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Research Article

Using Problem Based Learning through Blended Learning Based on JUMPISA Problem against Students Mathematical Literacy

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Abstract: This study aims to analyze the product of developing Problem Based Learning tools through blended learning based on JUMPISA on change and relationship content that comply criteria of valid, practical, and efficient, besides to analyze the effects of developed instructional tools against student mathematical literacy. This study was based on mix method which combine two types of research namely R&D (research and development) and experimental research. The study was conducted among three classes consists of students in the eleventh grade of high school. Through four steps of research namely (1) define, (2) design, (3) develop, and (4) disseminate, it results an instructional or learning tools (lesson plan, student worksheet, mathematical literacy test) that comply criteria of valid, practical, and efficient. Validity coefficient of lesson plan, student worksheet, and mathematical literacy test in a row are $4.84, 4.87, 4.82$. Practical criteria is complied to the result of observation of learning tools implementation by 92.5% in very good category. The effectiveness criteria is complied to the results of 87.4% students fulfill category of active students based on students activity observation, 95.1% of positive responses based on students questionnaires, and 91.43% students fulfill the minimum mastery criteria. Based on experimental research and observation using independent samples t-test, it is known that there is a significant effect of Problem Based Learning through blended learning based on JUMPISA on change and relationship content instructional tools against student mathematical literacy with 0.009 significance value ($sig < 0.05$)**.**

Keywords: instructional tools, Problem Based Learning, blended learning, jumping task, PISA, mathematical literacy

1. Introduction

Mathematics is fundamental knowledge in many fields such as science, technology, engineering, and many others. Mathematics includes the study of such topics as quantity, structure, space, and change. (Utubaku & Elizabeth, 2011; Agwagah, 2008; Sandhu & Grover, 2017; Yadav, 2017). Mathematics is not only an understanding that learns a way to calculate something, but people are accustomed to thinking creatively, logically, critically, systematically, and scientifically (Sumarmo, 2004; Yuanita et al., 2018; Wijayanti et al., 2018). It is needed a literacy skill especially mathematical literacy in learning mathematics. Mathematical literacy is also one of main studies in mathematics assessment for PISA namely reading literacy, mathematical literacy, and scientific literacy (OECD, 2013; She et al., 2018; Stacey, 2011).According to PISA results, Indonesia is 71st of 77 countries reviewed in 2018,with an average mathematics scoreof 379. While the whole average mathematics scorefor all countries is 489. This means that Indonesia is still ranked low. Besides, Indonesia's ranking is quite different compared to China, one continent country, which even ranks first with 591 average score of mathematics (Schleicher, 2018).

Based on the problems described, it is necessary to take an action to overcome the problem. A method that can be carried out to enhance students understanding concept is by applying blended learning system. According to Darma et al. (2020), technological development of industrial revolution 4.0 era requires an educator who can innovate teaching and learning process to be more efficient and interesting. Learning should be creative and innovative so blended learning is an effective way and strategy, especially for teaching mathematics. To make learning process more meaningful, a learning model is needed to facilitate students to enhance mathematical literacy ability, especially in solving a real-life problem. So, Problem Based Learning (PBL) can be one of the alternative ways. According to relevant research by Pratiwi & Ramdhani (2017) which states that the enhancement of student mathematical literacy who learn mathematics by using Problem Based Learning model is way better than students who learn mathematics by using conventional learning model.

Other than meaningful learning, a collaborative process between peers is also needed so students are more interested and feel challenged to learn. A way that can facilitate this case is providing jumping task. Jumping task is an assignment that contains problems that can improve students' ability (Hobri et al., 2020; Sari & Putri, 2019; Khoirudin et al., 2019). Jumping task also can be interpreted as challenging questions above the regular

curriculum level (Sugiarto et al., 2018; Ummah et al., 2020) and development or application of the main concepts taught (Fatimah et al., 2018).

Based on the importance of mathematical literacy among students, especially on contextual PISA and jumping task problems, as well as Indonesia's PISA ranking compared to surrounding countries in the Asia, therefore research will be conducted by developing learning tools that previously use conventional methods and routine questions to learning tools that use Problem Based Learning model through blended learning system based on JUMPISA on change and relationship content.

