Sriwijaya University Learning and Education – International Journal
e-ISSN: xxxx-xxxx
Vol. 1 No. 1, July 2024: 19-36
Research Article

Development of mathematics teaching material based on numeracy for blended learning

Hapizah[1*], Budi Mulyono[1], Ely Susanti[1], Gresia Situmorang[1], M. David Safitra[1], Amieyah Nuradinda[1], Norulhuda Ismail[2]

[1]Mathematics Education, Faculty of Teacher Training and Education, Sriwijaya University, Jl. Srijaya Negara, Bukit Besar, Palembang, Sumatera Selatan, 30139, Indonesia
[2]Department of Educational Sciences, Mathematics and Creative Multimedia, Faculty of Education, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia
*Corresponding author, email: hapizah@fkip.unsri.ac.id

ABSTRACT
Technology-assisted learning has a positive effect on improving students' abilities, one of which is blended learning which combines synchronous learning and asynchronous learning. The article discusses research that aims to produce numeration-based mathematics teaching materials for blended learning that are valid, practical, and have a potential effect on students' numeracy skills in class VII. This research is development research with Preliminary stages and Formative Evaluation stages. The subjects in this study were 30 students of class VII E, at one of the Public Middle Schools in Palembang City. Data was collected through questionnaires, tests, and interviews. The results of the study stated that the numeration-based mathematics teaching materials for blended learning were in the valid category with a score of 85 and in the practical category with a score of 92 and had a potential effect on the numeracy abilities of class VII students with an average score of 77 in the good category. In addition, the results of this study indicate that students' responses to teaching materials are in a good category.

ARTICLE HISTORY
Received 20 July 2024
Revision 28 July 2024
Accepted 31 July 2024
KEYWORDS
Blended Learning; Numeracy; Mathematics Learning; Junior High School

http://dx.doi.org/10.55379/sule-ij.v1i1.2

Introduction

Currently is the era of the industrial revolution 4.0 which is a combination phenomenon that utilizes technology (Ratnasari & Nurvicalesti, 2022). One of the impacts of the 4.0 industrial revolution in the field of education is the creation of blended learning (Utomo & Wihartanti, 2019). Blended learning is a blend of asynchronous and synchronous learning (Chaeruman, 2013). The use of blended learning can help teachers improve the quality of learning (Trimurtini et al., 2021). In order to fulfill 21st-century skills, students are required to fulfil several 21st-century abilities, one of which is numeracy ability (Diva et al., 2022). Numeration is an ability, skill, and knowledge to solve problems both in mathematics and in everyday life that use numbers and symbols in their solutions and can present conclusions in various forms of data (Mahmud & Pratiwi, 2019). Numeracy-based learning can develop students' planning and management abilities, calculations, and interpretations as well as making decisions (Patriana et al., 2021). One of the efforts that can be made to improve the quality of learning and students' numeracy abilities is by using teaching materials during the learning process (D. A. Putri et al., 2020).

Teaching materials are a set of learning supports that are used during the learning process (Rismawati et al., 2022). The use of appropriate teaching materials can improve numeracy skills and learning outcomes obtained by students during learning (Ladyawati & Rahayu, 2022; Rahman et al., 2021). Teaching materials adapted to blended learning activities can improve the quality of learning (Dewi et al., 2019; Loli et al., 2018). However, the learning that is carried out by the teacher in the classroom still does not make much use of teaching materials during the learning process (Hanifah & Utari, 2022). Learning that is usually used only uses textbooks and uses the teacher center method (Umar et al., 2022). Students are not used to solving various problems in real contexts using reasoning (Lestari et al., 2022; Yustinaningrum, 2021).

Teachers are required to be able to develop learning support tools such as determining models, strategies, and approaches according to the needs of students (Hapizah et al., 2022). The use of teaching materials adapted to numeracy-based activities in blended learning can be an option for teachers to improve the quality of learning. Technology-based teaching materials that involve student learning activities can be a solution in improving numeracy skills and the quality of learning (Rahman et al., 2021; Sofyan & Ratumanan, 2018). Indicators of numeracy skills used in blended learning, namely being able to use various kinds of numbers or symbols related to basic mathematics in solving everyday life problems, being able to analyze information displayed in various forms (graphs, tables, charts, diagrams, etc.) and interpret the results of the analysis to predict and make decisions (Sari & Aini, 2022).

The results of research conducted by (Rismawati et al., 2022) show that the development of teaching materials based on comics and android that are valid, practical, and effective can improve students' understanding of concepts and numeracy abilities. The use of numeration-based teaching materials that have been developed and categorized as valid, effective, and practical can improve students' numeracy skills (Ladyawati & Rahayu, 2022). However, researchers have not found research related to the development of numeracy-based teaching materials for blended learning. Based on research results (Rismawati et al., 2022) and (Ladyawati & Rahayu, 2022), the resulting product does not contain activities that are in accordance with blended learning. Therefore, the aim of this research is to produce numeration-based teaching materials for blended learning in class VII that are valid, practical, and have a potential effect on students' numeracy abilities.

Method

This research is development research with preliminary study and formative evaluation stages. In the preliminary study stage, the activities carried out are preparation, analysis, and design. In the formative evaluation stage, the Self Evaluation, Expert Review, One-To-One, Small Group, and Field Tests were carried out (Tessmer, 1993). What was done at the preparatory stage was determining the contexts to be used, taking photographs in the field to be used in teaching materials, and coordinating with the school. In the analysis and design phase, the researcher analyzed

the materials used, and designed the teaching materials according to the numeration-based components for data presentation material, starting from choosing the context determined at the preparation stage. At the self-evaluation stage, the researcher reviews and re- evaluates the draft teaching materials produced and then makes improvements. In the Expert Review step, the designed teaching materials are evaluated by expert lecturers by providing an assessment in terms of content, construct, and language. In parallel drafts of teaching materials were also given to several students at the One-to-One stage, to provide input related to readability. Selected students are representatives of students with low, medium, and high abilities. The results of the expert review and one-to-one stages are used as material for revising teaching materials. The next stage is the Small Group, where teaching materials are tested on a small group of students. The final stage is the Field Test, namely field test stage, teaching materials are used by classroom mathematics teachers to see how they impact students' numeracy abilities. The research subjects were 30 students of class VII D at one of the Public Middle Schools in Palembang City. The flow of developing of teaching materials based on numeracy for blended learning can be seen in Figure 1.

