

## NEEDS ANALYSIS OF THE DEVELOPMENT STUDENT WORKSHEET BASED BLENDED LEARNING TO ENCOURAGE MATHEMATICAL LITERACY

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### Abstract

Mathematical literacy is the ability of students to carry out activities formulate, apply, and interpret & evaluate mathematics in various contexts. This study aims to analyze the needs of the development student worksheet based Blended Learning which can stimulate students' mathematical literacy. This type of research is a qualitative descriptive study involving 15 students of class XI MIPA and 2 mathematics teachers of SMA Negeri 1 Gresik. This needs analysis includes material analysis, curriculum analysis, and student' characteristics analysis. . The instruments used were interviews and test for mathematical literacy. The results from material analysis showed that one of the difficult mathematics materials for class XI MIPA was linear program. The results from curriculum analysis showed that mathematics learning was carried out according to the 2013 Curriculum with the application of Blended Learning in the new normal era. The results from student' characteristics analysis showed that students still had difficulty solving problems on indicators of interpreting & evaluating mathematical process abilities. Therefore, student worksheet based Blended Learning need be developed which is more focused on activities that prioritize the interpretation and analysis of problem solving results according to the limitations and context of the problem in the Linear Program material.

**Keywords:** Blended Learning; Linear Program; Mathenatical Literacy; Student Worksheet.

### Abstrak

Kemampuan literasi matematika merupakan kemampuan peserta didik untuk melakukan aktivitas formulate, employ, dan interpret & evaluate matematika dalam berbagai konteks. Penelitian ini bertujuan untuk menganalisis kebutuhan pengembangan LKPD Berbasis Blended Learning yang dapat menstimulus kemampuan literasi matematika peserta didik. Jenis penelitian ini adalah penelitian deskriptif kualitatif yang melibatkan 15 peserta didik kelas XI MIPA dan 2 guru matematika SMA Negeri 1 Gresik. Analisis kebutuhan ini mencakup analisis materi, analisis kurikulum, dan analisis karakteristik peserta didik. Instrumen yang digunakan adalah wawancara dan tes kemampuan literasi. Hasil analisis materi menunjukkan bahwa salah satu materi matematika kelas XI MIPA yang dianggap sulit adalah program linear. Hasil analisis kurikulum menunjukkan bahwa pembelajaran matematika dilaksanakan sesuai kurikulum 2013 dengan penerapan Blended Learning di era new normal. Hasil analisis karakteristik peserta didik menunjukkan bahwa peserta didik masih mengalami kesulitan menyelesaikan masalah pada indikator interpret & evaluate dalam kemampuan proses matematika. Oleh karena itu, LKPD berbasis Blended Learning perlu dikembangkan yang lebih difokuskan pada aktivitas yang mengutamakan interpretasi dan analisis hasil penyelesaian masalah sesuai batasan dan konteks masalah pada materi Program Linear.

**Kata kunci:** Blended Learning; Kemampuan Literasi Matematika; LKPD; Program Linear.



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## INTRODUCTION

The literacy ability of students is one of the prerequisites for realizing 21st century skills (Pusmenjar, 2020). The 21st century skills for students include learning and innovation skills, skills to use and utilize information technology and media, and being able to work and survive using life skills (Prayogi, 2020). The 21st century skills are a basic requirement at nowadays and education is one of the formal ways to develop 21st century skills (Susilo et al., 2020).

Mathematical literacy is the ability of students to formulate, employ, and interpret mathematics in various contexts, including the ability to do mathematical reasoning (OECD, 2019). Mathematical literacy is one of the domains in the PISA test which held by the Organization for Economic Co-Operation and Development (OECD). Program for International Student Assessment (PISA) is program to assess 15 year old students who are nearing the end of their education have acquired important knowledge and skills in modern society (OECD, 2019).

In PISA 2018 mathematical literacy assessment, Indonesia obtained an average score of 379 and occupied ranked 73 out of 79 countries (OECD, 2019). Based on the assessment results analysis, it was found that of the 6 levels of ability formulated in the PISA test, most of the Indonesia students is only able to solve problems up to level 2, while other countries in this assessment reached level 3, 4, 5, and 6. The level 2 is considered as an outstanding student low in math.