2. Literature Review

2.1 Instructional Tools

Instructional or learning tools can be interpreted as a set of learning resources used by students and teacher to carry out teaching and learning process. The developed learning tools of this study consist of lesson plan, student worksheet, and mathematical literacy test. Lesson plan is an activity scheme for one or more meetings. Student worksheet is a tool that used as guideline of learning process and contains some tasks that must be done by students in certain concept. Test is a way to measure how far learning objectives have been achieved. It can be conducted by evaluation, in this case the evaluations of learning outcomes called mathematical literacy.

2.2 Blended Learning

Blended learning is a combination of synchronous and asynchronous learning (online, offline, or both) (Mamahit, 2021). Synchronous learning is an activity that carried out at the same time between teacher and student or it can be called as real time learning, while asynchronous learning is not an activity that carried out at the same time. Handoko & Waskito (2018) state that there are several types of blended learning namely Station Lab, Lab Rotation, Individual Rotation, Flex, Flipped Classroom, and A la Carte. Flex is used in this study. In flex type, most of learning activities are conducted online so learning and studying can be more flexible. Students can learn according to their abilities, needs, and pace. Teachers is a facilitator through discussion session, project in group, or even individual tutoring.

Several relevant studies show that the use of blended learning has positive effect on understanding concept and fluency of mathematical procedures (Nugraha et al., 2019; Setyaningrum, 2018), mathematical literacy during the pandemic (Aritonang & Safitri, 2021), students learning experiences with various access and learning opportunities (Attard & Holmes, 2020), creative thinking skill (Sya'roni et al., 2020), and mathematical thinking skill that help to overcome students obstacles in learning mathematics (Kashefi et al., 2012; Kashefi et al., 2012).

2.3 Lesson Study for Learning Community

Lesson study is a translation of the Japanese term "*jugyou kenkyuu*". *Jugyou* means live instruction and *kenkyuu* means research or study (Lewis, 2016). Lesson Study for Learning Community has been developed and it has orientation for students activities and how students learn, teachers as model, and parents who join the learning community and participate in recovering education (Saito in Hobri, 2020). The implementation of lesson study is intended to build a learning community between teachers, students, parents, and stakeholders. Therefore, it can be called as learning community. Learning community is formed of two main pillars namely 1) collaborative learning and 2) caring community (Hobri, 2020).

2.4 Problem Based Learning

Problem Based Learning is a learning model in which students experience authentic (real) problems so they are expected to be able to construct their own knowledge, enhance higher order thinking skill and problem-solving skill, build independent students, and enhance their self-confidence (Pratiwi & Ramdhani,2017). Problem Based Learning syntax according to Arends in Nur et al., (2018) is shown in Table 1.

Table 1. Syntax of Problem Based Learning

Phases	Teacher Behavior
Phase 1 Student orientation to the problem	- Explain the purpose of learning - Describe the required logistics - Motivate students to actively participate in problem solving
Phase 2 Organize students	- Help students define and organize learning tasks related to the problem
Phase 3 Individual or group research guide	- Encourage students to gather relevant information - Encourage students to perform experiments for explanations and problem solving
Phase 4 Develop and present the work	- Assist students in planning and preparing appropriate tasks such as reports, models, and sharing assignments with friends

Phase 5 Analyze and evaluate the problem-solving process	- Evaluate learning outcomes of the material learned / askpresentation of group work.

Several studies show that the use of Problem Based Learning can be integrated and has some effects on mathematical literacy (Pratiwi & Ramdhani, 2017; Hutagaol & Sopia, 2020; Pamungkas & Franita, 2020; Hidayat et al., 2018), critical thinking skill and learning outcome (Nafiah & Suyanto, 2014; Setyorini et al., 2011; Ningsih et al., 2018), student activity (Rizki et al., 2019), student interest and learning achievement (Mashuri et al., 2019).

