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Numeracy-Based Teaching Material with Data Presentation Topic to Support Students' Numeracy Skills

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Abstract

Numeracy is the ability to identify, describe, and communicate various types of numbers and mathematical symbols to solve mathematical tables, graphs, and problems. There are few math teaching materials, especially those based on numeracy. The research aims to produce numeracy-based teaching material that is valid, practical, and potentially supports numeracy skills. The following type of research is development. The research subjects were students of class VII at Senior High school in Pagar Aam. The stages of the research consisted of preliminary study and formative evaluation (Expert Review, One to One, Small Group, and field tests) with the instruments used, namely questionnaires, tests, and interviews. This study states that the teaching material used can help improve numeracy skills, and the developed teaching material is declared valid without revision. This shows that with the help of numeracy-based teaching, the material can help students improve their numeracy skills in understanding data presentation material. Mathematics teachers can further use these numeracy-based teaching materials to improve students' numeracy skills.

Keywords: Numeracy; Presentation of Data; Teaching Materials.

Abstrak

Numerasi adalah kemampuan untuk mengidentifikasi, menjelaskan dan mengkomunikasikan berbagai jenis bilangan dan simbol matematika untuk tujuan pemecahan tabel, grafik dan masalah matematika. Belum banyak bahan ajar matematika khususnya yang berbasis numerasi. Tujuan penelitian ialah menghasilkan bahan ajar berbasis numerasi yang valid, praktis dan berpotensi mendukung kemampuan numerasi. Jenis penelitian ialah pengembangan. Subjek penelitian adalah peserta didik kelas VII disalah satu SMP Negeri di Kota Pagar Alam. Tahapan penelitian terdiri dari preliminary study dan formative evaluation (Expert Review, One to One, Small Group dan field test) dengan instrumen yang digunakan yaitu angket, tes dan wawancara. Penelitian ini menyatakan bahwa bahan ajar yang dikembangkan dinyatakan valid, praktis, dan memiliki efek potensial terhadap kemampuan numerasi peserta didik. Hal ini menunjukkan bahwa dengan bantuan bahan ajar berbasis numerasi dapat membantu peserta didik menumbuhkan kemampuan numerasi peserta didik khususnya materi penyajian data. Bahan ajar berbasis numerasi ini dapat digunakan guru dalam mendukung kemampuan numerasi peserta didik.

INTRODUCTION

Mathematics is a tool used to complete any tasks in everyday life (Başman & Kutlu, 2020; Bütüner & Baki, 2020; Diego-Mantecón et al., 2021). Because mathematics is essential, learning mathematics must be instilled from an early age. (Anggraeini, 2022), because the higher the level of education, the more difficult solving mathematics problems will be. (Hapizah, 2017). Developing problem-solving skills is also essential because mathematics is often found in everyday life (Syifa et al., 2022).

One of the topics in mathematics is data presentation. Data presentation is part of mathematics with collecting, compiling, and describing information in

tables or charts and investigating the information obtained to obtain goals or conclusions. (Susanto et al., 2021). Students are said to understand mathematics well, including if they can use symbols well (Hapizah et al., 2017). The students' skills in presenting data and using symbols still need improvement. This statement aligns with research results stating that students did not understand, could not interpret, and could not use words, notations, symbols, and structures to present mathematical ideas properly. (Hidayati & Prabawanto, 2022). The students' skills in communicating their mathematical ideas through good writing still need to improve (Fawziawati, 2022). The lack of learning facilities and media for students to support learning the data presentation

topic, especially presenting data in tabular form, is one of the causes. (Farida et al., 2022; Ferawati et al., 2021).

The activities on the data presentation topic are included in numeracy skills. Numeracy is the knowledge of using various numbers and basic mathematical symbols to solve problems in everyday life, analyzing information presented in various forms, and interpreting the results of the analysis to predict and make decisions. (Kemendikbud, 2017). Improving numeracy skills can help students count or calculate when learning mathematics (Ketaren et al., 2022). Several indicators used as a reference to determine the extent to which students' numeracy skills are: 1) the use of symbols and numbers when solving problems in the context of everyday life related to basic mathematics, 2) the ability of students to analyze information, whether in the form of charts, diagrams, tables, and graphs, 3) the ability of students to interpret the results that have been done, both in predicting and providing conclusions (Kii et al., 2021). Numeracy also refers to the appreciation and understanding of information expressed mathematically, such as graphs, charts, and tables (Mahmud & Pratiwi, 2019).