In the case of PISA, students are asked to analyze the problem that can be found in everyday life and then solved mathematically. Fadholi, et al. (2015) concluded the low level of

mathematical literacy skills because the typical questions in PISA have never been faced by the students. With thus, efforts are needed to improve the ability of mathematical literacy in order to increase student learning outcomes in mathematics.

In order to achieved that, the Government encourages education units to implement literacy-oriented learning (Pusmenjar, 2020). By identifying the needs of these students, the teacher can decide the type of assistance to be provided to students (Sa'dijah, et al., 2020). One form of teacher assistance is to facilitate students in solving problems in everyday life (Niswah & Qohar, 2020). For this reason, it is important for teachers to prepare teaching materials that focus on contextual problems (Manoy & Indarasati, 2018; Prabawati, et al., 2019). The integration of mathematical literacy skills in learning is an effort to fulfill curriculum objectives (NCTM, 2000; Kusumadhani, et al., 2018; Doran, 2017; Tso & Lei, 2018).

Kemendikbud describes the main teaching materials in the implementation of the 2013 Curriculum, i.e. *Buku Teks Pembelajaran / BTP* (Kemendikbud, 2014). BTP is the main source of learning to achieve basic competences and core competencies and has been standardized by Kemendikbud to be used in schools. BTP must be able to shape students in achieving independent learning patterns (Rahmawati, 2015). One of the complements to BTP is the Student Worksheet (Noviafitri, et al., 2016).

Student Worksheet contains a set of basic activities that must be carried out by students in achieving the predetermined learning outcome indicators (Trianto, 2015). Student Worksheet must be in line with the

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implementation of the 2013 Curriculum where learning is learner-centered and contextually oriented. Therefore, Student Worksheet can be developed by containing components of the mathematical process that are able to encourage the abilities of students in developing mathematical literacy. This is in line with Dewantara's research where the problems used in mathematics learning have a big influence in giving students the opportunity to develop their mathematical literacy (Dewantara, 2020). This is also strengthened by the research of Kusuma, et al., (2021) where Student Worksheet has a positive impact in developing students' mathematical literacy.

Student Worksheet plays a role as a support in the learning process, especially during the Covid-19 pandemic (Purnama & Suparman, 2020). Because of the Coronavirus Disease 2019 (Covid-19) pandemic, learning was carried out by paying attention to Government directives and implementing health protocols in the new normal era (Diana & Rofiki, 2020). The implementation of learning is in accordance with the *Pembelajaran Jarak Jauh* (PJJ) where students and teachers can carry out learning through online, offline, or a combination of both (Kemendikbud, 2020). One learning approach that combines online and offline learning is blended learning (Mifrahi, 2020).

Blended learning is a learning model that combines face-to-face learning models with online learning models (Handoko & Waskito, 2018; Hrastinski, 2019). The main objective of blended learning is to provide learning opportunities for students to be able to learn independently, improve, and sustainably (Dwiyoogo, 2018). The

application of blended learning in the learning process is responded to a very high category by students (Angraini, et al., 2018; Kurniawati, et al., 2019; Alsalhi, et al., 2019) which has a positive impact to fulfill the learning needs of students (Attard & Holmes, 2020).

Based on the importance of using Student Worksheet to train students' mathematical literacy and some of the advantages contained in the Blended Learning model, Student Worksheet based Blended Learning can be used as an alternative effort to encourage students' mathematical literacy. This study aims to describe the need for Student Worksheet based Blended Learning that can stimulate students' mathematical literacy skills to see existing problems and the causes, constraints, and deficiencies of teaching materials that have been used in school. This series of analysis is expected to provide an overview of the problem so that it can provide solutions and recommendations for developing Student Worksheet based Blended Learning that can help the learning process if needed.

## **METHOD**

This type of research is a qualitative descriptive study that aims to analyze the needs of Students Worksheet based Blended Learning that can stimulate students' mathematical literacy. This research was conducted at SMA Negeri 1 Gresik in the academic year 2020/2021 which involved 15 students of class XI MIPA and 2 mathematics teachers. The subject selection was determined by random sampling.