2.5 Jumping Task

Higher ability and also higher achievement need to be considered during learning process especially in the implementation of Lesson Study for Learning Community. Therefore, a challenging task with higher level is needed instead of daily routine task. This term is known as jumping task. Several studies show that the use of jumping task can be integrated and has some effects on metacognitive ability (Khoirudin, 2020), creative thinking skill (Ummah, 2021), cririca l thinking skill (Anwar et al., 2017; Hobri, 2021), problem solving ability (Hobri et al., 2020; Hobri et al., 2020), learning activity (Novrion, 2017), and communication skill (Susertyarini et al., 2021).

2.6 PISA

An abbreviation for PISA, Programme for International Students Assessment, which conducts assessmentsin some countries. 15-year-old students are randomly selected every 3 years. The latest evaluation is held on 2018 that followed by 77 countries. PISA does a test ofmultiple majors such as science, reading, and mathematics. Questions are given based on the actual problems.According to PISA results, Indonesia is 71st of 77 countries reviewed in 2018,with an average mathematics score of 379. While the whole average mathematics scorefor all countries is 489. This means that Indonesia is still ranked low. According to OECD (2013) and OECD (2018), there are four contents of mathematical knowledge in PISA namely 1) change and relationship, 2) space and shape, 3) quantity, and 4) uncertainty and data. Change and relationship content is used in this study.

According to 2.5 and 2.6, JUMPISA referred to a combination of jumping task and PISA questions.Jumping task is challenging question above the learning objectives that created based on indicators of learning objectives and PISA content used in this study is change and relationship related to algebra. Several studies show that PISA questions can be integrated and used to measure students' mathematical competence (Ehmke, 2020), thinking process and its effect against mathematical achievement (Unal & Demir, 2009; Demir et al., 2010), problem solving ability (Arfiana & Wijaya, 2018; Amalia et al., 2020), mathematical process ability (Hamidy & Jailany, 2019), solving strategies (Fitri et al., 2020), and representation ability (Trapsilasiwi, 2020).

2.7 Mathematical Literacy

Mathematical literacy is one of main studies of PISA namely reading literacy, mathematical literacy, and scientific literacy (OECD, 2013; She et al., 2018; Stacey, 2011). Mathematical literacy is a way that students formulate, use, and interpret mathematics in varietyof situations, including mathematical reasoning and the use of mathematical concepts, procedures, facts, and tools to describe, explain, and predict phenomena. In short, the skill of to do it. (Syawahid & Putrawangsa, 2017). According to PISA, there are 6 levels of mathematical literacy. Indicators of mathematical literacy are presented in Table 2.

Table 2. Indicators of Mathematical Literacy

Level	Indicators
Level 1	- answer questions in a familiar context where all relevant information is available and the questions are clearly defined - information can be identified and routine procedures can be carried out by following direct instructions in explicit situations - perform and take immediate and obvious action from a given stimulus
Level 2	- interpret and recognize situations in contexts that require no more than direct inference - extract relevant information from a single source and use a single representational mode - use basic algorithms, formulas, procedures, or rules - capable of direct reasoning and making literal interpretations of the results
Level 3	- execute well-described procedures, including procedures that require sequential decisions - select and apply simple problem-solving strategies - interpret and use representations based on various sources of information and justifies them directly - develop short communications when reporting interpretations, results, and reasoning
Level 4	- work effectively with explicit models of complex concrete situations that contain constraints or require assumptions - elect and integrate different representations, including symbolic ones, and link them directly to

	aspects of real situations - utilize well-developed skills and reason flexibly, with some insight, in these contexts - construct and communicate explanations and arguments based on interpretations, arguments and actions
Level 5	- develop and work with models for complex situations, identify constraints and specify assumptions - select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems related to these models - work strategically with a wide range of well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterizations and insight into these situations - look back on their actions and formulate and communicate their interpretations and reasoning
Level 6	- conceptualize, generalize and utilize information based on the investigations and modelling of complex problem situations - link various sources of information and representations and flexibly translate among them - apply insight and understandings along with a mastery of symbolic and formal mathematical operations and relationships to develop new approaches and strategies for attacking new situations - formulate and precisely communicate actions and reflections regarding their findings, interpretations, arguments and the appropriateness of these to the original situations

