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Development of Statistics Learning Worksheets Based on Realistic Mathematics Education for Junior High School Students

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Abstract: The purpose of this study was to develop valid, practical, and effective statistics learning worksheets based on realistic mathematics for eighth grader of junior high school. This development research uses a 4D development model with stages: definition, design, development, and deployment. The subjects of this research trial were the students of class VIII SMP Negeri 7 Bengkulu City, as many as 27 people. The research instrument consisted of product validity sheets, practicality sheets, and student learning outcomes tests. The data analysis consisted of validity analysis using Aiken's V index, rater agreement test, and N-gain test. This study resulted in realistic mathematics education-based student worksheet for statistical material for class VIII SMPN that met the following criteria: (1) Valid with an average Aiken's V index score of 0.86 in the high category and the results of the agreement test between raters with an intraclass correlation coefficient score of 0.99 categories. Very good. (2) Very practical in terms of the average practicality score of students of 81.51%. (3) Effective from the N-gain score of 0.72 high categories with classical completeness reaching 81.48%.

Keywords: students worksheet, development research, realistic mathematics education

Abstrak: *Tujuan penelitian ini adalah menghasilkan lembar kerja siswa berbasis matematika realistik pada pembelajaran statistika kelas VIII SMP yang valid, praktis, dan efektif. Penelitian pengembangan ini menggunakan model pengembangan 4D dengan tahapan: definisi, desain, pengembangan, dan penerapan. Subyek uji coba penelitian ini adalah siswa kelas VIII SMP Negeri 7 Kota Bengkulu yang berjumlah 27 orang. Instrumen penelitian terdiri dari lembar validitas produk, lembar kepraktisan, dan tes hasil belajar siswa. Analisis data terdiri dari analisis validitas menggunakan Aiken's V index, uji rater agreement, dan uji N-gain. Penelitian ini menghasilkan LKS materi statistika kelas VIII SMPN berbasis pendidikan matematika realistik yang memenuhi kriteria sebagai berikut: (1) Valid dengan rata-rata skor indeks V Aiken 0,86 dengan kategori tinggi dan hasil uji kesepakatan antar rater dengan skor koefisien korelasi intrakelas sebesar 0,99 kategori. Sangat bagus. (2) Sangat praktis ditinjau dari nilai rata-rata kepraktisan siswa sebesar 81,51%. (3) Efektif dari skor N-gain 0,72 kategori tinggi dengan ketuntasan klasikal mencapai 81,48%.*

Kata kunci: *lembar kerja siswa, penelitian pengembangan, pendidikan matematika realistik.*

▪ INTRODUCTION

Based on observations and interviews conducted by researchers with mathematics teachers at SMPN 7 Bengkulu City on January 6, 2022, it was found that the learning process still uses conventional teacher-centered learning. In this lesson, the teacher delivers material emphasizing the practice of working on questions or drills and practice, procedural, and the use of formulas (Sulianto, 2008). Then the teaching materials used are textbooks from schools and student worksheets. Usually, many student worksheets are monotonous and uninteresting because there are no pictures and colors, so students' learning desires become less, especially in mathematics which tends to contain questions (Wulandari, Patta, & Kadir, 2021).

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Initial data survey of student learning outcomes in the final exam of even semester VIII.B grades of SMPN 7 Bengkulu City consisted of 31 students; only 4 students (12.90%) achieved the minimum completeness criteria of the school, which was 68. In this case, it is necessary to the existence of high learning motivation to achieve better learning outcomes. In line with this, a survey of the ability of junior high school students in Bengkulu City was conducted in previous studies. The results showed that the level of mastery of SMP/MTs students in Bengkulu City in terms of material aspects, namely: (1) geometry material of 36.39% (low), (2) data and opportunity material with a mastery level of 50.40%. (Low) and (3) algebraic material and numbers of 59.18 (enough) (Susanta et al., 2020). Based on this, it is necessary to make improvements in learning so that the achievement of student learning outcomes can increase.

One of the efforts to increase students' interest in learning to help achieve the learning objectives is that teachers must be more creative in designing student worksheets in such a way. According to (Umbaryati, 2016), the Student Worksheet is a means to assist in teaching and learning activities to form effective interactions between students and teachers that can increase student learning activities and achievements. In designing teaching materials, the contribution of the learning approach is very necessary. Teachers must be able to choose the right approach to bridge the material to be delivered. Teachers as facilitators in developing students' abilities need to do innovative learning (Susanta, Koto, & Susanto, 2022) One of them can use the Realistic Mathematics Education (RME) approach. RME is learning that combines the same or balanced theoretical concepts in real life. Concepts can be realized as real facts (Siregar & Harahap, 2019).