Needs analysis is one way to identify the problem in preparing a preliminary report (Sulistyaningsih &

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Suparman, 2019). Needs analysis are very important to obtain information or looking for problems related to things that needed. The needs analysis includes material analysis, curriculum analysis, and student' characteristics analysis (Kurniawan & Suparman, 2018). Material analysis is intended to determine which material requires Student Worksheet through interviews in terms of the learning experience of students and the teaching experience of teachers (Ponjen & Suparman, 2019). Curriculum analysis includes interviews with teachers regarding the implementation of the 2013 curriculum in the new normal era. Analysis of the

characteristics of students in the form of tests of student's initial abilities to determine student's mathematical literacy (Taufik, 2019).

The instrument used in student' characteristics analysis was a test instrument for mathematical literacy skills (Utaminingsih & Subanji, 2021). Instrument validation is done through expert judgment. The validity and reliability of the mathematics literacy test questions were obtained through limited trial tests. Due to research limitations, indicators of mathematical process ability limited to five activities each refer to indicators developed by the OECD (2019) described in table 1.

Table 1. Indicators in mathematical process

Indicator	Activities	Code
Formulate	Identify the mathematical aspects of the context of real-world problems and identify important variables	F.1
	Simplify the situation or problem so that mathematical analysis can be accepted	F.2
	Identify the constraints and assumptions behind a mathematical model and the simplifications derived from its context	F.3
	Represent situations mathematically, using appropriate variables, symbols, diagrams, and standard models	F.4
	Translating problems into language or mathematical representations	F.5
Employ	Design and implement strategies for finding mathematical solutions	E.1
	Apply mathematical facts, rules, algorithms, and structures when looking for solutions	E.2
	Create diagrams, graphs and mathematical constructs, and extract mathematical information from them	E.3
	Make generalizations based on the results of applying mathematical procedures to find solutions	E.4
	Reflect on mathematical arguments and explain and justify mathematical results	E.5
Interpret & Evaluate	Interpret mathematical results back to real-world context	I.1
	Evaluating the reasonableness of mathematical solutions in the context of real-world problems	I.2
	Explain why a mathematical result or conclusion makes sense or not, given the context of the problem	I.3
	Understand the range and limits of mathematical concepts and mathematical solutions	I.4
	Criticize and identify the limitations of the model used to solve problems	I.5

The mathematical literacy test consists of two math problems adapted

from National Exam test which are described as follows.

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### Problem 1: PE & Etawa Goat

(Adapted from 2009 National Exam test)

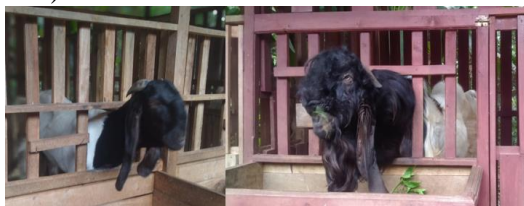


Figure 1. Illustration for problem 1

Approaching the Idul Adha holiday, Mr. Amar was about to sell PE (Peranakan Etawa) goats and etawa goats. The prices of one PE goat and etawa goat in Central Java are IDR 8,000,000.00 and IDR 9,000,000.00 respectively. The capital he has is IDR 124,000,000.00. After being kept for a month, Mr. Amar plans to sell the PE goat and the etawa goat at a price of IDR 9,200,000.00 and IDR 10,300,000.00 respectively. The cage that he has can only accommodate no more than 15 goats. How many PE goats and Etawa goats does Mr. Amar have to buy in order to achieve maximum profit?

### Problem 2: Batik Shoes

(Adapted from 2012 National Exam)



Figure 2. Illustration for problem 2

A businessman owns 2 batik shoe-making business units that utilize gunny sack, i.e. the Mentari unit and the Bintang unit. To fulfill orders for 600 women's shoes and 360 men's shoes, he operates the two business units. In 1 day, the Mentari business unit produces 60 pairs of women's shoes and 24 pairs of men's shoes with workers wages of

IDR 800,000.00/day. In 1 day, Bintang's business unit produces 30 pairs of women's shoes and 24 pairs of men's shoes with workers wages of IDR 600,000.00/day. How many days does it take to finish the order shoes for each business unit so that expenses minimum wage of workers?

Material and curriculum analysis data in the form of interview results were analyzed descriptively. Student characteristics analysis data in the form of the results of the students' answer. Furthermore, students were interviewed to determine the achievement of indicators of mathematical process ability that did not appear in their answers. Credibility of data by using source triangulation. Valid data is then analyzed with the stages of data reduction, data presentation, and making conclusions.