Souce: Purwasih et al. (2018), OECD (2013)

Several studies show that mathematical literacy can be measured or improved by developing teaching materials based on metacognition (Setiawan & Dores, 2019), TIMSS questions (Utomo, 2021), Problem Based Learning model (Tabun et al., 2020), Problem solving approach (Atsnan et al., 2018), e-module based on STEM and Project Based Learning (Hadiyanti et al., 2021), Realistic Mathematics Education approach based on LSLC (Rohman et al., 2019), and discovery learning based on RME-PISA (Babys, 2016).

3. Method

The research subjects are three classes of 11^{th} grade students consist of 1 class as a trial class for developed instructional tools, 1 class as an experimental class, and 1 class as a control class. The research method used in this study is a combination research method called mix method. The qualitative method is research and development (R&D) and the quantitative method is experimental research. The type of model for developing instructional tools is the Thiagarajan model known as four-D (4D) which consists of four stages namely 1) define, 2) design, 3) develop, and 4) disseminate. Define stage consists of front-end analysis, learner analysis, concept analysis, task analysis, and specifying instructional objectives. Design stage consist of test construction, media selection, format selection, initial design. Develop stage consist of expert validation and developmental testing.

Besides, the type of experimental research used in this study is quasi-experimental research design.Research design scheme is presentedin Table 3.

Table 3. Research design scheme

Experiment class	O_1	X_1	O_3
Control class	O_2	X_2	O_4

Description:

O_1, O_2 : *pre test*

O_3, O_4 : *post test*

X_1 : usingblended learningbased on JUMPISA instructional tools

X_2 : using regular instructional tools

4. Results

4.1 Process of Developing Instructional Tools

a. Define

Define stage consists of front-end analysis, learner analysis, concept analysis, task analysis, and specifying instructional objectives. After analysing the five stages of define, it can be concluded that it is needed to develop Problem Based Learning tools through blended learning based on JUMPISA problem on change and relationship content that can stimulate students' mathematical literacy, the ability to collaborate and care for each other in certain learning community. Learning model used in this study is Problem Based Learning with contextual approach and discovery, discussion, assignment, and debriefing (ask and answer) learning method.

b. Design

Design stage consist of test construction, media selection, format selection, initial design. After analysing the four stages of design, lesson plan, student worksheet, and mathematical literacy test were made with the subject of Linear Programming.

c. Develop

Instructional tools and research instrument were validated by two lecturers and a mathematics teacher with the result of validation comply valid criteria with minor revision. Furthermore, the instructional tools that have been developed were tested in a class of 11th grade students. Based on the analysis at the end of activity, it is obtained that developed instructional tools comply practical and effective criteria.