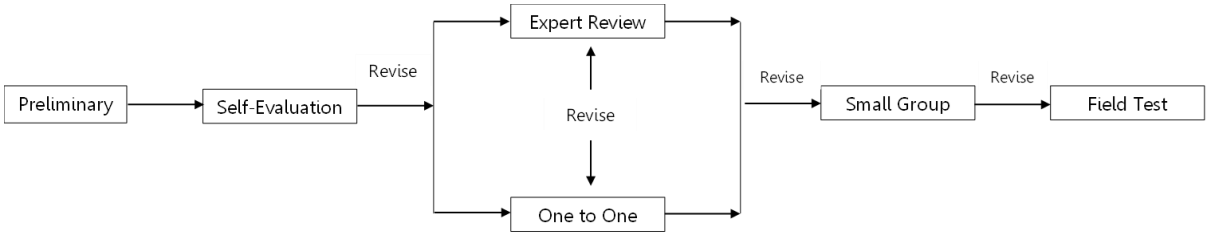


Fig. 1. The Flow of Developing Steps

Data collection techniques in this study were questionnaires, tests, and interviews. Questionnaires are used to assess the validity of teaching materials, which are carried out at the expert review and one-to- one stages. Questionnaires were also used to see the practicality of numeration-based teaching materials given at the Small Group stage. The test used is in the form of numeration-based description questions to see the potential effects of numeration-based teaching materials. Interviews are used to support the data that has been obtained from the results of the tests carried out.

Data analysis techniques used in this research are quantitative and qualitative. Quantitative data analysis was carried out to analyse the questionnaire and test data. The results of the questionnaire analysis were grouped to determine the validity and practicality categories. The criteria for the validity of teaching materials refer to Table I. Criteria for the practicality of teaching materials refer to Table II.

Table1. Validity Category

Validity Interval	**Criteria**
0,1-49	Invalid
50,1-69	Mayor Revision
70,1-84	Minor Revision
85,1-100	Valid

Table 2. Practicality Category

Practicality Interval	Criteria
20 – 36	Very Impractical
37 – 52	Impractical
53 – 68	Quite Practical
69 – 84	Practical
85 – 100	Very Practical

The results of the test data analysis are grouped into 3 categories namely high, medium, and low. As for the high, medium, and low-test categories by looking at the Mean (M) and Standard Deviation (SD) values of the results done by the students, the Test Categories are shown in Table III. The interview data were analysed qualitatively by referring to the student's answer sheets at the time of the test.

Table 3. Score Test Category

Score	Category
$x > M + SD$	High
$M - SD \leq x \leq M + SD$	Medium
$x < M - SD$	Low

Result and Discussion

Preliminary Study. In the preparatory stage, the team discussed selecting the context used in the teaching materials. The contexts used include typical food in South Sumatra, and shopping at the Online Shop. The team went to the field to take photo documentation that could be used in teaching materials. The team also held discussions with the school as a research location and observed students' initial abilities in terms of numeracy and school facilities in implementing blended learning. Students' numeracy skills are still good. Students have the facilities to apply blended learning, communication can be done through the WhatsApp application. At the design stage, the researcher designed numeration-based teaching materials for blended learning with components consisting of (a) module information given numeracy reinforcement; (b) learning objectives; (c) general description; (d) theoretical basis; (e) starting questions; (f) meaningful understanding; (g) description of learning; (h) learning (opening, core and closing activities); (i) assessment; (j) reflection; and (k) glossary. Formative Evaluation. In the formative evaluation stage, several stages were carried out, namely Expert Review, One to One, Small Group, and Field Test.

Expert Review. At this stage the teaching materials are validated by 2 expert lecturers, by providing an assessment based on predetermined aspects and indicators. The average of the assessment results given by the validator is presented in Table IV.

Table 4. The Assessment Results at Expert Review

No.	Aspect	Indicator	Score
1.	Content	Suitability material with Core/Basic competencies	69,32

No.	Aspect	Indicator	Score
		Suitability material with students' competencies	100
		Suitability context with material	86,36
		Suitability problems for asynchronous mode	78,41
		Suitability problems for blended learning	85,23
		Suitability problems for numeracy	86,36
		Evaluation	100
2.	Language	Suitability sentences with Indonesian standard	63,64
		Suitability punctuation	95,45
		Simplicity of sentence structure	73,86
		Sentence ambiguity	95,45
3.	Display	Cover appeal	69,32
		The suitability of the letters used in teaching materials	96,59
		Layout composition balance	77,27
		Compatibility of the images used	97,73
		Score Average	**85**

The average score given by the validator is 85 with a valid category. In addition to providing an assessment score the validator also provides comments or suggestions openly, which are used as material for consideration in revising teaching materials. Based on the validator's input or suggestions, some of the things that were revised are presented in Table V.

