used in this study were walkthroughs, interviews and tests. The data obtained were then analyzed descriptively. The document analysis used is the PISA 2022 framework, PISA questions and journals about PISA. The walkthrough analysis was carried out through an expert review conducted by an expert. Experts provide input and comments and suggestions related to content, constructs and language. The test result data were analyzed based on the scoring rubric that had been created. Interviews at the field test stage were also analyzed descriptively but to find out the potential effect on their literacy skills. as well as the results of the questionnaire when the small group focused on practicality and field tests to support the data on the potential effects of the questions.

Results

This study developed PISA-like numerical problems consisting of sharing task (multivitamin), jumping task (antibiotic), three evaluation problems (distance learning, antibiotic, vaccine). However, the researches made the antibiotic units include jumping task and evaluation problem as representations of the development process.

Preliminary stage

At this stage, a literature review related to the research was carried out, namely curriculum analysis, place, research subjects, stages of development research, mathematical literacy, *framework* PISA 2022 *Inquiry-Based Learning*. In the *framework*, researchers identify the characteristics of PISA questions which consist of content, context, level of PISA questions, and so on. In this study, researchers used *Change and Relationships* and the context of Immunity in the Pandemic Period. The mathematical topic involved in the PISA-type questions developed is a system of linear equations with two variables with a level of 3,4,5.

Researchers developed PISA-type questions and activities based on PISA 2006 and 2012 questions in the context of skateboard and mp3 players, which were then developed using

the context of antibiotics referring to the *framework* PISA 2022. Antibiotics are needed in this pandemic era because they can be used to kill or stop the growth of bacteria in the body, so they can help the immune system fights bacterial infections in the body. At this stage, an initial prototype is produced in the form of a jumping task and evaluation questions using the context of antibiotics. The researcher designed an activity in the form of a jumping task consisting of two questions containing the problem of how to determine the price of each antibiotic based on the purchase receipts of two previous visitors and then determine the possibilities that occur when other buyers bring a certain amount of money to buy the same type of antibiotic. The jumping task is designed in the form of closed constructed response questions totaling 1 question and 1 question selected response. Meanwhile, the evaluation questions are designed in the form of an open constructed response with the problem of determining how many tablets of each antibiotic can be purchased using a certain amount of money. The researcher compiled PISA-type questions, which were developed in a set of questions consisting of grids, question cards, and scoring rubrics. The original PISA problems, which were further developed using the context of immunity in the pandemic, can be seen in Figure 1.

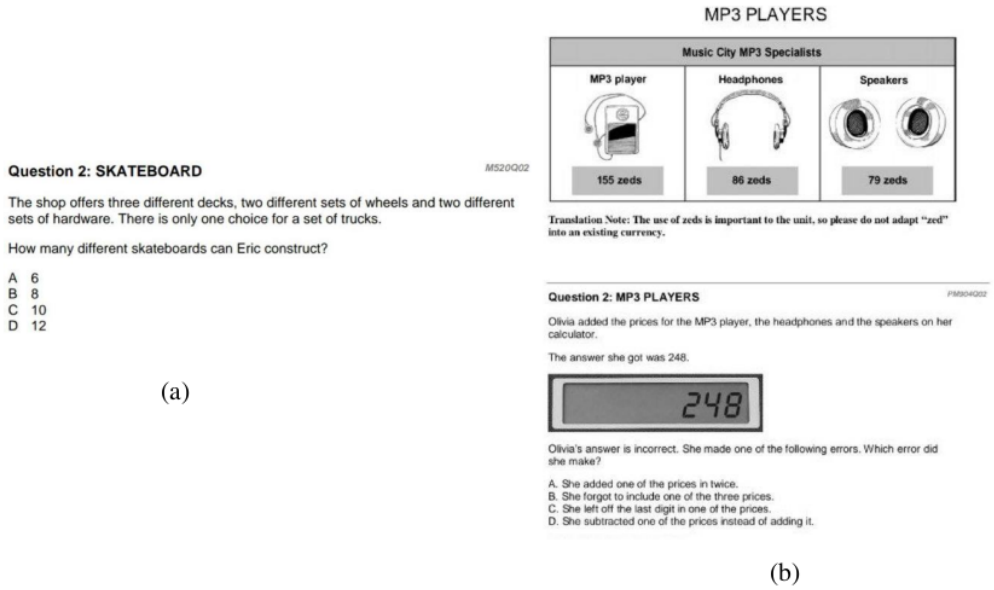


Figure 1. The original PISA Problem

Figure 1(a) presents the original 2006 PISA problem using "Skateboard". Figure 1(b) the original 2012 PISA problem using "MP3 Players".