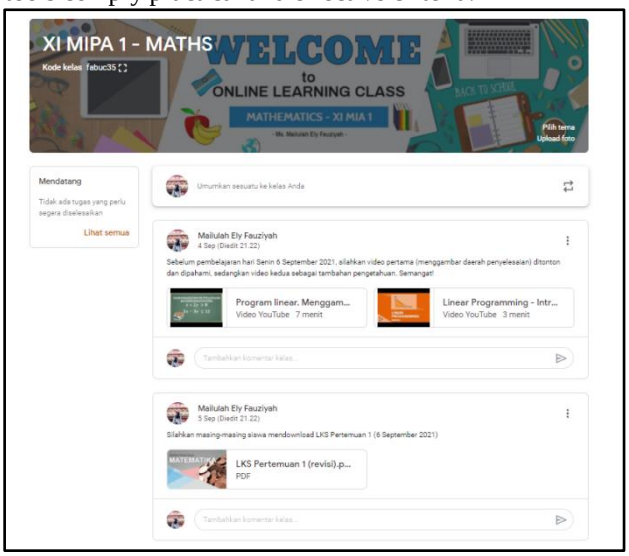


Figure 1. Asynchronous Activity

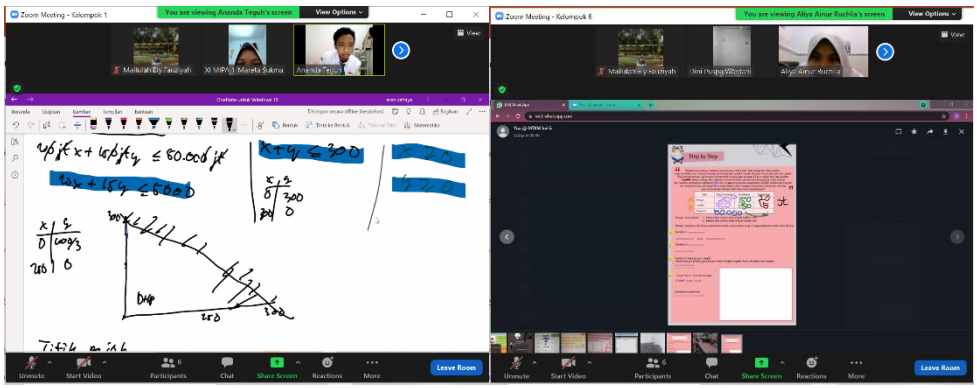


Figure 2. Synchronous Activity

d. Disseminate

Instructional tools that comply criteria of valid, practical, and effective are disseminated through YouTube channel and google drive link. Furthermore, developed instructional tools are used for experimental research.

4.2 Result and Data Analysis of Developing Instructional Tools

Table4. Validity Coefficient Criteria of Developed Instructional Tools

No	Instructional Tools	Coefficient of Validity	Criteria
1	Lesson Plan	4.84	Valid
2	Student worksheet	4.87	Valid
3	Mathematical Literacy Test	4.82	Valid

Table 5. Percentage and Practicalilty Criteria of Developed Instructional Tools

No	Activities	Aspect Average
1	1st meeting	4.485
2	2nd meeting	4.55
3	3rd meeting	4.835
Total		13.87
Percentage		**92. 5%**
Criteria		**Very Good**

Table 6. Percentage and Effectiveness Criteria (Observation Student Activity)

No	Activities	Average Percentage

1	1st meeting	86%
2	2nd meeting	82.5%
3	3rd meeting	93.6%
Mean		**87.4%**
Criteria		**Active**

Table 7. Percentage and Effectiveness Criteria (Students ResponseQuestionnaire)

No	Positive Response Percentage	Number of Students
1	70%	3
2	80%	1
3	90%	6
4	100%	25
Average Percantage		**95.1% positive responses**

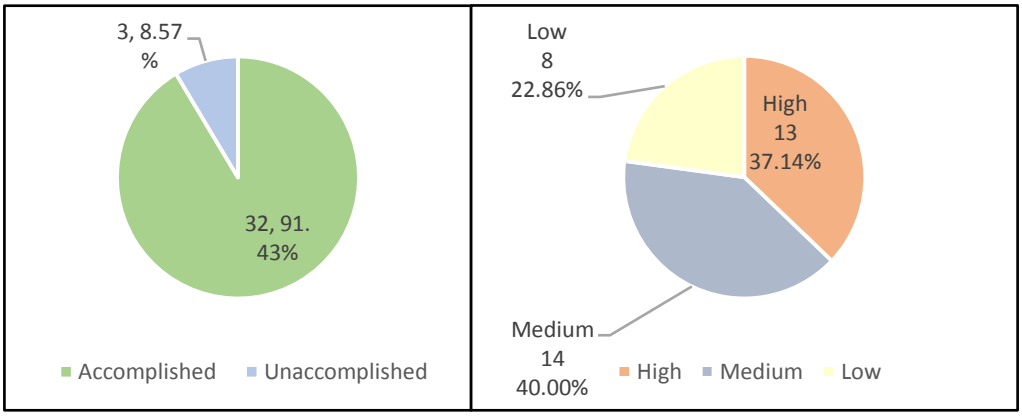


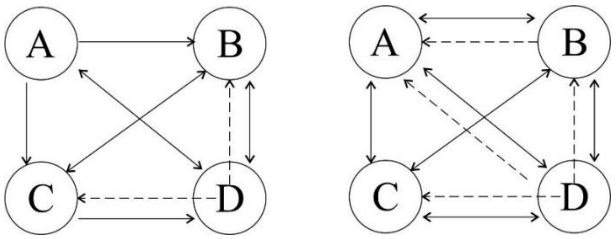
Figure 3. Percentage of Accomplishment and Mathematical Literacy Ability