Table 5. Revision Results from the Expert Review Stage

Before Revision	After Revision
Improve Competency Achievement Indicators	

Indikator Pencapaian Kompetensi

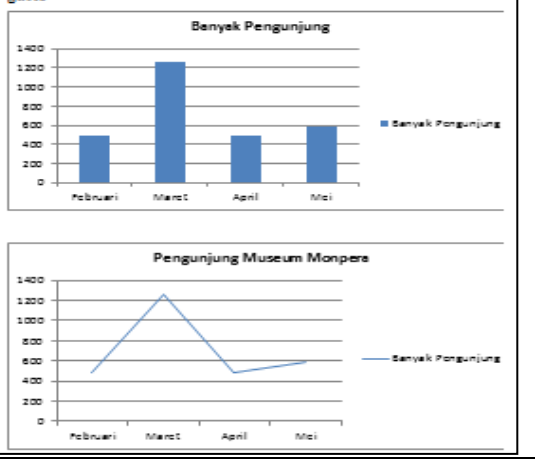
1. Mengenal data dalam kehidupan sehari-hari
2. Memahami cara mengumpulkan data
3. Menganalisis data (tabel, diagram garis, diagram batang, dan diagram lingkaran).
4. Membaca data

1. Menyajikan data dalam bentuk diagram batang
2. Menyajikan data dalam bentuk diagram garis
3. Menafsirkan data dalam bentuk diagram garis
4. Menyajikan data dalam bentuk diagram lingkaran
5. Menafsirkan diagram batang dan diagram lingkaran

Indikator Pencapaian Kompetensi

1. Mengenal data dalam kehidupan sehari-hari
2. Memahami cara mengumpulkan data
3. Menganalisis data (tabel, diagram garis, diagram batang, dan diagram lingkaran).
4. Membaca data

1. Menyajikan data dalam bentuk tabel, diagram batang, diagramm garis, dan diagram lingkaran
2. Menafsirkan data dalam bentuk tabel, diagram batang, diagramm garis, dan diagram lingkaran

Before Revision	After Revision
Add answers of the type of data presented with line chart answers	b. Dari tabel yang telah dibuat, buatlah diagram yang sesuai dari informasi tersebut! **Jawaban**: Disajikan dengan **diagram Batang atau diagram garis** 

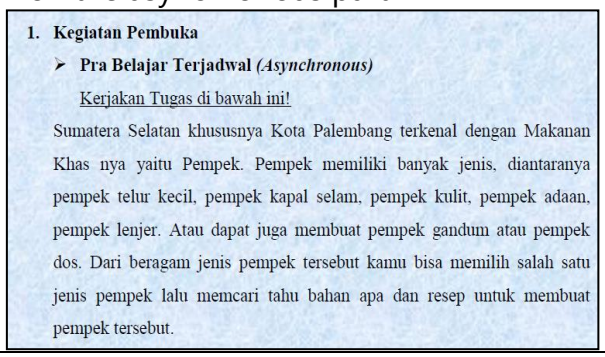
One-to-one. At this stage, teaching materials are given to 3 students to ask for input or suggestions. Asynchronously, these students are asked to understand and work on the problems that exist in these teaching materials. According to the three students, the language and words in the teaching materials were easy to understand and the activities were also interesting because they were taken from the real context in South Sumatra. but in some sentences, there were typing errors, and the researcher corrected the typing errors. The comments given by students after working on teaching materials can be seen in Table VI.

Table 6. Student Comments in the One-To-One Phase

Students	Comments
AR	The teaching materials are easy to understand. The cover colours used are good. Asynchronous questions are difficult to understand
MS	Good and interesting teaching materials Available materials are easy to understand The questions on the asynchronous part are too difficult
NK	Good teaching materials Commands on asynchronous problems are confusing

From the comments given by students, the researcher revised the asynchronous questions. The researcher clarifies the questions by separating the question sentences into 2 questions so that students easily understand what is being asked in the questions. The results of the revised teaching materials that have been developed at the One-to-One stage are shown in Table VII.

Table 7. Results of the One-To-One Phase Revision

Before Revision
Fixed the problem on the asynchronous part  1. **Kegiatan Pembuka** ➢ **Pra Belajar Terjadwal** ***(Asynchronous)*** Kerjakan Tugas di bawah ini! Sumatera Selatan khususnya Kota Palembang terkenal dengan Makanan Khas nya yaitu Pempek. Pempek memiliki banyak jenis, diantaranya pempek telur kecil, pempek kapal selam, pempek kulit, pempek adaan, pempek lenjer. Atau dapat juga membuat pempek gandum atau pempek dos. Dari beragam jenis pempek tersebut kamu bisa memilih salah satu jenis pempek lalu memcari tahu bahan apa dan resep untuk membuat pempek tersebut.
After Revision
Clarify what is asked in asynchronous questions so that it makes it easier for students to understand the questions given. Add a picture of pempek to make the question more interesting.  **Kegiatan Pembuka** ➢ **Pra Belajar Terjadwal** ***(Asynchronous)*** Sumatera Selatan khususnya Kota Palembang terkenal dengan Makanan Khas nya yaitu Pempek. Pempek memiliki banyak jenis, diantaranya pempek telur kecil, pempek kapal selam, pempek kulit, pempek adaan, pempek lenjer. Atau dapat juga membuat pempek gandum atau pempek dos. Dari beragam jenis pempek tersebut kerjakan soal di bawah ini! 1. Tentukan salah satu jenis pempek 2. Carilah apa saja bahan-bahan yang diperlukan untuk membuat pempek dari yang sudah ditentukan 3. Mencari resep untuk membuat pempek yang sudah ditentukan

Small Group

Teaching materials that have been revised based on input from validators and student comments at the one-to-one stage are then re-tested in small groups, namely at the Small Group stage. The small groups used were 2 groups, each consisting of 3 students. Each group was asked to understand and solve the problems that exist in the teaching materials. The work results of group 1 are shown in Fig. 2.

Fig.2 The answer of Group 1 in the Small Group

In Fig. 2 the results of the students' discussions were good. On the understanding indicator, students can determine information from the questions given, students are also able to use mathematical symbols correctly in writing down what is known and what is asked of the questions. In the application indicator, Group 1 has used the steps to answer correctly, namely answering by first determining the discount and then determining the postage based on the price of the goods and discounts at Online Shop A and B. In the reasoning section, it can be seen from the steps and the way students determine answers correctly in comparing the prices of the larger and the smaller. Furthermore, at the end of completion students provide conclusions or results of decisions from the answers given. This shows that the three indicators have emerged from the work of group 1.