Formative evaluation stage

The first stage in this process is a self-evaluation where the researcher reviews the initial prototype design with being validated by colleagues based on the PISA 2022 framework both in terms of content, construct, and language. The results of the development in this stage will be used in the next stage.

The next stage will be the validation of the content, construct and language aspects of an initial prototype as a result of self-evaluation by conducting a one-to-one stage and expert review at the same stage. Prototype 1 was given to experts through a mail review by sending prototype 1 to a lecturer who has experience in developing research on PISA questions via email, and a panel review was conducted with two Sriwijaya University lectures, doctoral and master students who also conducted research on problem development. PISA. In line with the expert review stage, the researcher also carried out a one-to-one stage using three students who were not research subjects with various abilities (high, medium, low). The three students were given prototype 1. They were asked to read the problem and solve it to the best of their ability. After that, they were asked to convey their obstacles to solving the problem and were asked to provide suggestions and comments on the matter. The results of the validation by the expert review and one-to-one will be revised based on the comments and suggestions given which will then produce prototype 2. Table 1 summarizes some of the experts' and students' comments on prototype 1.

Table 1. The experts' and students' comments and revision decisions

Validation	Comments and Suggestions	Revision Decisions
	Jumping Task	
Experts	• The sentence structure was improved to make it easier for students to understand. • Add question numbers so that students don't make mistakes • No need to use dots. Use appropriate question words • No need to add information in rupiah because receipts have been written in rupiah	• Corrected sentences and used appropriate question words • Rupiah descriptions are omitted • Each question is assigned a number.
Students	• Students do not understand how to answer the question because there are dots in the middle of the question. • Are the questions related to one another?	
	Evaluation Problem	

Experts	• Use sentences that are effective and not too long to explain the situation in the problem. • Consistency in writing numbers and letters	• Sentences are corrected so that students can easily understand them.
Students	• Students are confused whether the correct answer is more than one possibility	

Qualitative validity is assessed through three aspects. The first aspect is the content that contains the relationship between broad and circular material and the context of immunity during a pandemic. The second aspect is the suitability of the level and framework of PISA mathematics, literacy skills, and strategies. The third aspect is the linguistic aspect related to the characteristics of good and correct language.

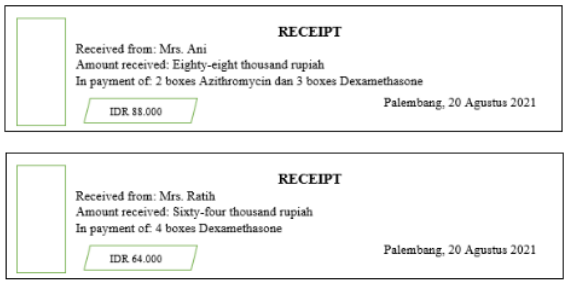
The revised results of comments and suggestions at the expert review and one-to-one stages are called prototype 2, which will be used in the next stage, namely the small group. In the small group stage, students will be divided into two groups, each consisting of 3 people with various abilities (high, medium, and low). At this stage, inquiry-based learning is applied in the learning process. Students are given problems in the form of jumping tasks and evaluation tasks. Students understand the problems, understand the problems asked in the questions, and use the information provided to solve the problems. Students conduct discussions with their group mates to solve the problems given. In the discussion process, there were conversations where they equalized their perspectives in understanding the problem, made hypotheses about the questions given, and then asked the researchers about the questions that confused them. Students are confused when determining how many antibiotics can be purchased with the given amount of money because so many possibilities can happen. Even so, they still answered the questions as expected by the researcher. After getting a hypothesis, students test the accuracy of their hypothesis by using the information in the problem related to the given problem. Then the hypothesis will be analyzed using the information obtained to get the right results. In the last stage, students can provide conclusions from the results of the answers to the questions and activities that have been given.

After the small group stage, the questions were revised and called prototype 3, which would be used in the field test stage. Figure 2 is a picture of the development of prototype 3 for the jumping task and evaluation task.