One of the causes of students' low numeracy skills is their low ability to understand problems, interpret data, and use words, notations, symbols, and structures in presenting mathematical ideas. (Hidayati & Prabawanto, 2022). This is due to the need for more supporting facilities and media. (Farida et al., 2022; Ferawati et al., 2021). Therefore, it is necessary to provide supporting facilities, including teaching materials.

Teaching materials contain the discussed topic, are arranged systematically, and are used by educators and students in the learning process

(Setiawan & Basyari, 2017). Another definition of teaching materials is the materials teachers need in teaching-learning topics (Ariani et al., 2019). Teaching materials are all forms of information in text, visuals, audio, or a combination thereof that students need to achieve specific competencies (Mitha Frilia et al., 2020). Teaching materials can significantly increase students' understanding of mathematics (Albany et al., 2022).

The purpose of teaching materials is to make it easier for students to learn existing information according to the topic being studied, to help educators as facilitators with more varied learning materials, and to make learning more exciting and not monotonous by only using books as a learning resource (Laily & Shofiyani, 2021). Using teaching materials related to everyday life will make learning more interesting (Umuhoza & Uworwabayeho, 2021). To achieve student competence in numeracy skills, teaching materials that need to be used in the learning process are teaching materials that can develop these numeracy skills.

The problem is that the teaching materials must fully support students' numeracy skills. Developing teaching materials to support numeracy skills was carried out in research by Setyawati (Setyawati, 2022), who developed module teaching materials for language literacy and numeracy for elementary students—and developed mathematics teaching materials for teachers to improve numerical literacy skills. In addition to these two studies, there have been several studies that have developed teaching materials. However, teaching materials focused on students' numeracy skills, especially data presentation topics, have never been done. Research conducted by (Widiantari et al., 2022) regarding numeracy-based e-modules

showed that these teaching materials were very effective for students to use in online learning needs. (Mamolo, 2019) has developed teaching materials in the form of DIMac, which has an application for drawing. No research has yet been found that develops numeracy-based teaching materials for the data presentation topic.

For this reason, it is necessary to develop numeracy-based mathematics teaching material on the data presentation topic. Numeracy is adequate for teaching materials during mathematics lessons (Winarni et al., 2021). The data presentation topic as a part of mathematics needs to be improved by designing learning (Partayasa et al., 2020).

Therefore, this research aims to develop numeracy-based teaching material for the data presentation topic in supporting students' numeracy skills. The problem formulation of this research is "Are the numeracy-based teaching materials for the data presentation topic valid and practical and have a potential effect on students' numeracy abilities?"

METHODS

This research uses the type of development research. The development models used are the preliminary research stage and the formative study stage, which consists of Expert Review, One to One, Small Group, and Field Test (Zulfah et al., 2020). The research subjects were 31 grade 7 students at one of the public junior high schools in Pagar Alam City. The flow in this research is in Figure 1.

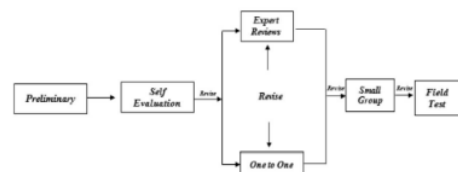


Figure 1 Teaching Material Development Flow (Aulia & Prahmana, 2022)

The steps that have been carried out by researchers at the preliminary research stage, namely 1) the preparation stage to determine the needs of the teaching material and the topic specified in the teaching material, the researchers also take care of research permits, 2) the design stage, the researchers design teaching materials according to components of numeracy-based teaching materials for a data presentation topic, starting from determining the context of activities and designing teaching materials.

The next stage is the formative study stage, which consists of the following stages: 1) Expert Review, the teaching material that has been designed will be evaluated by lecturers who are experts in the field of numeracy; 2) One to One, the stage where the teaching material will be given to three students those with low, medium, and high abilities to identify problems using the teaching material which then the work results will be revised to overcome deficiencies in teaching materials, 3) Small Group, the testing stage of a small group of students where the work results from the small group stage will be revised once again to improve the teaching material, 4) Field Test, during the field test stage, the mathematics teacher for grade 7 at a Public Junior High School in Pagar Alam City will conduct a trial of the teaching material. At this stage, the teacher, as an observer, will observe students using the numeracy-based teaching material.