## RESULTS AND DISCUSSION

Interviews between researcher and class XI MIPA students of SMA Negeri 1 Gresik were conducted on May 2, 2021. The interviews between the researcher and the mathematics teacher at SMA Negeri 1 Gresik was also held on that day. The results of the interview are also used as a guide in choosing the material in the mathematical literacy ability test.

### Material Analysis

The results of interviews with students related to materials that are considered difficult are presented in Table 2. Overall, based on the analysis of the results of the interviews with class XI MIPA students at SMA Negeri 1 Gresik, it was concluded that one of the mathematics material for class XI MIPA that was considered difficult was Linear Program material.

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Table 2. Difficult material tabulation

No	Material	Total
1.	Linear Program	8
2.	Derivative Function	5
3.	Mathematic Induction	1
4.	Indefinite Integral	1

The details of the researcher (R) interview with subject student 1 (S1) are described as follows.

R : *Regarding contextual problems, what mathematics material do you think is the most difficult to learn in class XI?*

S1 : *Linear program, because I am still confused about determining the optimum value of the objective function.*

R : *Have you ever used Student Worksheets based Blended Learning in learning mathematics in class?*

S1 : *In this class XI, I has never been used it.*

The results of interviews with subject S1 show that linear program is considered difficult especially when determining the optimum value of the objective function. Furthermore, the results of interviews with teachers show that the student' achievement at program linear material is lower than other material. This is in line with the research of Kenney, et al. (2020) which states that students experience form errors in linear program material related to the interpretation of the feasible solution. The inability of students in the interpretation of the feasible solution results in errors in writing answers (Elsa & Sudihartinih, 2020).

In the linear program material, students are expected to be able to solve problems related to the two-variable linear inequality system (Manullang, et al., 2017). Linear program is an analysis technique using a mathematical model

that aims to produce an alternative problem solving (Irfan, 2020). Linear program material is closely related to contextual problems in everyday life such as determining the maximum profit in a company, determining the minimum amount of materials to be used and so on (Ariawan, 2015). Therefore, it is necessary for teachers to improve student learning outcomes on linear program material by developing contextual problem solving student worksheet according to the research of Abdillah & Astuti (2020) which developed worksheet based problem based learning.

### Curriculum Analysis

The interview was related to the implementation of the 2013 curriculum in mathematics learning in the new normal era. The results of the interview showed that SMA Negeri 1 Gresik has implemented 2013 curriculum based on blended learning. Blended learning is a learning model that combining face-to-face learning models with online learning models. The details of the researcher (R) interview with subject teacher 1 (T1) are described as follows.

R : *How do you respond to the implementation of the 2013 curriculum in mathematics learning that has been implemented in high school nowadays?*

T1 : *It's good, but needs improvement, especially related to student worksheet in the new era.*

R : *Regarding the implementation of face-to-face learning and online learning (Blended Learning) in the current new normal era, what are the obstacles faced by you in teaching?*

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*T1 : Technical constraints is the network. Non-technical constraint: in online learning, the awareness of students must be increased, the material coverage is not so wide, educators cannot know the actual learning outcomes of students.*

*R : How is the use of Student Worksheets based Blended Learning in mathematics learning in SMA class XI MIPA today?*

*T1 : I use Student Worksheets, but not Student Worksheets based Blended Learning one.*

Based on the analysis of interviews results with the subject T1, it was concluded that mathematics learning was implemented according to the 2013 curriculum with the application of Blended Learning in the new normal era include face-to-face learning by implementing health protocols during the covid-19 pandemic and also online learning. The face-to-face learning is shown in figure 3.



Figure 3. Face-to-face learning

Beside that, the online learning were implemented by using online media, such as Whatsapp Group. The condition of online learning is shown in figure 4.