Jumping Task

At one time, there were two buyers who needed antibiotics such as Azithromycin and Dexamethasone to treat COVID-19

The following is receipt of purchase of Azithromycin and Dexamethasone at the "Rezky" pharmacy.



1. How much does one box of Azithromycin and Dexamethasone each cost at the "Rezky" pharmacy?
2. Midwife Tania has a clinic at her home. Every month he buys medicines at the "Rezky" pharmacy. Today, midwife Tania bought twenty boxes of Azithromycin and ten boxes of Dexamethasone. If the midwife Tania brings IDR 600,000 then what will happen?
   a. Midwife Tania gets a change of IDR 40,000
   b. Midwife Tania did not get any change
   c. Midwife Tania's money is still less than IDR 80,000
   d. Tania's midwife's expenses are IDR 550,000

(a)

Evaluation Problem

Ani bought 1 strip of amoxicillin and 5 tablets of paracetamol at a price of IDR 20,000, while Tania bought 3 strips of amoxicillin at a price of IDR 15,000. If Fahmi pays IDR 50,000 how much amoxicillin and paracetamol can he buy?

(b)

Figure 2. Prototype III of PISA-like activities and problems using immunity context during pandemic

Figure 2(a) prototype III of jumping task which is a development of the 2006 PISA questions with "skateboard" context. Figure 2(b) prototype III of evaluation problem which is a development of the 2012 PISA questions with "MP3 Players" context.

Potential effect of the problem

The next stage is used to see the potential effect of the development of activities and questions that have been made on students' mathematical literacy skills by conducting a field test involving 20 students of class VIII with high, medium, and low abilities who were the subjects in this study. Figure 3 and Figure 4 shows of students' answer to solve PISA-like activities and problems for the jumping task.

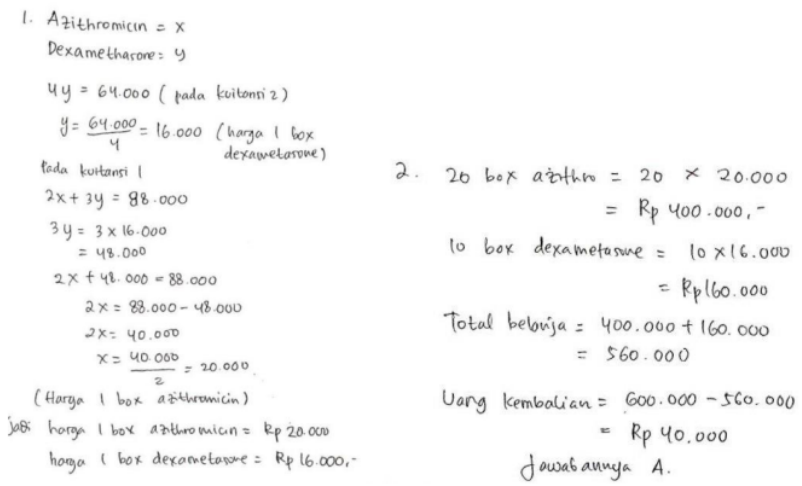


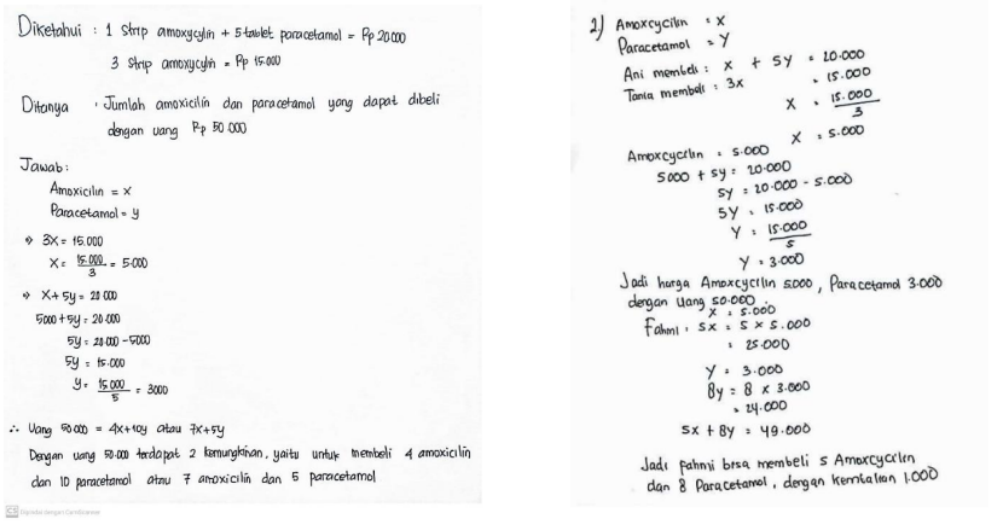
Figure 3. Students' A answer for jumping task (antibiotic context)