The data collection techniques in this research were Expert Review validation, questionnaire test, and interview. Expert Review validation was carried out to evaluate and revise the design of teaching material according to the validation results. The questionnaire was used to see the practicality of

Numeracy-based teaching material given at the Small Group stage. The test uses numeracy-based description questions to see the potential effects of numeracy-based teaching material. The interview was used to support the data obtained from the tests' results. The instrument used is an interview guide.

The data analysis techniques used in this research are quantitative and qualitative. The quantitative data analysis stage was obtained from data analysis validation of teaching material, questionnaire, and test. The teaching material validated according to the scoring guidelines using the teaching material validation sheet instrument was grouped according to the validity category (Akbar, 2013). The validity category refers to Table 1.

Table 1 Validity Categories

Category	Validity Level
Not Allowed	0,1-50
Major Revision	50,1-70
Minor Revision	70,1-85
Valid	85,1-100

In collecting questionnaire data, the researcher gave students a questionnaire sheet. Next, the researchers calculated the average score and grouped the average results according to the Practicality Category, which refers to Table 2.

Table 2 Practicality Categories

Category	Practicality Level
< 50	Impractical
50-59	Less Practical
60-79	Practical
80- 100	Very Practical

The written test data for students were then grouped into three categories: high, medium, and low. The high, medium, and low categories were determined by looking at the Mean and Standard Deviation scores of the

students' results (Arikunto, 2013). The test categories are shown in Table 3.

Table 3 Test Categories

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

Qualitative data was used to match the test data results with the interview results using the interview sheet instrument to strengthen the test results carried out by students.

RESULTS AND DISCUSSIONS

Preliminary Stage

In the preliminary stage, the researchers conducted a literature study on numeracy-based teaching materials and the data presentation topic, curriculum analysis, and analysis of students' characteristics. The researchers determined the research location, namely one of the public junior high schools in Pagar Alam city, followed by discussions with the school's grade 7 mathematics teacher. The information obtained from the results of the discussion is that the curriculum used is the 2013 curriculum, the lesson plan used by the teacher is by the 2013 curriculum, the teaching materials used by the teacher have not accommodated students' numeracy skills, and the use of teaching materials as a support for learning is still very minimal.

The next stage is that the researchers designed numeration-based teaching materials for the data presentation topic with due regard to Basic Competencies and Competency Achievement Indicators in the data presentation topic. In addition to designing teaching material drafts, the researchers also designed research instruments in the form of validation sheets, questionnaire sheets, tests, and interview sheets.

Formative Evaluation

The researchers carried out several stages at this stage, namely Self Evaluation, Expert Review, One-to-One, Small Group, and Field Test.

Self-Evaluation

At this stage, the researchers conducted self-evaluation by paying attention to the use of language and the writing layout and reviewing the content, namely data presentation. Overall, the evaluation results stated that the teaching material drafts were as expected regarding content, construct, and language. The content in the teaching material is suitable for the data presentation topic. The teaching material was considered to foster numeracy skills. The language and layout of all components are by the criteria. The results of this stage were called *Prototype 1*.

Expert Review

At this stage, *Prototype 1* was validated by two lecturers and a Mathematics teacher at the research location. Comments given by the validators are presented in Table 4. The results of the assessment given by the validators in terms of content, language, and layout are shown in Table 5.

Table 4 Comments by the Validators

Validator	Comment dan Suggestion
First lecturer	Revise the Learning Objectives and activities in the teaching material, and add the answers as line charts.
Second lecturer	Add a bibliography to the teaching material component.
Mathematics teacher	Make the teaching material focused on whether for students or teachers; delete the answers if the teaching material is for students.

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Table 5 Expert Review Stage Validation Results

No.	Aspect	Score
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1.	Content Eligibility	78.33
2.	Language Eligibility	93.75
3.	Layout Eligibility	89.58
Average Score		86.54

The questionnaire data analysis provided by the validators, as presented in Table 5, shows that the average score is 86.54, with a good category.

Based on comments from the validators, *prototype* one was revised, with the revision results shown in Table 6.

Table 6 Revision in the Expert Review Stage

After Revision
Revise the 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 tabel, diagram batang, diagramm garis, dan diagram lingkaran
2. Menafsirkan data dalam bentuk tabel, diagram batang, diagramm garis, dan diagram lingkaran

Revise the learning objectives according to the Competency Achievement Indicators:

B. Tujuan Pembelajaran



Melalui pembelajaran berbasis numerasi, peserta didik diharapkan mampu :

1. Mengenal data di kehidupan sehari-hari dengan tepat
2. Memahami cara mengumpulkan data dengan tepat.
3. Menganalisis data (tabel, diagram garis, diagram batang, dan diagram lingkaran) dengan tepat.
4. Membaca data (tabel, diagram garis, diagram batang, dan diagram lingkaran) dengan tepat
5. Menyajikan data dalam bentuk (tabel, diagram garis, diagram batang, dan diagram lingkaran) dengan tepat.
6. Menafsirkan data dalam bentuk (tabel, diagram garis, diagram batang, dan diagram lingkaran) dengan tepat.