Real problems relevant to the environment and the characteristics of students can be used as a starting point for developing mathematical ideas and concepts that can increase problem-solving activities, organize problems, and solve problems. The real context needs to be addressed in such a way that it can trigger students to carry out learning activities in accordance with the learning objectives (Wang, Zhang, & Zhou, 2013). Susanta, Sumardi, & Zulkardi (2022) mentions learning with an emphasis on contextual problems can support students to improve students' abilities. Abstract mathematics can become more concrete through contextual problems (Swanson & Williams, 2014). Teaching materials in the Students Worksheet related to realistic problems are needed to create a meaningful learning atmosphere. One is through Student Worksheets based on Realistic Mathematics Education (RME). Hafiz et.al (2016) mentions that the ability to connect mathematics is one of the mathematical abilities that must be developed in learning mathematics at school.

This Student Worksheet uses an approach to the mathematics learning process that starts from the real world to develop mathematical concepts and ideas and integrate mathematics into everyday life so that learning will be more meaningful and will undoubtedly be remembered by students for a long time (Sari & Yuniati, 2018). Mathematics should not be delivered as a ready-to-use tool, but must be an activity to construct mathematical concepts (Qurohman, 2018), Mathematics is not only learning but how to implement it in daily activities (Sumirattana, Makanong, & Thipkong, 2017). According Swanson & Williams (2014) Abstract mathematics can be modified to be more concrete so that students can imagine through contextual problems.

This RME-based Student Worksheet is one of the teaching materials that can be used for students to understand one of the materials, namely statistics. Statistics learning aims to form and develop statistical reasoning abilities. Statistical reasoning is how studentsreason with statistical ideas, make interpretations based on data sets, understand statistical information, data and representation, and summarize statistical data (Sari, 2017). Therefore, this is so important for students. The RME-based Student Worksheet can be an innovation in the learning process to make students more active and understand mathematical concepts.

The results of previous research showed that the learning outcomes of students using the RME approach were better than those using the scientific approach (Wibowo, Hanifah, & Muchlis, 2019). Research conducted by Susanto, Rusdi, and Susanta (2021) shows that learning using a realistic mathematical approach based on the Bengkulu people's culture can improve learning outcomes, especially mathematical communication skills. Mathematical realistic learning tools have been proven to improve students' mathematical connection abilities (Hasbi, Lukito & Sulaiman, 2019; Trisnawati, Pratiwi, & Waziana, 2018). The application of RME can increase the effectiveness of mathematics learning (Wahyudi, Joharman, & Ngatman, 2017; Zakaria & Syamaun, 2017).In RME learning, students learn in a reasonable context in improving mathematical understanding (Dickinson & Hough, 2012); RME has a significant impact on students' mathematical position (Safitri, et.al, 2017); RME has a significant effect on students' creative thinking (Ndiung, 2019).

This means that this approach considerably influences enhancing student learning outcomes. Therefore, researchers are interested in contributing to research entitled "Development of Student Worksheet Based on Realistic Mathematics Education in Statistics Materials for Class VIII Students of SMPN 7 Bengkulu City."

▪ METHOD

Participants

The subjects in this study were students of class VIII, semester 2. The location for conducting trials in assessing the feasibility of the resulting Student Worksheet product was SMPN 7 Bengkulu City, which had its address at Jalan Enggano, Bengkulu Market, Sungai Serut District, Bengkulu City, Bengkulu Province. Research preparation starts from 11 December 2021-7 April 2022. The trial to determine the feasibility of the resulting Student Worksheet begins from 9 April 2022-23 April 2022. The trial is carried out in two stages: the practical trial phase and the effective trial to class students VIII. There are 27 students in class VIII. A is doing practical trials, and in-class VIII.B, there are 27 students for effective trials.

Research Design and Procedures

The model developed by Thiagarajan (Thiagarajan, Semmel, & Semmel, 1974) is known as the 4-D Model. This model is carried out through 4 main stages, namely Define, Design, Develop, and Disseminate. The detailed modification of the research procedure that will be developed is the Define stage consisting of a final preliminary analysis, student analysis, material analysis, and task analysis. Then, in the second stage, namely the Design stage, the preparation of tests, media selection, and format selection is carried out to produce draft 1 as the initial student worksheet design.

Furthermore, at the Develop stage, the initial student worksheet design will be tested through validity tests, practical tests, and effectiveness tests. If the student worksheet has been designed, if there are no revisions and has met the valid, practical, and effective criteria, the final product in the form of an RME-based student worksheet on statistical material for class VIII students of SMPN 7 Bengkulu City enters the dissemination stage (desseminate).