The results of group 2 work are shown in Fig. 3. In Fig. 3 the results of the participants' discussions were quite good. On the understanding indicator, students only write down what is known, they do not write down what is asked of the questions. In the application indicator, the students did not describe the completion steps in detail, the students answered one by one starting from Online Shop A and then to Online Shop B. However, for the reasoning indicator, group 2's answers had different answers because the calculation started by adding shipping costs and then subtracting them by discount and correctly conclude that Online Shop B is cheaper and more affordable. This shows that reasoning indicators appear in group 2's answers.

Fig. 3. The answer of Group 2 in the Small Group

After working on assignments in teaching materials, students were asked to fill out a questionnaire. The results of the questionnaire given by the students were used to see the level of practicality of teaching materials. The results of the student questionnaire at the Small Group stage are presented in Table VIII.

Table 8. Questionnaire Results

Student Initials	Questionnaire Score
AG	91,07
AB	94,64
KL	92,86
GS	91,07
SL	91,07
VL	94,64
Score average	**92,56**

Based on Table VIII, the average result of the questionnaire calculation score is 92.56. This shows that the numeration-based teaching materials that have been developed are included in the very practical category. The teaching materials developed can be declared as valid and practical products, after the small group trial results are obtained and the teaching materials are revised based on the questionnaire results and the students' work when working on numeration-based teaching materials for Blended Learning.

Field Test

At this stage, the teaching materials were extensively tested in one class, namely as many as 30 students. The learning process follows all the stages in the developed teaching materials, with reference to the blended learning stages, namely the occurrence of asynchronous and synchronous learning processes. After going through the learning process, students are given test questions and interviewed with the following descriptions.

Analysis of Test and Interview Data

The written test carried out by students is in the form of numeration-based description questions with the context of South Sumatra's special food, namely Pempek. From the results of tests done by students, the average score is 77.66 in the good category. Overall students can complete the test questions given with 8 students in the high category, 19 students in the medium category, 3 students in the low category. The description of students' numeracy abilities in each category is:

High Category Student MH

MH is classified as a high ability student, the answers given by MH can be seen in Fig. 4. MH fulfils all indicators of numeracy ability. For the first indicator, MH was able to use numbers and symbols completely and accurately in determining information, namely knowing and asking about the price of *pempek* sold by Mrs. Tina. For the second indicator, MH was able to write correctly and accurately about solving the

problem, namely writing in detail how to get the biggest result from Mrs. Tina's *pempek* sales, namely Sunday. However, when determining Mrs. Tina's sales results in one week, MH made a mistake in carrying out the calculation operation. MH is still experiencing difficulties when calculating sales results. On the reasoning indicator, MH also wrote the conclusions correctly.

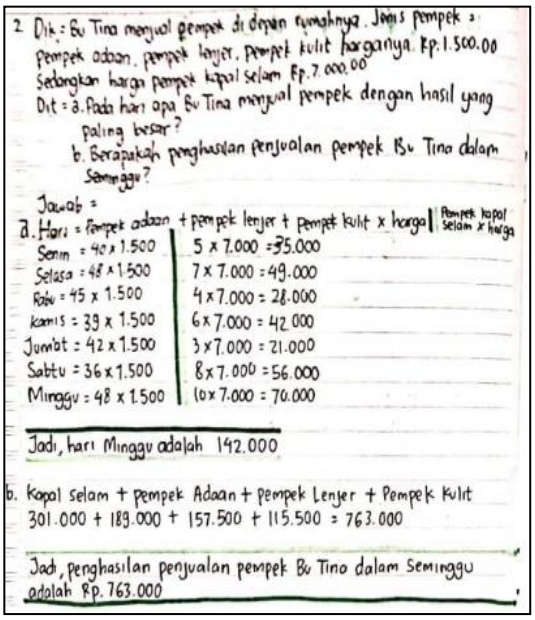


Fig. 4 MH's Test Results

To deepen MH's numeracy skills, an interview was conducted with excerpts from the interview results as follows:

...

P : Explain your understanding of the function of symbols in algebraic form.

MH : Its function is as a symbol of something that was exemplified earlier.

P : Why did you choose Sunday for the answer to question A?

MH : I have proven it by calculating one by one Mrs. Tina's sales results from Monday to Sunday, and her biggest income is on Sunday, which is IDR 142,000.00.

P : Why on question B did you answer Rp. 763,000.00?

MH : Yes, sorry ma'am, I was wrong in calculating it on the results of pempek lenjer so the results are wrong ma'am. It should be IDR 145,500.00.

...

Based on the results of the interviews that have been conducted, MH has mastered the test questions that have been given. During the interview, MH found out where he went wrong when answering the questions, namely when he was carrying out an operation to calculate *pempek lenjer* sales. According to MH, he prefers to learn using the developed teaching materials because he uses questions in the context of everyday life.

Medium Category Student SD

SD is categorized as a medium-category student, SD answers can be seen in Figure 5. SD fulfils the first indicator, namely understanding in answering known

information and being asked from the questions given. For the second indicator, SD can answer correctly when determining Sunday as the day with the most sales. However, SD was not correct in calculating Mrs. Tina's sales. SD experienced an error in performing the addition operation. SD also did not write a conclusion from the results that were done, only answered briefly answer A on Sunday and answer B, which was Rp. 721,000.00.