Add line chart forms in the answers to the questions:

After Revision

b. Dari tabel yang telah dibuat buatlah diagram yang sesuai dari informasi tersebut!

Jawaban: Disajikan dengan diagram Batang atau diagram garis



Add a bibliography at the end of the teaching material:

L. Daftar Pustaka

Isuati, M. (2018). Profil Minat Dan Hasil Belajar Siswa Dalam Pembelajaran Matematika Kelas VII I Smp Negeri 5 Yogyakarta Pada Pokok Bahasan Penyajian Data Dengan Menggunakan Media Pembelajaran Kahoot. Universitas Sanata Dharma, Yogyakarta. https://repository.usd.ac.id/31126/2/141414096_full.pdf

Maghfiroh, L., Mustangin, & Fuady, A. (2020). Analisis Kesulitan Pemahaman Konsep Matematis Peserta Didik dalam Menyelesaikan Soal pada Materi Penyajian Data Kelas VII SMP. *Jurnal Pendidikan, Penelitian, Dan Pembelajaran*, 15(33), 38–45.

One-to-One

Prototype 1, in parallel with the expert review stage, was also validated at the one-to-one stage by three students in the High, Medium, and Low categories. Students have provided comments regarding the readability of the teaching material through students' understanding of the meaning of the sentences in the teaching material. The one-to-one results concluded that students understood the meaning of the sentences in the teaching material.

Small Group

The researchers carried out the Small Group stage with two groups, each consisting of 3 students. Students determination was based on the results of discussions with the mathematics teacher. At the Small Group stage, students were asked to read the numeracy-based

teaching material and work on activities on the teaching material provided.

Group 1 and Group 2 collected data and determined the requested tables and charts, namely row-column tables and bar charts. However, according to the students, the activity in the question reinforcement section needed to be explained. Students need to read repeatedly to understand the questions. For this reason, the researchers made revisions to the activities seen in Table 7.

Table 7 Revision in the Small Group Stage

Before Revision



Buatlah penyajian data siswa yang pernah berkunjung ke tempat wisata yang ada di Kota Pagar Alam, contohnya seperti Tugu Rimau, Ayik Pacar, Green Paradise, Tangga Seribu, dll. Tiap kelompok dapat menentukan empat tempat wisata. Siswa dapat berdiskusi untuk menyakan tempat wisata mana yang pernah dikunjungi teman di kelas. Buatlah tabel dan diagram apa yang sesuai untuk menampilkan data tersebut! Apa kesimpulan dari data yang sudah kamu buat?

After Revision



Buatlah penyajian data dari siswa yang pernah berkunjung ke tempat wisata yang ada di Kota Pagar Alam, seperti Tugu Rimau, Ayik Pacar, Green Paradise, Tanga Seribu, Kebun Teh dan Dempo Park. Siswa dapat berdiskusi untuk menanyakan tempat wisata mana yang pernah dikunjungi teman satu kelompok. Kemudian kerjakan aktivitas di bawah ini!

1. Tentukan jenis tabel dan diagram apa yang sesuai untuk menampilkan data tersebut! Lalu gambarkan tabel dan diagram tersebut sesuai dengan data yang kamu miliki!
2. Apa kesimpulan dari data yang sudah kamu dapatkan?

After working on activities on the teaching material, students were asked to respond to the teaching material through a questionnaire sheet. The results of the analysis of students' questionnaire sheets at the Small Group stage are shown in Table 8.