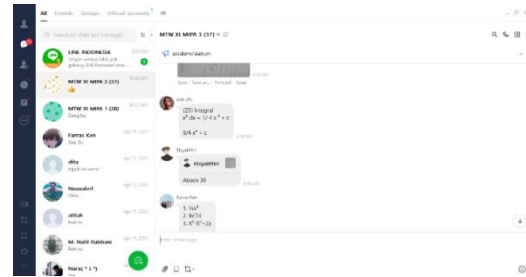


Figure 4. Online learning using Line

One of the obstacles faced by the subject T1 is that she cannot know the actual learning outcomes of students because the teachers do not get a complete picture of the student's activeness during *Kegiatan Belajar Mengajar* (KBM) synchronously and asynchronously. Beside that, subject T1 has not used Student Worksheets based Blended Learning. The lack of using Student Worksheets causes a lack of student activity in learning so that teachers cannot know the actual learning outcomes of students. This is in line with Nabillah & Abadi (2020) which states that one of the causes of low student learning outcomes is the lack of student activity.

Therefore, it is necessary to develop Student Worksheets to have a positive impact on student learning outcomes (Inan & Erkuş, 2017). The Student Worksheets developed was adjusted to the KBM according to the research of Choirudin, et al. (2021) which developed Student Worksheet that can increase the activities of students in improving learning achievement.

### Student' Characteristics Analysis

Based on the material analysis, it was found that one of the mathematics materials in class XI MIPA that was considered difficult was the Linear Program material. Therefore, the material used as a topic in the mathematical literacy test questions is

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linear program material. Based on limited trial tests which is held on May 2, 2021, the validity of problem 1 was 0.966 and problem 2 was 0.971. Furthermore, based on the results of the reliability test, the score of  $r = 0.4972$ , while the score of  $r$  table = 0.497, so that the test instrument was declared reliable.

The mathematical literacy test of class XI students of SMA Negeri 1 Gresik was held on May 3, 2021. The test was conducted to determine students' mathematical literacy in terms of the aspect of mathematical process. The results of the test are then analyzed from indicators of mathematical process ability consisting of aspect formulate, employ, and interpret & evaluate. Next, an interview was conducted to subject student 3 (S3) who scored high on the problem 1 "PE & Etawa Goat" and subject student 10 (S10) who scored high on the problem 2 "Batik Shoes".

**Problem 1: PE & Etawa Goat**

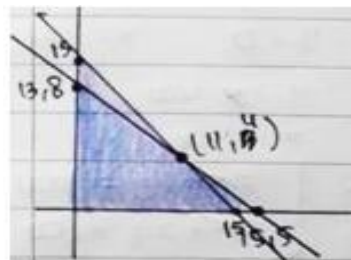
Based on the answer on the problem 1 "PE & Etawa Goat" and interview with subject S3, the analysis can be detailed according to each mathematical process ability indicators. The answer of subject S3 in Formulate indicator is shown in figure 5.

Harga kambing PE : Rp 2.000.000
" Etawa : Rp 9.000.000
Modal yg dimiliki : Rp 124.000.000
HJ Kambing PE : Rp 9.200.000
" Kambing Etawa : Rp 10.300.000
Kandang, hanya bisa menampung tidak lebih dari 15 ekor
• $x$ : Kambing PE $y$ : Kambing Etawa
• Model Matematika $x \geq 0; y \geq 0$
$8.000.000x + 9.000.000y \leq 124.000.000$ $\div 1.000.000$
$8x + 9y \leq 124$ (1)
$x + y \leq 15$

Figure 5. The answer of subject S3 in formulate indicator

Analyzed from Formulate indicator, subject S3 was able to identify mathematical aspects of the context of real-world problems and identify important variables because she was able to analyze information related to PE and etawa goats; able to simplify the situation or problem so that the mathematical analysis is acceptable because she was able to make the assumption of many PE and etawa goats as  $x$  and  $y$  variables; able to identify the constraints and assumptions behind the mathematical model and the simplification obtained from the context because she was able to determine the constraint function PE and the objective function of the problem; able to represent situations mathematically, using appropriate variables, symbols, diagrams, and standard models because she was able to determine the inequality system of two variables from the problems; able to translate the problem into a language or mathematical representation because she was able to determine the objective function as a solution to the problem.

The answer of subject S3 in Employ indicator is shown in figure 6.