Figure 3. shows the results of student A's answers. In the picture it can be seen that student A is able to connect the pieces of information listed in the question to determine the price of each antibiotic, student A also has communication skills seen from how students write down each process of the problem to reach the desired solution. It is hoped that students will be able to explain the process to obtain the solution by substituting the first and second equations. Students are also able to use the ability to make plans or strategies to reframe contextual problems mathematically by doing examples and performing mathematical manipulations well, namely doing examples using x and y variables. Students also use their mathematical abilities well, as can be seen from the process of how students can use the variables they have identified in solving the given problems.

Figure 4. Students' B answer for jumping task (antibiotic context)

Based on Figure 4, it can be concluded that student B has used communication skills by understanding statements and questions to form a model of the situation presented and then connecting pieces of information from the problem, namely by finding the price for each antibiotic from the receipt provided. Students have also been able to identify and use variables in solving these problems. However, the students were inconsistent when they did the approximation of the x and y variables, in the first problem they wrote down the x variable for the price of the azithromycin antibiotic, but in the second problem the students mistakenly changed the value of the x variable to represent the azithromycin price, not the dexamethasone price. Actually students are able to explain the process to obtain the results of solving problems by eliminating the first and second equations, but students are not able to complete the plan to get the right results. In addition, students are not able to re-check the answers because the students are in a hurry when solving existing problems.

Figure 5 shows of students' answer to solve PISA-like activities and problems for the evaluation problem.



(a) (b)

Figure 5. Students' answer for evaluation problem (antibiotic context) (a) VA (b) FM

Based on Figure 5, it can be seen that the two students can read, understand codes, understand statements and questions; identify variables and mathematical structures that underlie real-world problems, use appropriate variables to represent real-world problems using symbol language and make mathematical representations of the information presented in real-world problems, VA and FM students have different assumptions about how to use the money to buy for the antibiotic drug, VA students use the money to the maximum so that no change is obtained. In contrast, FM students use enough money to buy antibiotics, so he still gets change from their purchases. In the field test stage, the findings are collected. Some students can work according to the researcher's expectations, while others are only interested in supporting the question.

(Note: R = Researcher; VA = Student 1; FM = Student 2)

R : Please explain how could you get the amount of each antibiotic that can be used Bought by Fahmi?

VA : I saw that Tania only bought amoxicillin, so that I can find the unit price of amoxicillin. After I get the price of amoxicillin, I will reduce Ani's purchase price with the price of the amoxicillin she bought. Then, after I get the price of the two antibiotics, I will look for possible drugs I can buy for a total amount of 50 thousand. I first looked for the amount of amoxicillin medicine. Then I looked for the amount of paracetamol from the remaining money.

R : Okay, good answer. How about FM?

FM : I look for the unit price of amoxicillin and paracetamol first, then calculate the amount of money that must be spent to buy amoxicillin and then the rest for paracetamol.

R : Why did you not use all the money to buy the antibiotics?

FM : Because I saw how much money can be bought with 50 thousand, I think it is okay as

long as it is not more than 50 thousand.

Based on the analysis results, it can be concluded that students who answered correctly have been able to use communication skills where they can read, understand codes, understand statements, questions, assignments, objects or pictures to form a mental model of the situation presented. In addition, students can use argumentation and reasoning skills where they can explain, defend and provide justification for those identified by using their assumptions.

Discussion

PISA-type questions and activities with *change and relationship* using the context of immunity during the pandemic which was developed was declared valid in terms of content, constructs and language after going through an *expert review* that reviewed the problems in terms of content, construct and language and the results obtained at the *one to one*, namely the understanding and responses of students in solving the developed PISA-like activities and questions (Zulkardi, 2002). The content aspect is reviewed based on the suitability of the problems developed with the characteristics of the PISA questions in *the framework* and the 2013 curriculum, namely using *change and relationship* using the topic of two-variable linear equations, the context of immunity during the pandemic. includes personal and social contexts; The construct aspect is reviewed based on the suitability of the problem with the characteristics of the PISA problem level, namely, process competence, namely Basic Mathematics Ability in mathematical literacy, namely communication skills, mathematization, representation, argumentation and reasoning, strategy selection in problem-solving and the use of symbolic, formal and technical language as well as operations and PISA level questions consisting of levels 3, 4 and 5, display of images, graphs and tables of the questions presented and language aspects are reviewed based on PISA-like activities and questions which were developed using correct spelling according to language standards and did not contain double meanings (Zulkardi, 2006).