Table 8 Questionnaire Results

No.	Student's Initials	Questionnaire Score
1	DT	91.07
2	GW	89.29
3	AV	92.86
4	SN	89.29
5	TR	87.50
6	CL	92.86
Average Score		90.48

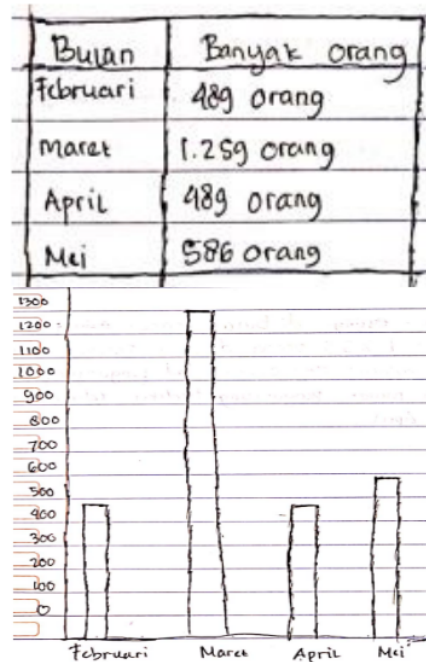
Based on Table 8, the average result of the questionnaire calculation score is 90.48. This shows that the numeracy-based teaching material that has been developed was included in the efficient category.

Field Test

The teaching material declared valid and practical from the stages described above was tested more broadly through

the Field Test stage. At this stage, the model teacher was Mrs Suratini, S.Pd, a mathematics teacher for grade 7D. The model teacher learned the data presentation topic at this stage using learning resources in the developed teaching material. The model teacher completed the learning process using a previously validated lesson plan.

The activities carried out by students have followed all the instructions in the teaching material. One of the student work results from the given activity is shown in Figure 3.



Alasan : karena tabel jenis Baris belum digunakan pada data yang terdiri dari ~~Bulan dan Banyak Orang~~ & satu kolom dan beberapa baris : contohnya Bulan dan Banyak orang

Alasan : karena terdiri dari dua sumbu yaitu sumbu X (Horizontal) contohnya Bulan, dan sumbu Y (Vertikal) contohnya Banyak Orang

Kesimpulan : ~~Orang~~ di bulan maret ada pengunjungnya adalah : 1.259 orang, di bulan februari dan April pengunjungnya adalah : 619 orang, jadi pengunjung terbanyak adalah Bulan maret, pengunjung terditir adalah Bulan februari dan April

Figure 3 Field Test Work Results for Group 1

From Figure 3 above, indicator 1, namely determining the use of numbers and symbols, needed to have been done better, where students did not write down the x-axis and y-axis. For indicator 2, namely determining the type of tables and charts and giving reasons, group 1 answered correctly. The reasons given by Group 1 were correct and to the information in the Monpera Museum activity data. For indicator 3, namely writing conclusions, group 1 was correct in concluding. However, the group's answers needed to be corrected when making a column row table because they had yet to write down the number of visitors at the table's end, totaling 2,823.

Judging from the results of the students' work when working on the numeracy activities in the teaching material, students have answered all the question items, although there are still incomplete answers.

After doing all the activities on the teaching material, at the end of learning, the teacher closed the lesson and asked students to provide conclusions from the learning activities. Students were able to conclude reasonably. Next, the model teacher closed the learning activity.

Analysis of Test and Interview Data²

The results of the written test in the form of numeracy-based description

questions on data presentation topics for grade 7 resulted in an average score of 76.29 in the excellent category. The distribution of students based on low, medium, and high categories is shown in Figure 4.

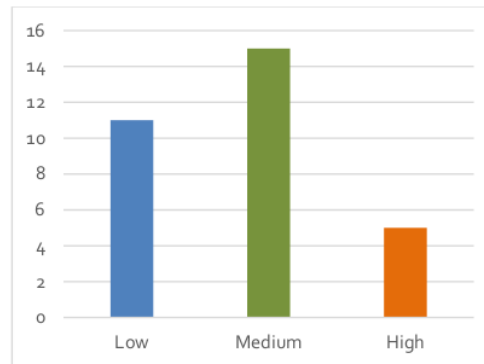


Figure 4 Test Results Distribution

According to students, the teaching material developed is fascinating because the problems came from the context of students' daily lives; the pictures are engaging and help students understand the topic presented in the data. To support the test results, interviews were conducted, with the following results:

1. Students in the High Category

The student with the initials N is a student in the high category. The work results of student "N" can be seen in Figure 5.

Jawaban: Warga, Jumlah, Ibarat, Sama, Lokal, banyak, Siswa, laki-laki, dan Perempuan.

Jawaban: Jenis tabel: Kontingensi.