• Laba penjualan kambing PE : $9.200.000 - 8.000.000 = 1.200.000$
" Etawa : $10.300.000 - 9.000.000 = 1.300.000$
• Laba Max : $1.200.000x + 1.300.000y$
• Titik pojok $1200.000x + 1.300.000y$
(0,0)      0
(11,4) $1.200.000(11) + 1.300.000(4)$
$13.200.000 + 5.200.000$
18.400.000,,

Figure 6. The answer of subject S3 in employ indicator

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Analyzed from Employ indicator, subject S3 was able to design and implement strategies to find mathematical solutions because she was able to determine alternative x and y values using the extreme points of the feasible solution; able to apply facts, rules, algorithms, and mathematical structures when looking for solutions because she was able to perform eliminations and substitutions correctly; able to make diagrams, graphs and mathematical constructions, and take mathematical information from them because she was able to graph the feasible solution well; able to make generalizations based on the results of applying mathematical procedures to find solutions because she was able to determine profit based on the substitution of variables x and y in the objective function; able to reflect mathematical arguments, explain, and justify mathematical results because she was able to determine the profit based on the comparison of the value of the objective function substitution obtained.

The answer of subject S3 in Interpret & Evaluate indicator is shown in figure 7.

maka, kambing yang harus dikulak P. Amar agar mencapai keuntungan max adalah 11 kambing PE dan 4 kambing etawa

Figure 7. The answer of subject S3 in interpret & evaluate indicator

Analyzed from Interpret & Evaluate indicator, subject S3 was able to interpret the mathematical results back to the real world context because she was able to determine the maximum profit obtained; able to evaluate the reasonableness of mathematical solutions in the context of real-world problems because she was able to compare the number of PE goats and

etawa goats obtained from each of the alternative values of x and y obtained; able to explain why mathematical results or conclusions make sense or not, to the context of the problem, because she was able to choose (11,4) as an answer compared to choices (15,0) and (0; 13,8); able to understand the range and limitations of mathematical concepts and mathematical solutions because she was able to provide reasons (11,4) as a solution that can be obtained which means  $x = 11$  and  $y = 4$ ; able to criticize and identify the limitations of the model used to solve the problem because she analyzed the answers (0; 13,8) as an incorrect answer based on the constraints of PE goats and Etawa goats which is impossible to be a fraction.

Mathematical process ability test scores on problem 1 “PE & Etawa Goat” which refers to the indicators in Table 1 as a percentage from all students have been summarized in diagram 1.

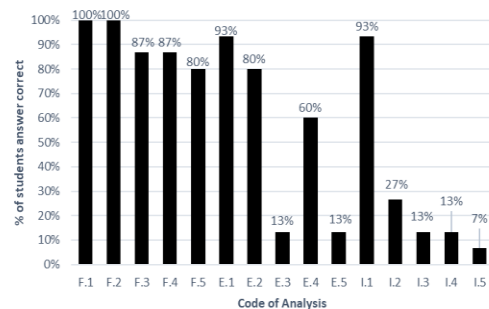


Diagram 1. Students achievement on mathematical process indicator for problem 1

Based on Diagram 1, the results of the analysis of students' abilities on the formulate indicator, obtained 100% students able to identify the mathematical aspects of the context of real-world problems and identify important variables; 100% students able

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to simplify the situation or problem so that mathematical analysis can be accepted; 87% students able to identify the constraints and assumptions behind a mathematical model and the simplifications derived from its context; 87% students able to represent situations mathematically, using appropriate variables, symbols, diagrams, and standard models; and 80% students able to translating problems into language or mathematical representations.

The results of the analysis of students' abilities on the Employ indicator, obtained 93% students able to design and implement strategies for finding mathematical solutions; 80% students able to apply mathematical facts, rules, algorithms, and structures when looking for solutions; 13% students able to create diagrams, graphs and mathematical constructs, and extract mathematical information from them; 60% students able to make generalizations based on the results of applying mathematical procedures to find solutions; and 13% students able to reflect on mathematical arguments and explain and justify mathematical results.

The results of the analysis of students' abilities on the Interpret & Evaluate indicator, obtained 93% students able to interpret mathematical results back to real-world context; 27% students able to evaluating the reasonableness of mathematical solutions in the context of real-world problems; 13% students able to explain why a mathematical result or conclusion makes sense or not, given the context of the problem; 13% students able to understand the range and limits of mathematical concepts and mathematical solutions; and 7% students able to criticize and identify the limitations of the model used to solve problems.