Based on Table 4 – 7 and Figure 3, the result of developing Problem Based Learning tools through blended learning based on JUMPISA content on change and relationship content comply the criteria of valid, practical, and effective. Coefficients of validityof lesson plan, student worksheet, and mathematical literacy test in a row are 4.84; 4.87; 4.82. Practicality criteria is complied with the result of the implementation of instructional tools observation which is 92.5% in very good category. Effectiveness criteria is complied with the result of 87.4% in active category based on the result of student activity observation, 95.1% positive response based on student questionnaires, and 91.43% of students comply the minimum mastery criteria.

4.3 Effect of Instructional Tools against Mathematical Literacy

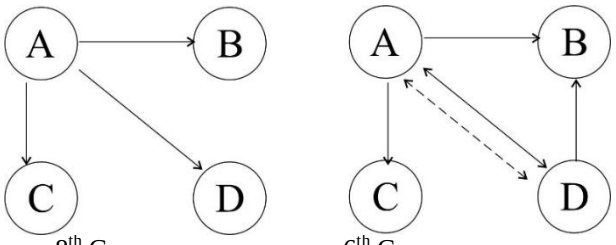
Treatment was given to 2 classes.Experimental class used Problem Based Learning tools through blended learning based on JUMPISA on change and relationship content, while control class used daily conventional learning tools. Learning activities are carried out through student collaboration with some groups consist of 4 students for 3 meetings. In experimental class, learning is carried out based on the Problem Based Learning syntax except at the second meeting so that students didn't get bored for using the same learning model. Syntax of Problem Based Learning consist of 1) student orientation to the problem, 2) organize students, 3) individual and group research guide, 4) develop and present the work, 5) analyse and evaluate problem-solving process. Due to time constraints, the stage of developing and presenting the work is integrated through collaborative learning and learning community activities by making video presentations that can be done in asynchronous activities. The questions used in student worksheet and mathematical literacy test (post-test) are collaboration between routine problem and JUMPISA (jumping task and PISA).

In control class, most of learning processesare carried out through direct instruction and expository learning strategy which is strategy that emphasize the process of delivering material is verbally from a teacher to students with intention that students can master the subject optimally. However, discussion method is still used through group activities as variation of learning. The questions used in student worksheet are routine problem according to indicators of competency achievement of Linear Programming.



First Meeting Third Meeting

Figure 4. Experimental Class Group Discussion



8th Group 6th Group

Figure5. Control Class Group Discussion

Description:

⇢ Students ask

→ Students explain / answer

In an experimental class, it is found that there are students with mathematical literacy level 1 to level 6. Figure 6 shows an example of a student answer with level 6 of mathematical literacy. Subjects with level 6 can answer all the given question. Based on Figure 6, it is shown the student's answer with level 6 mathematical literacy for the last complex question. According to the indicator of mathematical literacy, student has complied that subject:

1) conceptualize, generalize and utilize information based on investigating and modelling the situation of complex problems,
2) link various sources and representations and flexibly translate among them,
3) apply their insight and understandings along with a mastery of symbolic and formal mathematical operations and relationships to develop new approaches and strategies for attacking novel situations,
4) formulate and precisely communicate their actions and reflections regarding their findings, interpretations, arguments and the appropriateness of these to the original situations (almost perfect).