Gambar tabel:

No	Wiwayah	Jumlah	L	P
1	Kec. Pagarlalim Selatan	2.140	1.166	974
2	Kec. Pagarlalim Utara	2.548	1.298	1.250
3	Kec. Dempo Utara	671	337	334
4	Kec. Dempo Selatan	558	285	273
5	Kec. Dempo Tengah	527	278	249
TOTAL		6.444	3.364	3.080

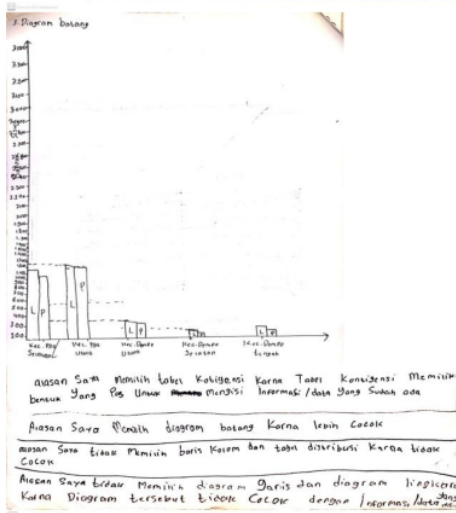


Figure 5 The Answer of One High Category Student

In Figure 5, the answer given by student "N" was not all correct. The student could answer the first indicator correctly using numbers and symbols to solve the problem, namely, finding the information from the question. In the second indicator, the student could not analyze information correctly. The student determined the type of contingency tables and bar charts correctly. However, in giving reasons for choosing a chart, this student only stated that it was more suitable without giving reasons why bar charts were more suitable for presenting the data provided.

In the third indicator, the student had not been able to interpret the results that had been done correctly. When presenting data as a contingency table, the student did not place the columns for

the number and sex correctly. Sex should be put first, then the number. In the bar chart, the student needed to write down the x-axis and y-axis. In addition, the students needed to be more detailed in explaining why they did not choose other tables and charts. The reason for the answer was that other types of tables and charts were only suitable for describing data by giving detailed reasons for the answers given.

R: Why didn't you use other types of charts and tables?

N: I chose a contingency table and bar chart because other tables and charts were inappropriate for presenting data with available information.

R: What conclusions can you draw from the tasks you have completed?

N: Ma'am, the conclusion is that the contingency table and bar chart can be used to present data on Pagar Alam Junior High School students in 2022 and 2023. Based on the data, Dempo Utara District has the fewest students, while Pagar Alam Utara District has the most. That is all from me, ma'am.

The student in the high category could answer the questions asked in the interview correctly. The student could also explain why the student chose the contingency table and bar chart. The student could also explain why they did not use other types of tables and diagrams because, as far as the student knows, the data used was not appropriate to be presented using other types of tables and diagrams. In addition, the student was proficient in concluding the questions given.

2. Students in the Medium Category

According to the test score, the student with the initials "G" is in the

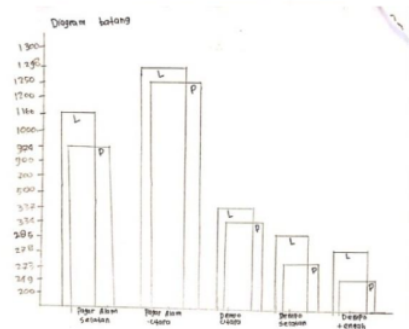
medium category. The student needed to meet all indicators regarding numeracy skills when working on test questions. The work results of student "G" are shown in Figure 6.

Jawaban:
 kami menemukan data dengan cara sekunder dari website

Jawaban: Jenis tabel Kontingensi.....

Gambar tabel:

Wilayah	Jumlah	
	L	P
kec. Pagar Alam S	1.166	974
kec. Pagar Alam U	1.298	1.260
kec. Dempo Utara	337	334
kec. Dempo Selatan	285	283
kec. Dempo Tengah	278	249
Total	3.364	3.080
Jumlah keseluruhan = 6.444		



Alasan
 saya memilih tabel kontingensi karena data tersebut memiliki 2 lebih dari 2 (dua)
 variabel dan saya memilih diagram tabel karena lebih mudah untuk diinterpretasikan

Figure 6 The Answer of One Medium Category Student

The student only mentioned a small part of the information found in response to the first indicator, using numbers and symbols to solve problems, namely finding information from questions. In the second indicator, the ability of the student to analyze information correctly had yet to be seen in the student. The students needed to be more precise in giving reasons for choosing the type of tables and charts, and they only wrote that because the bar chart was more suitable and did not provide more specific reasons.

In the third indicator, the student needed to be more precise in writing the position of the number in the column on the table and on the bar chart. The student also needed to write down the x-axis- and y-axis on the drawn bar chart. The student had yet to write down and explain why not to choose other tables and charts.