The practicality PISA content of *change and relationship* using the context of immunity during a pandemic can be viewed from how students understand the problem. The questions developed are easy to understand by students, supported by learning by applying discussion strategies using IBL learning, making it easier for students to integrate problems well so that can be said to be practical. In addition, practical aspects can also be reviewed based on PISA-type questions that can be applied both in the learning process and during written tests (Akker, 1999). In this case, students can understand the problem well and do not cause double interpretation even though some students experience some mistakes, and these mistakes can be used as revision material for researchers to perfect the questions developed so that the questions developed can be said to be practical (Zulkardi, 2006).

The potential effect that the researcher will review is based on the students' mathematical literacy ability in solving PISA-type questions with the content of *change and relationship* using the context of immunity during a pandemic. Which was developed was applied in learning activities using the *Inquiry-Based Learning* (IBL) learning model. Learning activities build students' confidence to use their abilities in solving mathematical problems

including mathematical literacy skills (Pratama, 2020). The IBL learning model directs students to seek and find their answers to something in question. The teacher is placed not as a learning resource but as a facilitator and motivator of student learning (Abidin, 2020) by finding their own will make them apply their knowledge and try to find out knowledge. Needed and can develop thinking skills (Rahmatsyah, 2022) and then pour ideas to potentially solve the developed PISA-type questions to affect maximum mathematical literacy skills potentially. The IBL model also helps students explore their answers by directing students to ask questions if they have difficulty. It makes students challenged and enthusiastic in solving problems in questions. It is reinforced by (Artigue & Blomhøj, 2013), which states that students are guided to discuss with friends or ask the teacher if something is not understood. IBL learning also provides opportunities for students to be able to use their respective strategies in solving problems.

The mathematical literacy ability reviewed by researchers is based on the Basic Mathematics Ability *framework*. The following is an explanation of the KDM students use to solve PISA-type questions that were developed :

In completing the jumping activity and evaluation problem, students use their communication skills. Students' abilities can be seen from the ability to present solutions, show the work involved in solving answers or summarize mathematical results. In line with the research of Jannah et al. (2019) students are said to have communication skills when they can write down the process to get a solution to a problem. However, there are still many students who make mistakes in using communication skills due to errors in understanding statements or questions and their inability to present solutions to these problems mathematically. In line with the research of Fazzilah et al. (2020), which states that the cause of students not being able to evaluate problems is that students do not know the process of solving problems even though students are correct in determining the formula and appropriate in carrying out procedures. Rusyda et al. (2020) states that weaknesses cause the weak communication skills of students in expressing mathematical ideas and relationships due to the difficulty of interpreting numerical symbols, variables, and so on, which are influenced by experience.

In addition, students also use representational abilities in solving evaluation problem one, where the question uses a literacy process to formulate mathematical situations. Representational skills are seen when students can make mathematical representations of the information presented in real-world problems—supported by the results of research (Wahyu Utomo et al., 2020), which states that based on indicators of mathematical literacy, students have met the category in formulating problems in real situations mathematically when students can write down information and develop problems in the actual context in the issue. However, some students cannot make representations, and some have tried to make representations. Still, the models they produce are wrong or do not follow the information presented in mathematical problems. The term is not accompanied by an understanding of the problems presented (Samsuddin & Retnawati, 2018). In this case, procedural errors made by students were defining variables and forming mathematical structures, and this was because students did not fully understand the problems presented.

Students also use argumentation and reasoning skills. Students' argumentation and reasoning abilities can be seen in students' ability to connect pieces of information to achieve mathematical solutions and make various levels of arguments correctly. It is in line with (Nurhalin & Effendi, 2022) which states that reasoning ability is a thought process to produce a statement and conclusions can be drawn without being based on formal logic but the truth is already known. and Mumu and Tanujaya (2019) states that various processes can achieve the reasoning used by these students, one of which is making assumptions or conjectures, namely by forming opinions or assumptions based on incomplete information.