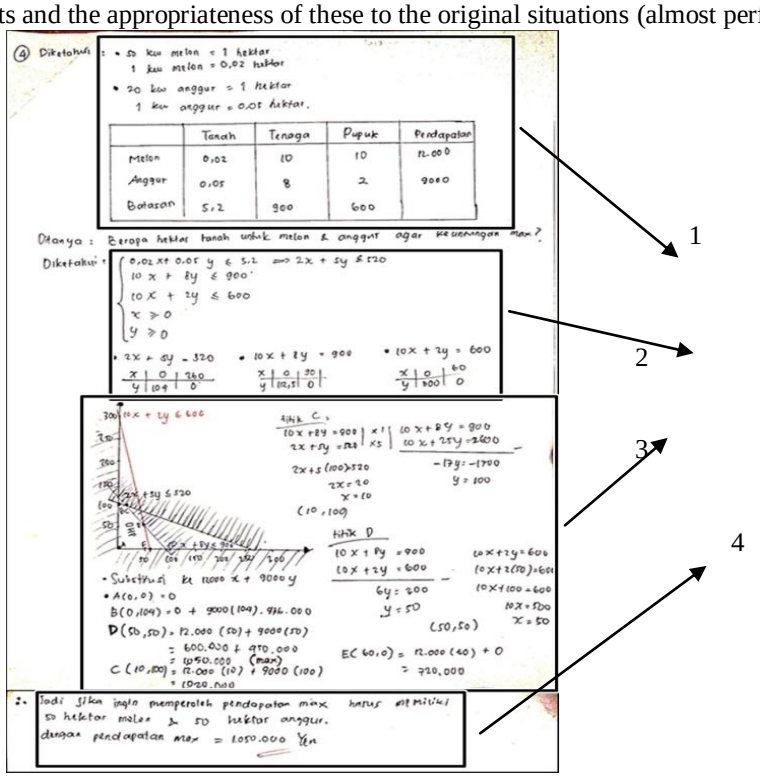


Figure 6. Student Answer of Level 6 Mathematical Literacy

Before conducting independent samples t-test, some assumptions are required, therefore preliminary assessment of normality and homogeneitytest were carried out. Based on Kolmogorov-Smirnov data analysis, it is found that significance value of normality test of experimental class pre-test is $Sig = 0.067$ and significance value of normality test of control class pre-test is $Sig = 0.111$. Meanwhile, significance value of normality test of experimental class post-test is $Sig = 0.061$ and significance value of normality test of control class post-test is $Sig = 0.069$. Therefore, it can be concluded that pre-test and post-test data in experimental and control classes are normally distributed. Based on Levene's data analysis, it is found that the significance value of homogeneity test of experimental and control classes pre-test is $Sig = 0.362$. While the significance value of homogeneity test of experimental and control classes post-test is $Sig = 0.243$. Therefore, it can be concluded that pre-test and post-test in experimental and control classes have homogeneous variants. This homogeneous variant indicates that the difference of statistical test that will be found in this study is truly caused by given treatment, namely the implementation of Problem Based Learning tools through blended learning based on JUMPISA on change and relationship content.

Based on preliminary assessment, pre-test and post-test data are normally distributed and have homogeneous variants. Therefore, it is used parametric test data analysis, namely independent samples t-test. Result of data analysis are shown in Table 8 and Table 9. According to independent samples t-test of experimental and control class pre-test, Table 8 shows $Sig = 0.479$ ($Sig > 0.05$). It means that before giving treatment, there was no significant difference on student average score of mathematical literacy between control class and experimental class.

Table8. Independent Samples t-test of Pre-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Kemampuan Literasi Matematika	Equal variances assumed	,843	,362	,711	69	,479	1,07063	1,50544	-1,93263	4,07390
	Equal variances not assumed			,713	67,673	,478	1,07063	1,50183	-1,92647	4,06774

According to independent samples t-test of experimental and control class post-test, Table 9 shows $Sig = 0.009$ ($Sig < 0.05$). It means that after giving treatement, there is significant effect of Problem Based Learning through blended learning based on JUMPISA instructional tools against mathematical literacy. In other words, the student average score of mathematical literacy between control class and experimental class are significantly different.