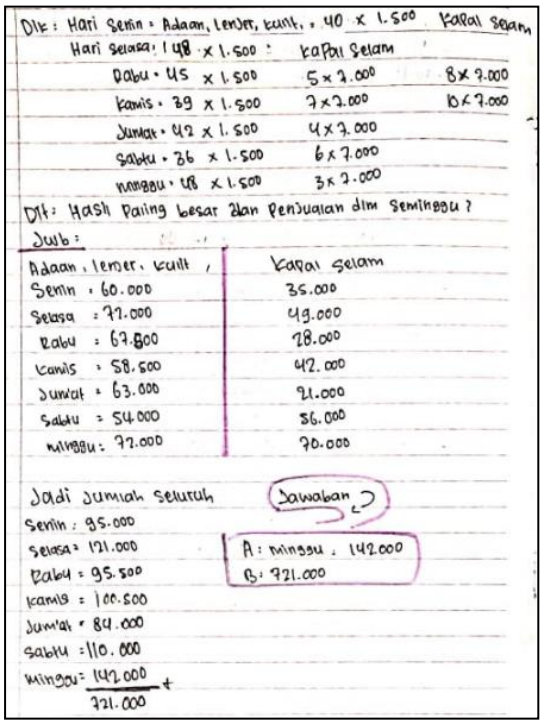


Fig. 5 SD's Test Results

To deepen elementary numeracy skills, interviews were conducted with excerpts from the interview results as follows:

...

P : Why did you choose Sunday for answer A?

GS : Because after calculating and comparing each day of Mrs. Tina's sales, the biggest sales are on Sundays.

P : Why did you answer Rp. 721,000.00 for question B?

GS : I counted it, and the result is IDR 721,000.00

P : Why don't you provide a summary of the answers you've worked on?

GS : Sorry ma'am, I forgot to write it down. So, I'm only answering the A and B answers, ma'am

...

Based on the results of the interview, it appears that SD made a mistake in calculating Bu Tina's *pempek* sales. In addition, SD cannot state the conclusions of the answers that have been done. According to the results of the analysis, SD was right in carrying out the settlement steps, it was just that SD was wrong when adding up the results of *pempek* sales.

Low Category Student NK

NK is classified as a low-ability student, NK's answers can be seen in Figure 7. NK is not able to fulfil the three indicators of calculating ability correctly and precisely, is unable to write data that is known from the information presented and asked, uses numbers and symbols in working on test questions and write problem solutions correctly and precisely and explain wrong results or conclusions.

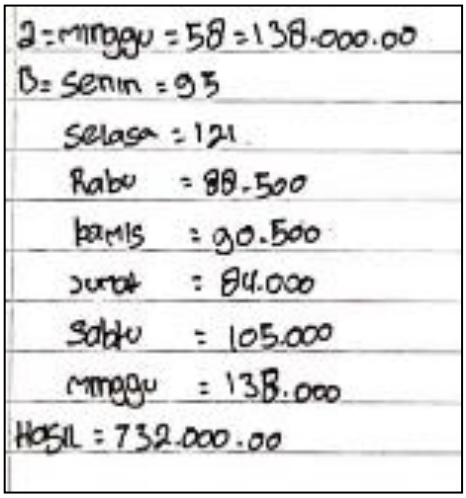


Fig. 6 NK's test results

To deepen the NK's numeracy skills, interviews were conducted with excerpts from the interview results of the researchers as follows:

...
P : Why did you answer Rp. 138,000.00 when answering question, A?
NK : I counted the results, ma'am
P : Where did you answer that result B was Rp. 732,000.00?
NK : I added up all the sales for the week and the result was Rp. 732,000.00
P : Why don't you write a conclusion from your answer?
NK : Sorry ma'am, the conclusion is in results A and B ma'am, IDR 138,000.00 and IDR 732,000.00
...

Based on the results of the interview, it appears that NK experienced difficulties in answering the questions. NK did not understand the questions given and the answers given by NK were not correct. NK understands the application of working according to the steps when answering question B, but NK still experiences difficulties during the addition operation. According to NK, learning to use teaching materials is easier and more fun because the appearance of teaching materials is interesting and there are various activities in teaching materials.

The feasibility of the teaching materials developed is categorized as valid with an average score of 85. The material discussed in this teaching material has been declared in accordance with the curriculum, even though there is some content that looks inappropriate because it follows the terms in the PISA framework, such as for comparison material. The content in the PISA framework is Change and Relationship, Space and Shape, Quantity, Uncertainty, and Data (OECD, 2022). Comparison is included in the PISA framework with Change and Relationship content. The material in

teaching materials is categorized according to the abilities of students, namely for class VII students. The score given by the validator for suitability with the ability of students is 100. The contexts developed in this teaching material include the tourism context at the Jakabaring and *Monpera* Stadiums as well as the Export and Import of South Sumatra Province. These contexts were chosen to suit the conditions of students in the South Sumatra region. This context is categorized according to the material in the teaching materials. The score given by the validator for this indicator is 86.36.

Blended learning implements asynchronous and synchronous modes. The problems given for blended learning are in the very appropriate category with a score of 85.23. In learning, the suitability of the problems used determines the success of a lesson. Problems for asynchronous activities in this teaching material are categorized as appropriate, namely with a score of 78.41. Asynchronous activities require students to be able to learn independently, clear guidance on asynchronous activities will greatly help students. Thus, blended learning can increase student learning independence (Bakhtiar, 2017; Ballouk et al., 2022; Febriani, 2021; Fitriasari et al., 2018; Hamsia et al., 2020; Kustandi et al., 2020; Ma'rufa & Mustofa, 2021; Paraskeva et al., 2017; Setyaningrum, 2019; Stevens, 2020; Zhu et al., 2020). Student learning independence can support student success (Izzati, 2017). Input from students at the one-to-one stage stated that the problems given at asynchronous times were classified as difficult. In response to this comment, the problem was revised by simplifying sentences more and clarifying the meaning of the problem. Teaching materials are added pictures, to make it look more interesting and not monotonous. Teaching materials are considered monotonous teaching materials if teaching materials are only in the form of text and there are no pictures (Istiqomah, 2020). The problems raised in this teaching material are also required to be able to foster students' numeracy abilities. Based on the results of the validator's assessment, this teaching material is very supportive of students' numeracy skills, as evidenced by the score given by the validator which is 86.36. The evaluation given in this teaching material is also classified according to what will be measured with the score given by the validator being 100.