Instrument Research

The instrument used in this study consisted of a validation sheet and an RME-based LKPD practical sheet consisting of three aspects referring to the Ministry of National Education (2008). Aspects that will be validated on the student worksheet are in the form of material, construction, and language that will be assessed by the validator. Meanwhile, the student worksheet practicality sheet provided is given to students to assess whether the developed student worksheet is practical or not. Furthermore, there is an instrument of Learning Outcomes Test which is used as a pre-test and post-test in the form of an essay with statistical material. The instrument test was tested for feasibility through a logical validity test and an agreement test between validators using the Intaclass Correlation Coefficient (ICC) formula. The results of logical validity were analyzed using Aiken's V. The following criteria interpret the degree of logical validity for the instrument based on the Aiken index if the validity score is > 0.80 then the validity score is in the high category, the validity score is 0.60 $\leq V < 0.80$ in the fairly high category, 0.40 $V<0.60$ is in the sufficient category, and the validity score is $0 \leq V<0.40$ in the poor category (Febriandi, Susanta, & Wasidi, 2019).

Data Collection Technique

Data collection techniques are methods used to collect data on the validity, practicality, and effectiveness of the developed RME-based Student Worksheet. The data collection techniques in this study include: in the form of interviews used in the refined stage, questionnaires for expert assessment, and tests at the trial stage.

Each student worksheet consists of four stages of Realistic Mathematics Education, namely understanding problems, solving problems, comparing and discussing, and drawing conclusions (Setiani, Hanifah, & Muchlis, 2017). The designed student worksheet contains material on data presentation, data concentration measures, and data distribution measures. The student worksheet will be assessed for validity by experts using a validity sheet that is assessed from three aspects, namely material, construct, and language. Furthermore, the student worksheet practicality test will be assessed by students using the student worksheet practicality sheet. Then at the test stage the effectiveness of the student worksheet is assessed from learning outcomes using Learning Outcomes Test questions which consist of 5 essay questions on statistical material with the presentation of question indicators using realistic problems related to the environment around students.

Data Analysis Technique

Student worksheet validity analysis

Analysis of logical validity based on the validation sheet containing comments, suggestions, input, revision notes, and assessments from the validator based on a Likert scale of 1-4. The product developed in the form of questions will be declared valid if the

results of the expert validation analysis meet the valid categories in terms of content, construct, and language validation. This analysis was carried out using the calculation of the Aiken validity index (Aiken's V). The equation for determining the validation index along with the criteria (Retnawati, 2016) is as follows:

$$V = \frac{\sum s}{n(c-1)}, \; s = r - I_0$$

V: Item validation index
r: The score is given by the validator
I_0 he lowest score of the validity assessment (in this case, is 1)
C: The highest validity rating score (in this case, is 4)
n: Number of validators

In determining validity based on calculations with Aiken's index using the criteria. if the validity score is > 0.80 then the validity score is in the high category, the validity score is 0.60 ≤V < 0.80 is in the high enough category, 0.40 ≤ V < 0.60 is in the sufficient category, and the validity score is 0 ≤ V < 0.40 categorized as bad (Febriandi, Susanta, & Wasidi, 2019)

Test agreement between validators

After the validation process is complete, the agreement test is carried out. The agreement test between validators was carried out to see the level of agreement between validators when assessing the Student Worksheet that had been developed (Febriandi, Susanta, & Wasidi, 2019). To see the level of agreement between raters in assessing every aspect of the Student Worksheet using the Intraclass Correlation Coefficient (ICC) formula (Ismunarti et al, 2020):

$$ICC = \frac{\delta_s^2}{\delta_s^2 + \delta_o^2 + \delta_e^2}$$

δ_s^2 = subject variation size
δ_o^2= research aspect variance
$\delta^2 e$ = variance due to random factors

Statistical criteria in determining agreement between raters using the ICC score are interpreted if the ICC score <0.4 is in the bad category, 0.4≤ICC <0.75 is in the good category, and the ICC score 0.75 is in the very good category (Zaki, 2017).

Student Worksheet Practical Analysis

The analysis of the practicality of the Student Worksheet is assessed based on a questionnaire filled out by students by scoring the answers to the questionnaire on a scale of 1-4. The formula calculates the value of practicality (Hidayat & Irawan 2017)

$$P = \frac{Total\ score\ obtained}{maximum\ score} \times 100\%$$

The results of the practicality score assessment are adjusted to the practicality category (Sakdiyah & Annizar, 201), namely if the practicality score > 81% is in the very practical category, 61% < P ≤ 81% is in the practical category, 41% < P ≤ 61% is in the quite practical category, 21% < P ≤ 41% categorized as impractical.