**Problem 2: Batik Shoes**

Based on the answer on the problem 2 “Batik Shoes” and interview with subject S10, the analysis can be detailed according to each mathematical process ability indicators. The answer of subject S10 in Formulate indicator is shown in figure 8.

	Jumlah sepatu		Pesanan
	Mentari	Bintang	
Pria	24	24	360
Wanita	60	30	600
Dongkos	800.000	600.000	

Mentari : A  
Bintang : B

24 A + 24 B → Pria  
60 A + 30 B → Wanita

24 A + 24 B ≥ 360 ⇔ A + B ≥ 15  
60 A + 30 B ≥ 600 ⇔ 2A + B ≥ 20

Z = 800.000 A + 600.000 B

$$\begin{array}{r} A + B = 15 \quad \times 2 \\ 2A + B = 20 \quad \times 1 \\ \hline A + B = 15 \\ A = 5 \end{array}$$

Titik  
a (20,0)  
b (10,5)  
c (5,10)  
d (0,20)

Figure 8. The answer of subject S10 in formulate indicator.

Analyzed from Formulate indicator, subject S10 was able to identify mathematical aspects of the context of real-world problems and identify important variables because he was able to analyze information related to Mentari and Bintang units; able to simplify the situation or problem so that the mathematical analysis is acceptable because he was able to make the assumption of many days needed to finish the order in Mentari and Bintang units as A and B variables; able to

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identify the constraints and assumptions behind the mathematical model and the simplification obtained from the context because he was able to determine the constraint function and the objective function of the problem; able to represent situations mathematically, using appropriate variables, symbols, diagrams, and standard models because he was able to determine the inequality system of two variables from the problems; able to translate the problem into a language or mathematical representation because he was able to determine the objective function as a solution to the problem.

The answer of subject S10 in Employ indicator is shown in figure 9.

$$\begin{aligned}
 a &\rightarrow 800.000(20) + 600.000(0) = 16.000.000 \\
 b &\rightarrow 800.000(10) + 600.000(5) = 11.000.000 \\
 c &\rightarrow 800.000(5) + 600.000(10) = 10.000.000 \\
 &\quad \text{(minimum)} \\
 d &\rightarrow 800.000(0) + 600.000(20) = 12.000.000
 \end{aligned}$$

Figure 9. The answer of subject S10 in employ indicator

Analyzed from Employ indicator, subject S10 was able to design and implement strategies to find mathematical solutions because he was able to determine alternative A and B values using the extreme points; able to apply facts, rules, algorithms, and mathematical structures when looking for solutions because he was able to perform eliminations and substitutions correctly; unable to make diagrams, graphs and mathematical constructions, and take mathematical information from them because he didn't graph the feasible solution; able to make generalizations based on the results of applying mathematical procedures to find solutions because he was able to determine cost based on the substitution

of variables A and B in the objective function; unable to reflect mathematical arguments, explain, and justify mathematical results because he didn't determine the cost based the analysis on the feasible solution.

The answer of subject S10 in Interpret & Evaluate indicator is shown in figure 10.

Dengan demikian dapat disimpulkan bahwa biaya total minimum untuk upah pekerja adalah Rp10.000.000,00. Hal ini tercapai jika unit Mentari 5 hari dan unit Bintang 10 hari.

Figure 10. The answer of subject S10 in interpret & evaluate indicator

Analyzed from Interpret & Evaluate indicator, subject S10 was able to interpret the mathematical results back to the real world context because he was able to determine the minimum cost obtained; able to evaluate the reasonableness of mathematical solutions in the context of real-world problems because he was able to compare the days needed in Mentari and Bintang units obtained from each of the alternative values of A and B obtained; unable to explain why mathematical results or conclusions make sense or not, to the context of the problem, because he just make assumption in choosing the extreme point; unable to understand the range and limitations of mathematical concepts and mathematical solutions because he just answer  $A = 5$  and  $B = 10$  from the assumption without graph the feasible solution; unable to criticize and identify the limitations of the model used to solve the problem because he didn't know the feasible solution well.

Mathematical process ability test scores on problem 2 "Batik Shoes" which refers to the indicators in Table 1

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as a percentage from all students have been summarized in diagram 2.