For language feasibility and appearance of teaching materials, it is categorized as appropriate, namely in terms of sentences, use of punctuation marks, simplicity of sentence structure, sentence interpretation, attractiveness of cover, suitability of letters and layout composition and suitability of images. In line with the comments of students at the one-to-one stage, which stated that the teaching materials were easy to understand, the activities were interesting, the teaching materials developed were categorized as valid. The practicality of teaching materials is known through the small group stage, seeing how students try to solve problems that exist in teaching materials. The ability of students to answer problems indicates that students understand well or not well the problems that exist in these teaching materials. Group 1 and group 2 have given good answers. This indicates that students understand well the existing problems. At the small group stage, students are given a questionnaire related to the

practicality of teaching materials. The average score given by students in the practicality questionnaire was 92.56 which was categorized as very practical.

The potential effect of this teaching material is known after students complete the test questions. The test questions given are questions about numeration. There were 8 (26.7%) students included in the high category. In this high group, students have been able to use numbers and symbols completely and correctly in solving *pempek* sales problems, have been able to analyse *pempek* sales information displayed in tabular form, have been able to state conclusions correctly. However, in this high group there are still students who make mistakes in calculations. There are 19 (63.3%) students who fall into the medium category. Intermediate group students have been able to use various kinds of numbers and symbols to solve problems in the context of *pempek* sales, students are able to analyse information presented in tabular form, but students have not been able to write conclusions from the results of the analysis, and there are still errors in calculating. There are still students who have not been able to write conclusions, in line with the research conducted by Anggraeni & Kadarisma (2020) and Erfani et al. (2020).

There were 3 (10%) students included in the low category. Students in the low group have used various kinds of numbers and symbols to solve problems in the context of *pempek* sales properly and correctly, but students still make mistakes in analysing the information provided, indicated by there are still errors in writing down the information presented and asked, and students have not been able to write conclusions correctly. For errors in calculating, students in the low group also did not perform calculations properly. Of the three groups of students, all groups made mistakes in calculations. This is research finding that students still need to pay attention in terms of doing calculations. Student errors in calculating are findings obtained from studies that have been conducted on various materials, such as research (Amin et al., 2021; Anggraeni & Kadarisma, 2020; Diah Pratiwi et al., 2021; Dinda Amalia & Windia Hadi, 2020; Erfani et al., 2020; Gustianingum & Kartini, 2021; Hidayat & Pujiastuti, 2019; Lutfia, 2021; Ningsih et al., 2020; Rachman & Saripudin, 2020; Sitompul & Effendi, 2021; Suciati & Wahyuni, 2018; Utami et al., 2019; Wahyuni, 2020).

Conclusion

From the results of the research that has been done, it can be concluded that the developed numeracy-based mathematics teaching materials for blended learning are categorized as valid and practical and have a potential effect on students' numeracy abilities. The research findings revealed that there were still students who made mistakes in calculations, which occurred in high, medium, and low group students. The teaching materials developed received a good response from students because they used activities related to everyday life.

Acknowledgment

The following research was made thanks to the contributions of the research scheme of Penelitian Unggulan Kompetitif funded by Universitas Sriwijaya with contract number: 1439/UN9.FKIP/TU.SK/2022.

References

Amin, K., Kamid, K., & Hariyadi, B. (2021). Analisis Kesalahan dalam Menyelesaikan Masalah Matematika Kontekstual pada Materi Bangun Ruang Sisi Datar Berdasarkan Newman Error Analysis Ditinjau dari Gender. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(2). https://doi.org/10.31004/cendekia.v5i2.692

Anggraeni, R., & Kadarisma, G. (2020). Analisis Kemampuan Pemecahan Masalah Matematik Siswa Smp Kelas VII Pada Materi Himpunan. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2). https://doi.org/10.31004/cendekia.v4i2.334

Bakhtiar, M. I. (2017). Tingkat self-regulated learning mahasiswa melalui pembelajaran blended learning berbasis aplikasi Google Classroom. *Prosiding Seminar Nasional Lembaga Penelitian Universitas Negeri Makassar*.

Ballouk, R., Mansour, V., Dalziel, B., McDonald, J., & Hegazi, I. (2022). Medical students' self-regulation of learning in a blended learning environment: a systematic scoping review. In *Medical Education Online* (Vol. 27, Issue 1). https://doi.org/10.1080/10872981.2022.2029336

Chaeruman, U. A. (2013). Merancang Model Blended Learning. *Jurnal Teknodik*, 053–063. https://doi.org/10.32550/teknodik.v17i4.577

Dewi, K. C., Ciptayani, P. I., Surjono, H. D., & Priyanto. (2019). Blended Learning - Konsep dan Implementasi pada Pendidikan Tinggi Vokasi. In *Jl. Tukad Batanghari VI.B No. 9 Denpasar-Bali* (Issue 28).

Diah Pratiwi, I., Aritsya, A., & Yanti, Y. (2021). ANALISIS KESALAHAN SISWA DALAM MENGERJAKAN SOAL CERITA TRIGONOMETRI. *PHI: Jurnal Pendidikan Matematika*, *5*(1). https://doi.org/10.33087/phi.v5i1.125

Dinda Amalia, & Windia Hadi. (2020). ANALISIS KESALAHAN SISWA DALAM MENYELESAIKAN SOAL HOTS BERDASARKAN KEMAMPUAN PENALARAN MATEMATIS. *Transformasi : Jurnal Pendidikan Matematika Dan Matematika*, *4*(1). https://doi.org/10.36526/tr.v4i1.904

Diva, S. A., Khafidin, D., & Ulya, H. (2022). Pengaplikasian Pmri Dengan Soal Hots Guna Meningkatkan Kompetensi Literasi Numerasi Dalam Asesmen Kompetensi Minimum. *Seminar Nasional Pendidikan Matematika*, *9*, 138–148.