 R: Why didn't you choose different types of tables and graphs?
 G: I do not know either, ma'am, but a bar chart and contingency table are more suitable.
 R: What is the conclusion of the problem?
 G: Ma'am, a contingency table and bar chart can be used to present data on Pagar Alam Junior High School students in 2022 and 2023. The information can be seen in Pagar Alam City on the Ministry of Education and Culture's website. That is all from me, ma'am.

Based on the interview findings that the researchers conducted with the student in the medium category, the student could state important information from the question but needed to state the information in the question entirely. The student could explain and give reasons for choosing the appropriate contingency table and bar chart and describe them. However, the student only believes that contingency tables and bar charts were more suitable for presenting data based on existing information, so the student could not give reasons not to choose other types of tables and charts. The question is very suitable for the student to draw their conclusions.

3. Students in the Low Category

According to their test score, the student with the initials "A" is in the low category. When working on test questions, the student needed to meet all

indicators regarding their numeracy skills. The work results of student "A" are shown in Figure 7.

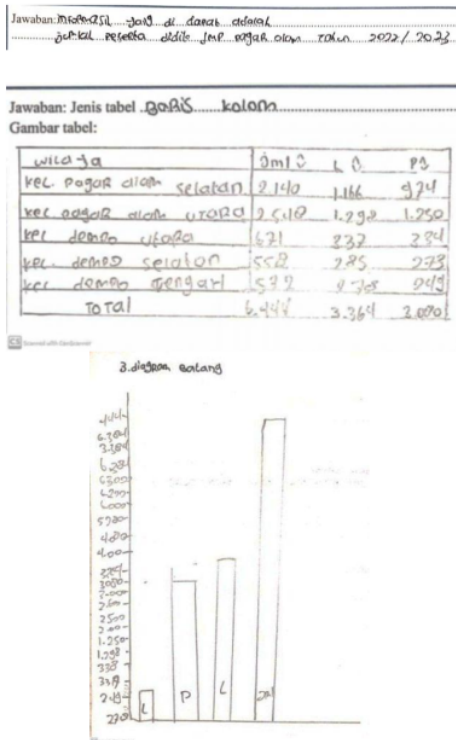


Figure 7 The Answer of One Low-Category Student
 In the first indicator, using numbers and symbols to solve problems, namely finding information from questions, the student had yet to answer the questions fully and had not mentioned the questions in detail, only mentioning the title of the data without complete information. The student also needed help correctly analyzing the second indicator's information. The student could only correctly determine the appropriate type of chart but had yet to be able to determine the appropriate type of table correctly. The student described the table accurately but needed to be more precise when describing the chart accurately. In addition, the student had yet to write down and explain why not choose other tables and charts.

R: Why did you answer using a line chart?

AL: I do not know either, Mom; maybe this line chart is better for presenting data based on existing data? Also, describe the line chart type based on the provided

data.

AL: I am confused, ma'am; because the data consists of men and women, it is difficult for me to conclude.

Based on the interview results, the low-category student revealed important information about the question, but the student needed to explain it in detail. The information only mentioned the number of Pagar Alam Junior High School students in 2022 and 2023, and it needed to explain in detail what this information means. While the student could identify and describe the different types of contingency tables, the student chose the correct chart. The students also could not give reasons why the students did not choose a different type of table and graph, only referring to the fact that the table might be more suitable for introducing information from existing data. The student was able to draw solid conclusions from the questions given.

Discussions

This research has produced numeracy-based teaching material for the data presentation topic in grade 7 that is valid, practical, and potentially affects students' numeracy skills. The validity of the teaching material is known from the average score given by the validator, which is 86.54. Based on the guidelines in Table 1, it is said that the teaching material developed is classified as valid. From the aspect of content, this teaching material is categorized as good with a score of 78.33; this means that the content

in the teaching material is suitable for the data presentation topic. From the language and layout aspects, both are categorized as very good, with a score of 93.75 and 89.58, respectively. This means that from the aspect of language and layout, it followed the existing standards.

Even though the score of this teaching material is categorized as valid, the validators made suggestions for this teaching material to be revised. The suggestions made by the validators are shown in Table 4. The suggestions are given to improve learning objectives. Learning objectives were suggested to be written more fully so that what will be achieved becomes more focused. The teacher must consider learning objectives because they will impact the value of learning outcomes (Hansen, 2021), making them an essential component of learning (Li et al., 2021).