Effectiveness analysis

This data analysis is in the form of understanding test questions in the Student Worksheet, which aims to determine the effective criteria of the student worksheets developed in terms of student learning outcomes. Student learning outcomes obtained from giving test in the form of pretest and posttest to students and see whether the developed Student Worksheet is effective in improving student learning outcomes using normalized gain values or N-gain as follows (Pratiwi, 2016)

$$< g > = \frac{S_{posttest} - S_{pretest}}{S_{max} - S_{pretest}}$$

$S_{posttest}$: posttest score
$S_{pretest}$: pretest score
S_{max} : maximum score

The results obtained after using the N-gain formula will then be interpreted in terms of the effectiveness of the application, namely if N-gain 0.7 then the treatment criteria using student worksheet is effective, 0.3≤N-gain <0.7 has quite effective criteria and if N -gain <0.3 treatment criteria using student worksheet is not effective (Hake, 1998).

▪ RESULT AND DISSCUSSION

Preliminary End Analysis

The description of the results of the initial final analysis is to find out the basic problems faced during mathematics learning and the learning approach used. Three aspects of mathematics learning problems must be studied: teaching materials, materials, and learning processes. Problems regarding teaching materials can be seen in the learning resources provided by the teacher to students during the implementation of learning activities in the classroom. The teacher uses the Student Worksheet from the publisher, where Student Worksheet contains routine practice questions so that it does not guide students to understand the concept independently. Whereas the role of the Student Worksheet is very important as a supporter of learning, as stated (Trianto, 2012), the Student Worksheet functions to optimize learning because students are led to work on a series of activities made by the learning objectives to be achieved. This causes students to get used to doing routine questions at school and are less able to understand mathematics, which has an impact on the low learning outcomes of students.

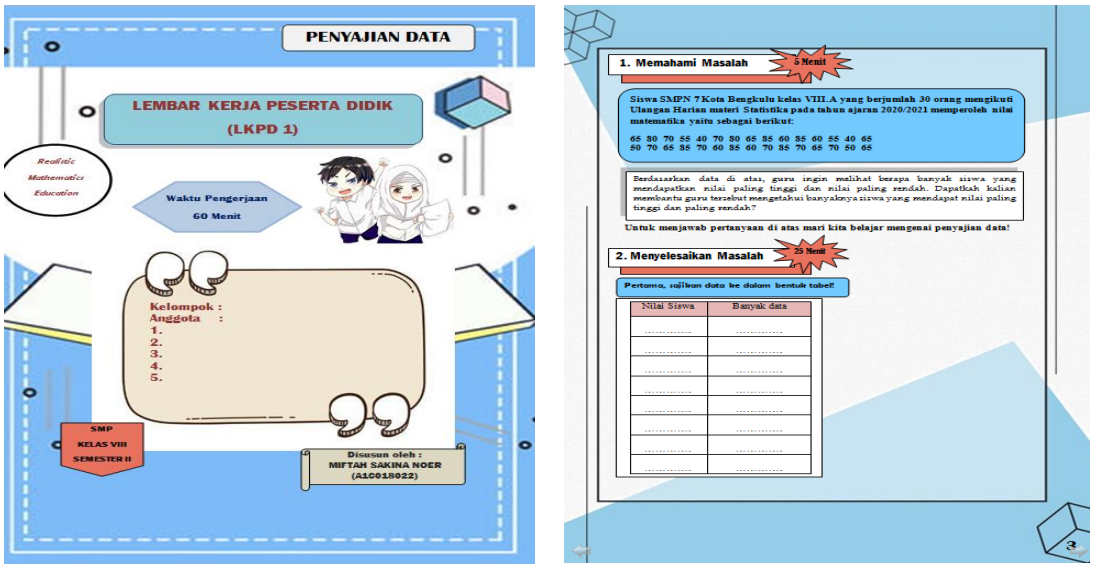
Next is the analysis of students; the purpose of analyzing students is to determine the characteristics of students who are different in a class, including background knowledge, academic abilities, the character of students, and ability to work together in groups. The following are the results of the analysis of students in class VIII SMPN 7 Bengkulu City. The knowledge background of class VIII SMPN 7 Bengkulu City students generally varies. They are categorized as having high, medium, and low-level abilities. Students with a school environment, namely SMPN 7 Bengkulu City, are geographically located around the beach area and the nearest activity center from the cultural heritage, traditional villages, cultural parks, and studios. Therefore, the use of realistic problems in the developed Student Worksheet relates to the area around students, namely the school environment and the beach. This is to help students understand the concept and achieve the learning objectives to be achieved better. The

academic abilities obtained by class VIII students of SMPN 7 Bengkulu City also varied from high, medium, and low levels.