Erfani, G. A., Rokhman, M. S., & Sholikhakh, R. A. (2020). Analisis kesalahan siswa dalam menyelesaikan soal cerita matematika materi aritmetika sosial menurut Polya. *AKSIOMA : Jurnal Matematika Dan Pendidikan Matematika*, *11*(2). https://doi.org/10.26877/aks.v11i2.6850

Febriani, H. (2021). Meningkatkan Kemandirian Belajar Siswa melalui Metode Blended Learning berbantuan Google Classroom pada Materi Kesetimbangan Kimia. *Jurnal Pendidikan Kimia Indonesia*, *5*(1). https://doi.org/10.23887/jpk.v5i1.31343

Fitriasari, P., Tanzimah, T., & Sari, N. (2018). Kemandirian Belajar Mahasiswa Melalui Blended Learning pada Mata Kuliah Metode Numerik. *Jurnal Elemen*, *4*(1). https://doi.org/10.29408/jel.v4i1.439

Gustianingum, R. A., & Kartini, K. (2021). Analisis Kesalahan Siswa Berdasarkan Objek Matematika Menurut Soedjadi pada Materi Determinan dan Invers Matriks. *Mosharafa: Jurnal Pendidikan Matematika*, *10*(2). https://doi.org/10.31980/mosharafa.v10i2.977

Hamsia, W., Riyanto, Y., & Arianto, F. (2020). Utilizing A New Technology of English Discoveries Platform in Implementation of Blended Learning to Improve English Speaking Performance. *Jo-ELT (Journal of English Language Teaching) Fakultas Pendidikan Bahasa & Seni Prodi Pendidikan Bahasa Inggris IKIP*, *7*(2). https://doi.org/10.33394/jo-elt.v7i2.3191

Hanifah, & Utari, T. (2022). *Pelatihan Pengembangan Bahan Ajar Diferensial Model Apos Berbantuan Geogebra*. *1*(02), 154–162.

Hapizah, H., Indaryanti, I., Susanti, E., Yusup, M., Sari, N., Araiku, J., & Pratiwi, W. D. (2022). Pendampingan Pendesainan Perangkat Pembelajaran Berbasis Problem Based-Learning Bagi Guru-Guru Matematika Kota Lubuklinggau. *Jurnal Martabe*, *5*(4), 1512–1523.

Hidayat, D. W., & Pujiastuti, H. (2019). Analisis kesalahan siswa dalam menyelesaikan masalah matematis pada materi himpunan. *Jurnal Analisa*, *5*(1). https://doi.org/10.15575/ja.v5i1.4120

Istiqomah, D. (2020). PENGEMBANGAN MODUL BERBASIS MODEL MISSOURI MATHEMATIC PROJECT PADA MATERI BANGUN DATAR. In *SELL Journal* (Vol. 5, Issue 1).

Izzati, N. (2017). PENERAPAN PMR PADA PEMBELAJARAN MATEMATIKA UNTUK MENINGKATKAN KEMANDIRIAN BELAJAR SISWA SMP. *Jurnal Kiprah*, *5*(2). https://doi.org/10.31629/kiprah.v5i2.283

Kustandi, C., Wargahadibrata, H., Fadhillah, D. N., & Suprayekti, K. I. N. (2020). Flipped classroom for improving self-regulated learning of pre-service teachers. *International Journal of Interactive Mobile Technologies*, *14*(9). https://doi.org/10.3991/ijim.v14i09.11858

Ladyawati, E., & Rahayu, S. (2022). Pengembangan Buku Ajar Matematika Berbasis Literasi dan Numeari Sebagai Penguat AKM. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *6*(2), 1433–1448. https://doi.org/10.31004/cendekia.v6i2.1312

Lestari, A., Hapizah, Mulyono, B., & Susanti, E. (2022). Implementasi Blended Learning Pada Materi Bilangan Pecahan. *JUPITEK: Jurnal Pendidikan Matematika*, *5*, 60–70.

Loli, K. J., Damayanti, N. W., & Yuniarto, E. (2018). Pengembangan Lks Berdasarkan Masalah Kontekstual Pada Materi Operasi Hitung Bentuk Aljabar. *Edu Sains: Jurnal Pendidikan Sains & Matematika*, *6*(1), 30. https://doi.org/10.23971/eds.v6i1.897

Lutfia, A. (2021). Analisis Kesalahan Siswa Dalam Menyelesaikan Soal Matematika Materi Lingkaran. *INNOVATIVE: Journal Of Social Science Research*, *1*(1). https://doi.org/10.31004/innovative.v1i1.2033

Mahmud, M. R., & Pratiwi, I. M. (2019). Literasi Numerasi Siswa Dalam Pemecahan Masalah Tidak Terstruktur. *KALAMATIKA Jurnal Pendidikan Matematika*, *4*(1), 69–88.