The next suggestion given by the validators is to add answers in the form of line charts. The answers in the teaching material are only in the form of bar charts. This suggestion needs to be accommodated for students' understanding of the types of data presentation charts to be more diverse.

At the One-to-One stage, the students could identify the types of tables and charts appropriate to the teaching material activity data based on the results produced for these activities. RK (students in the high category), AP (students in the medium category), and KN (students in the low category) said that the words used in the teaching material were easy to understand so that the students could use the teaching material for learning activities.

The next stage is the Small Group stage, which consists of two groups of three people each, similar to the One-to-One stage. The students were asked to read and complete activities based on the

teaching material provided during the small group stage. The score of the questionnaire results was 90.48. This shows that the developed numeracy-based teaching material was included in the convenient category.

At the Field Test stage, the students had done all the activities in the teaching material, although some still needed to be completed. During the learning process, the teacher directed the learning. After the lesson, the students were asked to provide responses related to the teaching material used. Students' responses to the teaching material stated that the teaching material is exciting because there are contexts that relate to the life around the students.

To get good learning outcomes, teachers are strongly encouraged to use contexts that are relevant to students (Reinke & Casto, 2022). Tasks/activities using contexts can help improve students' ability to complete contexts (Wijaya et al., 2018).

The average score of students in answering questions related to numeracy was 76.29, which is in the excellent category. There were 5 (16.1%) students belonged to the high category. This group was able to use numbers and symbols correctly, was able to analyze information correctly, but was not yet able to interpret the results correctly, still made mistakes in placing table columns, did not write the reasons for choosing the type of table correctly, and was able to conclude.

There are 15 (48.4%) students belong to the medium category. This group was able to use numbers and symbols to solve problems. It had been able to analyze information correctly. However, it could have been more precise in giving reasons for choosing the type of table (the answers given were not specific) and needed to be more precise in writing table data.

There are 11 (35.5%) students belong to the low group. This group had not wholly written down the information on the problem, could not analyze the information provided correctly, and could not explain the reasons for choosing the type of table or chart.

Based on the description of the research results, the teaching material that had been developed could help students present data well and choose the right type of data presentation. This teaching material is different from other teaching materials, which do not support students in choosing the type of data presentation. This teaching material can be used by students independently at home because the stages given in it provide opportunities for students to present data properly without teachers' guidance. Thus, this teaching material can be used for students with less daring characteristics to ask the teacher some problem-solving questions.

In all categories of student groups, one problem needed to be solved by students, namely the ability to give reasons for choosing the type of chart chosen. The students were asked to explain the reasons for choosing the chart type from the existing data. This finding indicates that the teaching material could have ideally provided information about the reasons for choosing the chart type for specific data. So, it needs to be a concern in revising the teaching material. Students' ability to present data in the form of charts indicates the level of knowledge of students (Diezmann, 2000).

This research needs to be developed further to deepen the study of the impact of using teaching materials on students' numeracy skills. It is necessary to develop more detailed activities in teaching materials to support students' ability to explain the reasons for choosing the chart type from the provided data.

Implication

The **implication** of the results of this research is to provide a reference for teachers in improving students' numeracy skills, especially in the data presentation topic using the resulting teaching materials. For students, this teaching material can be used independently to be used in order to train numeracy skills, especially in the data presentation topic. For other researchers, this research can be a reference for developing numeracy-based teaching materials on other topics.

Limitation

The **limitation** of this teaching material is that this teaching material needed to optimally provide space for students to give reasons in determining the type of data presentation selected. So that in the future, steps that provide opportunities for students to express reasons for choosing the type of data presentation can be added.

CONCLUSIONS

This research concluded that the data presentation teaching material developed in grade 7 was valid, with a score of 86.57 based on research findings conducted through preliminary, design, and formative studies. The teaching material was also included in the efficient category with a score of 90.4, and the field test results showed that the average student's work results were 76.29, which is in the excellent category.

The results of the numeracy test done by grade 7 students showed that the developed teaching material could affect numeracy skills. Five students were included in the high category, fifteen students were included in the medium category, and eleven students were included in the low category. The students said that the teaching material developed

was fascinating because the questions were taken from real-world situations, the pictures were exciting, and it could help students understand the information in the data.

The researchers suggest that this teaching material can be used as a reference to help teachers teach the data presentation topic so that students understand the topic better. This teaching material can also be used as a reference in developing numeracy-based teaching materials in other mathematics topics. In addition, further research can be carried out with different skills, making this research a reference.

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