In addition, students have also demonstrated their ability to formulate strategies in problem-solving, which can be seen from the way students complete jumping activities and evaluation questions two that use the literacy process to formulate mathematical situations where this ability can be seen from the ability of students to choose or make a plan or strategy to frame mathematical contextual problems. It is in line with the research results of Suratmi and Purnami (2017) which state that the problem-solving ability that every student must have is how to solve problems related to learning activities, including solving mathematical problems by making a strategy or plan.

Then the student's ability to use symbolic/formal and technical language as well as the operations used by students to complete the jumping task and evaluation problem using the literacy process to formulate mathematical situations where the use of symbolic/formal language and operations in this process can be seen from the student's ability to use variables, symbols, diagrams, and standard models that are suitable for representing real-world problems. It is in line with Zulyanty (2022)which states that sometimes students use symbols, mathematical language and operations in solving problems. In contrast, the benchmark is that students can use symbols, formulas, and mathematical models in solving problems and can use mathematical symbols correctly, even knowing the meaning of variables used in solving problems. In this case, the definitions, rules and formal systems and algorithms used include the method of substitution of a value in a variable, multiplication, and division.

Conclusion

This research produced valid and practical question in form of activities and problems such as sharing task, jumping task, and evaluation problem that potentially impact mathematical literacy skills. The valid and practical questions produced have the characteristics of PISA items. The criteria of the developed PISA-like activities and questions focused on change and relationship contents with levels 3,4 and 5 of immunity context problems. Learning how to maintain immunity through PISA-like activities and problems enabled the students to use their mathematical literacy skills, such as communication, mathematization, representation, argumentation, and reasoning, to solve the problems using the strategy on the problems. Besides, the students applied their knowledge and logical thinking to increase immune system and also understanding various multivitamin and antibiotic used to help boost the immune system. Therefore, the students could learn how to protect their health and deal with pandemic situation while using their mathematical literacy skills.

Acknowledgment (13-point, bold)

This study was financially supported by Hibah Profesi with Contract Number: 0014/UN9/SK.LP2M.PT/2021. The researcher would like to thank the Principal of Junior High School 13 Palembang, who has allowed the researcher to collect data at the school and the class VIII students of Junior High School 13 Palembang who have participated in this research, as well as to Mrs Lia Purnama Indah and Duano Sapta Nusantara S.Pd. who have helped us during the research.

References (14-point, bold)

Jurnal Elemen Ayu Luviyanti Tanjung

ORIGINALITY REPORT

16%	10%	11%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	ejournal.unsri.ac.id Internet Source	4%
2	moam.info Internet Source	2%
3	R D Jannah, R I I Putri, Zulkardi. "PISA-like mathematics problem: The context of basketball in Asian Games", Journal of Physics: Conference Series, 2018 Publication	1%
4	Fahruh Juhaevah. "Developing mathematics problems using local wisdom context of Maluku to improve students' numeracy", Jurnal Elemen, 2022 Publication	1%
5	Husni Husni. "The Effect of Inquiry-based Learning on Religious Subjects Learning Activities: An Experimental Study in High Schools", Jurnal Penelitian Pendidikan Islam, 2020 Publication	1%

6	Ismi Nurazizah, Zulkardi Zulkardi. "Students' mathematical reasoning ability in solving PISA-like mathematics problem COVID-19 context", Jurnal Elemen, 2022 Publication	1 %
7	Submitted to University of College Cork Student Paper	1 %
8	pubs.sciepub.com Internet Source	1 %
9	Nurjanah, R Yuliardi, A F Luthfi. "Learning mathematics assisted by adobe flash software to improve mathematical reasoning ability students ongeometry concepts", Journal of Physics: Conference Series, 2020 Publication	<1 %
10	Enggar Tri Aulia, Rully Charitas Indra Prahmana. "Developing interactive e-module based on realistic mathematics education approach and mathematical literacy ability", Jurnal Elemen, 2022 Publication	<1 %
11	L Sulistiani, Zulkardi. "Developing PISA-Like Mathematics Problems Using Indonesian Food Context", Journal of Physics: Conference Series, 2019 Publication	<1 %