Ma'rufa, I. M. U., & Mustofa, M. (2021). A Narrative Inquiry into EFL Teachers' Professional Experiences in Blended Learning during COVID-19 Pandemic. *International Journal of Language Teaching and Education*, *5*(1). https://doi.org/10.22437/ijolte.v5i1.13772

Ningsih, A. A., Utami, C., & Wahyuni, R. (2020). Analisis Kemampuan Koneksi Matematis Siswa Pada Materi Trigonometri. *Journal of Educational Review and Research*, *3*(1). https://doi.org/10.26737/jerr.v3i1.2015

Paraskeva, F., Alexiou, A., Mysirlaki, S., Souki, A. M., Panoutsos, S., Gkemisi, S., & Boutsia, C. (2017). Applying PBL and SRL to enhance learning strategies and collaboration in a blended learning environment. *Communications in Computer and Information Science*, *734*. https://doi.org/10.1007/978-3-319-62743-4_8

Patriana, W. D., Sutama, & Wulandari, M. D. (2021). Pembudayaan Literasi Numerasi untuk Asesmen Kompetensi Minimum dalam Kegiatan Kurikuler pada Sekolah Dasar Muhammadiyah. *Jurnal Basicedu*, *5*(5), 3413–3430. https://doi.org/10.31004/basicedu.v5i5.1302

Putri, D. A., Susanti, V. D., & Apriandi, D. (2020). Pengembangan Modul Berbasis Rme Untuk Meningkatkan Kemampuan Literasi Matematika Siswa Kelas Xi Smk. *Prima Magistra: Jurnal Ilmiah Kependidikan*, *1*(2), 138–146. https://doi.org/10.37478/jpm.v1i2.470

Rachman, A. F., & Saripudin, S. (2020). Analisis Kesalahan Siswa Kelas XI Pada Materi Trigonometri. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(1). https://doi.org/10.31004/cendekia.v4i1.166

Rahman, M. T. Q., Hapizah, & Yusup, M. (2021). Penerapan Problem Based Learning Dengan Menggunakan Bahan Ajar Berbasis Android Pada Materi Barisan Dan Deret Aritmatika. *Lentera Sriwijaya: Jurnal Ilmiah Pendidikan Matematika*, *3*(2), 1–16. https://doi.org/10.36706/jls.v3i2.14376

Ratnasari, & Nurvicalesti, H. (2022). Analisis Penerapan Media Pembelajaran Interaktif Berbasis Google Classroom dalam Menyongsong Era Revolusi Industri 4 . 0 Terhadap Hasil Belajar Matematika Siswa. *Cendikia : Media Jurnal Ilmiah Pendidikan*, *13*(1), 68–78.

Rismawati, M., Hidayat, M., Saputri, A. S., & Isa, R. (2022). Pengembangan Bahan Ajar Berbasis Komik Materi Bentuk Aljabar Untuk Meningkatkan Literasi Siswa. *EduMatSains: Jurnal Pendidika, MAtematika Dan Sains*, *7*(1), 131–138.

Sari, F. A., & Aini, I. N. (2022). Analisis Literasi Numerasi Siswa SMP dalam Menyelesaikan Soal Pola Bilangan. *Jurnal Pendidikan Tambusai* , *6*(2), 11963–11969.

Setyaningrum, W. (2019). Self-regulated learning in blended learning approach. *Journal of Physics: Conference Series*, *1320*(1). https://doi.org/10.1088/1742-6596/1320/1/012089

Sitompul, M. T., & Effendi, K. N. S. (2021). ANALISIS KESALAHAN SISWA KELAS VII DALAM MENYELESAIKAN SOAL BENTUK ALJABAR. *Transformasi : Jurnal Pendidikan Matematika Dan Matematika*, *5*(2). https://doi.org/10.36526/tr.v5i2.1310

Sofyan, A., & Ratumanan, T. G. (2018). Terhadap Hasil Belajar Matematika Siswa Smp Negeri 21 Ambon the Effect of Learning and Independence Activitieson Studentd Mathematical Learning Outcomes of Sma Negeri 21 Ambon. *JUPITEK: Jurnal Pendidikan Matematika*, *1*(1), 17–24.

Stevens, M. (2020). Expertise, Complexity, and Self-Regulated Engagement: Lessons from Teacher Reflection in a Blended Learning Environment. *Journal of Online Learning Research*, *6*(3).

Suciati, I., & Wahyuni, D. S. (2018). ANALISIS KESALAHAN SISWA DALAM MENYELESAIKAN SOAL MATEMATIKA PADA OPERASI HITUNG PECAHAN PADA SISWA KELAS V SDN PENGAWU. *Jurnal Penelitian Dan Pembelajaran Matematika*, *11*(2). https://doi.org/10.30870/jppm.v11i2.3760

Trimurtini, Nugraheni, N., Sb, N. S., Putra, G. C. M., & Bektiningsih, K. (2021). Pendampingan Blended Learning Berpusat Pada Kemampuan. *Pengabdian Kepada Masyarakat*, *4*(4), 64–71.

Umar, Hasratuddin, & Surya, E. (2022). Pengembangan LKPD Berbasis Model Think Aloud Pair Problem Solving Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa SD Negeri 067248 Medan. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *06*(03), 3402–3416.

Utami, D. N., Kusmanto, B., & Widodo, S. A. (2019). Analisis Kesalahan dalam Mengerjakan Soal Geometri. *Jurnal Edukasi Matematika Dan Sains*, *7*(1). https://doi.org/10.25273/jems.v7i1.5290

Utomo, S. W., & Wihartanti, L. V. (2019). Penerapan Strategi Blended Learning Untuk Meningkatkan Kemampuan Berpikir Kritis Mahasiswa Pada Era Revolusi Industri 4.0. *Kwangsan: Jurnal Teknologi Pendidikan*, *7*(1), 30–44. https://doi.org/10.31800/jtp.kw.v7n1.p30--44

Wahyuni, A. (2020). Analisis Kesalahan Siswa dalam Menyelesaikan Soal Aritmatika Sosial. *Jurnal Pendidikan Matematika*, *11*(1). https://doi.org/10.36709/jpm.v11i1.10022

Yustinaningrum, B. (2021). Deskripsi Kemampuan Literasi Numerasi Siswa. *Jurnal Sinektik*, *4*(2), 129–140.

Zhu, Y., Zhang, J. H., Au, W., & Yates, G. (2020). University students' online learning attitudes and continuous intention to undertake online courses: a self-regulated learning perspective. *Educational Technology Research and Development*, *68*(3). https://doi.org/10.1007/s11423-020-09753-w