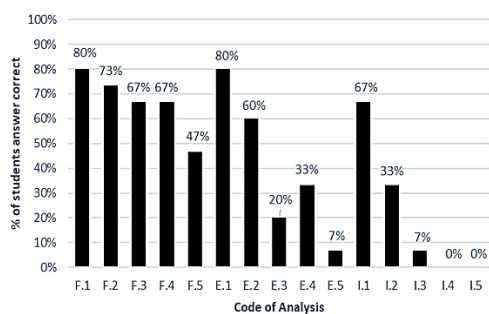


Diagram 2. Students achievement on mathematical process indicator for problem 2

Based on Diagram 2, the results of the analysis of students' abilities on the Formulate indicator, obtained 80% students able to identify the mathematical aspects of the context of real-world problems and identify important variables; 73% students able to simplify the situation or problem so that mathematical analysis can be accepted; 67% students able to identify the constraints and assumptions behind a mathematical model and the simplifications derived from its context; 67% students able to represent situations mathematically, using appropriate variables, symbols, diagrams, and standard models; and 47% students able to translating problems into language or mathematical representations.

The results of the analysis of students' abilities on the Employ indicator, obtained 80% students able to design and implement strategies for finding mathematical solutions; 60% students able to apply mathematical facts, rules, algorithms, and structures when looking for solutions; 20% students able to create diagrams, graphs and mathematical constructs, and extract mathematical information from

them; 33% students able to make generalizations based on the results of applying mathematical procedures to find solutions; and 7% students able to reflect on mathematical arguments and explain and justify mathematical results.

The results of the analysis of students' abilities on the Interpret & Evaluate indicator, obtained 67% students able to interpret mathematical results back to real-world context; 33% students able to evaluating the reasonableness of mathematical solutions in the context of real-world problems; 7% students able to explain why a mathematical result or conclusion makes sense or not, given the context of the problem; none able to understand the range and limits of mathematical concepts and mathematical solutions; and none able to criticize and identify the limitations of the model used to solve problems.

Overall, based on the analysis of the mathematical literacy test in terms of the mathematical process, it is concluded that students still have difficulty explaining why mathematical results or conclusions make sense or not, regarding the context of the problem and have not been able to criticize and identify the limitations of the model used to solve problems. These activities are included in the interpret & evaluate indicators of mathematical process ability.

The low score achievement of students in the interpret & evaluate indicators is in line with the research of Umbara & Suryadi (2019); Hayati & Kamid (2019); and Chasanah, et al., (2020). Umbara & Suryadi's research showed that students in Indonesia are weak in interpreting mathematical solutions to real-world situations. Research by Hayati & Kamid showed that students of class X MIPA are not

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able to express opinions and analyze the results of solutions mathematically. Research by Chasanah, et al. showed that students with an assimilated learning style have not been able to evaluate problem solving well.

Therefore, it is necessary to apply mathematics learning with contextual problem-oriented, teachers need to direct students to perform analysis of incoming mathematical conclusions reasonable or not to the context of the problem, check the limits of mathematical concepts and mathematical solutions, as well as identify model boundaries used to solve problems. Mathematical literacy ability very important to be honed as important component in solving problems in daily life (Utaminingsih & Subanji, 2021). The Student Worksheet based Blended Learning should be develop with focus to encourage matematisal literacy ability especially in Interpret & Evaluate indicator.

## CONCLUSION AND SUGGESTION

Based on the material analysis, it is concluded that one of difficult material is Linear Program. Based on curriculum analysis, it is concluded that Student Worksheet need to be develop based Blended Learning with contextual problem-oriented in the new normal era according to 2013 curriculum. Based on the results of the student' characteristics analysis, it is concluded that students still have difficulty explaining why mathematical results or conclusions make sense or not, regarding the context of the problem and have not been able to criticize and identify the limitations of the model used to solve problems where the activity is included in the interpret & evaluate indicator in mathematical process.

In developing Student Worksheet based Blended Learning, it should be more focused on activities that prioritize the interpretation and analysis of the results of problem solving according to the constraints and context of the problem. The development of student worksheet is expected to improve students' mathematical literacy. Therefore, it is necessary to have good cooperation between students and teachers during teaching learning process in mathematics.

This study findings implicate further research to develop how teachers can promote the higher order thinking skills related to students' mathematical numeracy.

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