12	S M Ambarita, Zulkardi. "Designing mathematical problems task through COVID-19 context", Journal of Physics: Conference Series, 2020 Publication	<1 %
13	D Yansen, R I I Putri, Zulkardi. "Mathematical problems of PISA-like with the 200m swimming contexts in Asian Games", Journal of Physics: Conference Series, 2018 Publication	<1 %
14	Dina Lita Sari, Farida Nursyahidah. "Learning design for statistics materials using the context of traditional market assisted by interactive videos", Jurnal Elemen, 2022 Publication	<1 %
15	Isnaeni Umi Machromah, Christina Kartika Sari, Zakiyyah. "Batik Context as PISA-like Problem to Assess Students' Mathematical Literacy", Journal of Physics: Conference Series, 2021 Publication	<1 %
16	Muntazhimah Muntazhimah, Reni Wahyuni. "The Development and Validation of Mathematical Reflective Thinking Test Instruments for Prospective Mathematics Teachers Using the Rasch Model", Jurnal Elemen, 2022 Publication	<1 %

17	Uliyatul Usnul, Rahmah Johar, Hizir Sofyan. "Potential Effect of PISA Equivalent Questions Using the Context of Aceh Traditional Houses", JRAMathEdu (Journal of Research and Advances in Mathematics Education), 2019 Publication	<1 %
18	ojs.unm.ac.id Internet Source	<1 %
19	M A Pratama. "Mathematical critical thinking ability and students' confidence in mathematical literacy", Journal of Physics: Conference Series, 2020 Publication	<1 %
20	Meryansumayeka, Zulkardi, R I I Putri, C Hiltrimartin. "The prototype of PISA-like digital mathematical tasks", Journal of Physics: Conference Series, 2020 Publication	<1 %
21	Yonarlianto Tembang, Ratna Purwanty, Markus Palobo, Rudolf Irwanto Kabrahanubun. "Development of Interactive Based Powerpoint Learning Media In The Class Iv Students Of Merauke Basic School", Proceedings of the 4th International Conference on Learning Innovation and Quality Education, 2020 Publication	<1 %

22	Submitted to Sriwijaya University Student Paper	<1 %
23	Epa Wira Darmawan, Suparman Suparman. "Design of Mathematics Learning Media based on Discovery Learning to Improve Problem Solving Ability", Indonesian Journal on Learning and Advanced Education (IJOLAE), 2019 Publication	<1 %
24	A Efriani, R I I Putri, Hapizah. "PISA like Mathematics Problems: a case of soccer context", Journal of Physics: Conference Series, 2018 Publication	<1 %
25	Dyah Worowirastri Ekowati, Arina Restian, Erna Yayuk, Kamariah Kamariah. "Semiotic analysis on Malangan Batik for elementary school mathematics learning", Jurnal Elemen, 2022 Publication	<1 %
26	Tria Gustiningsi, Ratu Ilma Indra Putri, Zulkardi, Hapizah. "Secondary mathematics teachers' ability in solving Pisa- like mathematics problems", AIP Publishing, 2022 Publication	<1 %
27	jglobal.jst.go.jp Internet Source	<1 %

28	pisa.e-wd.org Internet Source	<1 %
29	Dina Apryani, Rambat Nur Sasongko, Muhammad Kristiawan, Nurul Astuty Yensy B., Hidayatulloh Hidayatulloh. "A comparison of reciprocal teaching and scientific approaches for improving pupils' mathematical understanding", Jurnal Elemen, 2022 Publication	<1 %
30	Y Anastasya, Darmawijoyo. "The development of math model student worksheet using transportation context of one variable linear inequality", Journal of Physics: Conference Series, 2020 Publication	<1 %
31	e-journal.hamzanwadi.ac.id Internet Source	<1 %
32	P N Sagala, A Andriani. "Development of Higher-Order Thinking Skills (HOTS) Questions of Probability Theory Subject Based on Bloom's Taxonomy", Journal of Physics: Conference Series, 2019 Publication	<1 %
33	S W Permatasari, Darmawijoyo. "Students' worksheet in number multiplication learning	<1 %

using lined-up context in the second grade", Journal of Physics: Conference Series, 2020
Publication