Tabel 9. Independent Samples t-test of Post-Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Kemampuan Literasi Matematika	Equal variances assumed	1,390	,243	2,708	69	,009	4,17262	1,54074	1,09893	7,24631
	Equal variances not assumed			2,716	66,771	,008	4,17262	1,53611	1,10634	7,23890

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5. Discussion

During the process of developing instructional tools, lesson plan use Problem Based Learning syntax that aim to provide opportunities for student to construct their own knowledge so learning becomes more meaningful. This statement appropriate with previous research by Pratiwi & Ramdhani (2017). It shows that Problem Based Learning Model can actively involve students, allow students to do an exchange idea, construct their own knowledge, develop problem solving skills including mathematical literacy, and make students feel more independent and enhance their self-confidence. Student worksheet that has been developed contains routine question and JUMPISA (jumping task and PISA) on change and relationship content, and brings up Lesson Study for Learning Community (LSLC) components in a form of collaborative learning and learning community. This supports the use of Problem Based Learning model and it appropriates with research by Putri & Zulkardi (2019).It states that the use of jumping task can facilitate student in understanding problem through collaborative learning activities and students who have problems in understanding concept can be finally helped to solve the jumping task. Mathematical literacy test that has been developed also contains routine questions and JUMPISA problem because it appropriates with research by Oktiningrum et al. (2016) which states that PISA questions can be used as a tool to assess students' mathematical literacy.

Problem Based Learning through blended learning based on JUMPISA on change and relationship instructional tools that comply criteria of valid, practical, and effective are used in experimental research with

quasi-experimental research design in two classes called control and experimental classes. In experimental class, instructional tools that have been developed are used, namely Problem Based Learning through blended learning based on JUMPISA on change and relationship content. Meanwhile, in control class, direct instruction and expository-based learning are used with conventional learning methods. Based on the result of pre-test in both classes, initially, it was shown that there was no significant difference of average mathematical literacy score with significance value of 0.479 ($sig > 0.05$).After giving treatment and doing a post-test, based on the result of independent samples t-test analysis, it is shown that there is a significant effect of Problem Based Learning through blended learning based on JUMPISA on change and relationship instructional tools with significance value of 0.009 ($sig < 0.05$). In other words, there is a significant difference of mathematical literacy average score between experimental class and control class. In addition, there are differences of mathematical literacy percentage of both classes. The percentage of students with high, medium, and low mathematical literacy ability in control class respectively are 14.3%; 57.1%; 28.6%. Meanwhile the percentage of students with high, medium, and low mathematical literacy ability in experimental class are33.3%; 55.6%; 11.1%. According to these data, it is shown that the percentage of students with high mathematical literacy ability in experimental class is higher than control class. Meanwhile, for students with medium criteria, the percentage is not quite different. On the other hand, students with low mathematical literacy ability in experimental class have lower percentages compared to control class.

The significant effect of Problem Based Learning through blended learning based on JUMPISA on change and relationship content appropriates with the results of several studies. This result of study in line with research of Aritonang & Safitri (2021) which states that the use of blended learning method has and impact on the quality of students learning reviewed by mathematical literacy during corona virus pandemic. In addition, research by Zulkardi (2019) also states that the use of jumping task in learning mathematics especially with LSLC system can help student to learn mathematics concept. Students get facilities to understand concepts though collaborative learning so students who have difficulty in understanding problems can be helped by students who have already understand, therefore they can solve problems completely. This is supported by research of Damayanti et al. (2017)which states that the application of collaborative learning model can improve mathematical literacy ability. In addition, the result of some studies also shows that Problem Based Learning model and problem solving approach has an effect on student's mathematical literacy (Tabun et al., 2020; Atsnan et al., 2018; Pratiwi & Ramdhani, 2017; Hutagaol & Sopia, 2020); Pamungkas & Franita, 2019; Hidayat et al., 2018).

6. Conclusion

Based on stages of define, design, develop, and disseminate, the result of developing Problem Based Learning through blended learning based on JUMPISA on change and relationship content instructional tools comply the criteria of valid, practical, and effective. Based on experimental research and observation, it is known that there is a significant effect of Problem Based Learning through blended learning based on JUMPISA on change and relationship content against students' mathematical literacy with 0.009 significance value ($Sig. < 0.05$).

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