34	Sri Utami, Zulkardi. "Developing proportional reasoning problem like PISA with “choosing services” context", Journal of Physics: Conference Series, 2020 Publication	<1 %
35	Septi Puspita Sari, Zulkardi Zulkardi, Darmawijoyo Darmawijoyo. "Students' Numeracy Skills Relating to Algebra Topic Using COVID-19 Context", JTAM (Jurnal Teori dan Aplikasi Matematika), 2021 Publication	<1 %
36	Siti Nabila, Ratu Ilma Indra Putri. "Students’ mathematical reasoning skills on number pattern using PMRI and collaborative learning approach", Jurnal Elemen, 2022 Publication	<1 %
37	Wardono, , S B Waluya, Scolastika Mariani, and S Candra D. "Mathematics Literacy on Problem Based Learning with Indonesian Realistic Mathematics Education Approach Assisted E-Learning Edmodo", Journal of Physics Conference Series, 2016. Publication	<1 %

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		

Jurnal Elemen Ayu Luviyanti Tanjung

PAGE 1

Article Error You may need to use an article before this word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Article Error You may need to use an article before this word.

PAGE 2

Missing "," Review the rules for using punctuation marks.

Prep. You may be using the wrong preposition.

Article Error You may need to use an article before this word. Consider using the article **the**.

Prep. You may be using the wrong preposition.

Article Error You may need to use an article before this word. Consider using the article **a**.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Article Error You may need to remove this article.

Article Error You may need to use an article before this word.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Sentence Cap. Review the rules for capitalization.

PAGE 3

Run-on This sentence may be a run-on sentence.

Article Error You may need to use an article before this word. Consider using the article **the**.

Article Error You may need to remove this article.

Article Error You may need to use an article before this word.

Prep. You may be using the wrong preposition.

Article Error You may need to remove this article.

Garbled This sentence contains several grammatical or spelling errors that make your meaning unclear. Proofread the sentence to identify and fix the mistakes.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees with the verb.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Prep. You may be using the wrong preposition.

S/V This subject and verb may not agree. Proofread the sentence to make sure the subject agrees with the verb.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Article Error You may need to use an article before this word.

Missing "," Review the rules for using punctuation marks.

Run-on This sentence may be a run-on sentence.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Missing "," Review the rules for using punctuation marks.

Sentence Cap. Review the rules for capitalization.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word. Consider using the article **the**.

Hyph. Review the rules for using punctuation marks.

Prep. You may be using the wrong preposition.

Article Error You may need to use an article before this word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Possessive

Possessive

Missing "," Review the rules for using punctuation marks.

Article Error You may need to remove this article.

PAGE 7

Verb This verb may be incorrect. Proofread the sentence to make sure you have used the correct form of the verb.

Sentence Cap. Review the rules for capitalization.

PAGE 8

Missing "," Review the rules for using punctuation marks.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Missing "," Review the rules for using punctuation marks.

Missing "," Review the rules for using punctuation marks.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

PAGE 9

Possessive

Confused You have used either an imprecise word or an incorrect word.

Sentence Cap. Review the rules for capitalization.

Confused You have used either an imprecise word or an incorrect word.

Confused You have used either an imprecise word or an incorrect word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Article Error You may need to remove this article.

PAGE 10

Missing "," Review the rules for using punctuation marks.

PAGE 11

Article Error You may need to use an article before this word.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Run-on This sentence may be a run-on sentence.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word. Consider using the article **the**.

Article Error You may need to remove this article.

Prep. You may be using the wrong preposition.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Prep. You may be using the wrong preposition.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

PAGE 12

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

PAGE 13

Missing "," Review the rules for using punctuation marks.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Article Error You may need to remove this article.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

Sp. This word is misspelled. Use a dictionary or spellchecker when you proofread your work.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Article Error You may need to use an article before this word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Confused You have used either an imprecise word or an incorrect word.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

PAGE 14

Missing "," Review the rules for using punctuation marks.

Sentence Cap. Review the rules for capitalization.

Article Error You may need to remove this article.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word. Consider using the article **a**.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

Article Error You may need to use an article before this word.

Garbled This sentence contains several grammatical or spelling errors that make your meaning unclear. Proofread the sentence to identify and fix the mistakes.

Article Error You may need to use an article before this word. Consider using the article **the**.

PAGE 15

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.

P/V You have used the passive voice in this sentence. You may want to revise it using the active voice.

Sentence Cap. Review the rules for capitalization.

Frag. This sentence may be a fragment or may have incorrect punctuation. Proofread the sentence to be sure that it has correct punctuation and that it has an independent clause with a complete subject and predicate.