This is also evidenced by students' learning outcomes with an average value of the Final Semester II exams for class VIII.B students for the 2021/2022 academic year 43.12. The average value still does not meet the school criteria minimum set of 68. Therefore, RME-based Student Worksheet teaching materials are needed to help students obtain better learning outcomes. Concept analysis aims to determine the content and subject matter needed in developing Student Worksheet. The material is very necessary to achieve the indicators of learning objectives. The material for class VIII SMP in the second semester, which was developed in the scope of Statistics, material related to statistics is found in KD 3.10. Analyzing data, average value, median, mode, and distribution of data to conclude, make decisions, and create editorials; 4.10 Presenting and solving problems related to data distribution, mean value, median, mode, and data distribution to conclude, make decisions and make editorials. Then the task analysis, in this phase, is the preparation of the number, title, sequence of Student Worksheet, number of Student Worksheet, and analysis to identify tasks that students must master to achieve the expected learning competencies. The Student Worksheet title is determined as the result of the development of the sub-materials discussed, and the order of the Student Worksheet is arranged by sub-material.

Design Phase

The design phase has three main steps: the preparation of tests, media selection, and format selection. First, the preparation of a test where the results of the task analysis and the previously described concepts are the things that underlie the preparation of the test, namely the Learning Outcome Test. Learning Outcome Test used in research. The learning outcome test is structured according to the learning indicators that have been designed, namely the presentation of data, the size of data concentration, and the size of the data distribution.



Worksheet cover Examples of Worksheet Problems

Figure 1. Worksheet product

The selection of learning media that will be used at each meeting is to use Student Worksheet according to the title and indicators prepared in the definition phase. Other media that will help students work on Student Worksheet are stationery such as rulers, pencils, and erasers when the learning process is carried out. RME stages and values (Prastowo, 2015). The following is an example of a development product display.

Validity Test Results

Validity Test Results The results of the initial design on the Student Worksheet that have gone through the two initial phases of the development process, namely the define and design stages, have been carried out; the next step is validity testing. This validity test contains three aspects: material validation, language validation, and construction validation, which refers to the feasibility component of the Student Worksheet, according to the Ministry of National Education (2008). Based on the validity test process on the material aspect, some parts of the Student Worksheet are wrong. Some parts have been revised according to suggestions and input by the validator.

Based on the results of the revisions made to the Student Worksheet in the material aspect section, it can be concluded that the material used in the Student Worksheet has met the valid criteria and can be used later. The results of the assessment given by 3 validators were analyzed using Aiken's V formula to determine the validity of the RME-based Student Worksheet on the statistical material developed as follows:

Table 1. Results of Aiken's analysis of the product validity test

Aspect	Total items	Mean score	Validity
Content	10	0.84	High
Construct	17	0.88	High
Language	7	0.88	High

From the data obtained from the analysis of the material validation sheet in the table above, it is concluded that with the specified criteria, the result is that the revised 1 Student Worksheet draft gets a validation score of 0.84 with a high category. Furthermore, changes and improvements were made from the construction aspect. The results of improvements to the revised Student Worksheet in the construction aspect concluded that the construction aspect of the Student Worksheet was valid and could be used for the next stage. The results of the construction validation show that the revised Student Worksheet obtained a score of 0.88, meeting the high criteria. This indicates that all Student Worksheets have met the construction requirements. Observations from the results of the revisions made to the Student Worksheet are assessed from the language aspect; it can be concluded that the language used in the Student Worksheet is valid and can be used later.

The language was analyzed and concluded with predetermined criteria based on the data validity. Thus, the results of the language validation show that the revised Student Worksheet obtained a score of 0.88, which meets the high criteria. The validation of the Learning Outcome Test items was assessed by 2 Lecturers of Mathematics Education at Bengkulu University and a Mathematics teacher at SMPN 7

Bengkulu City. This question has been designed with as many as 5 questions. Each question is arranged according to learning indicators: data analysis, average value, median, mode, range, quartile, and interquartile range.

Table 2. Analysis of aiken's test validity

Aspect	Mean score	Validity
Content	0.89	High
Construct	0.83	High
Language	0.82	High

Based on the table above, the score obtained has a high criterion with a number of 0.84. Thus, the validator believes that the questions that have been prepared can be used to test learning outcomes. The results of the agreement test between raters analyzed through the ICC (Intraclass Correlation Coefficients) show agreement between raters to assess every aspect of the student worksheets as: Content aspect is 0,99 and very good criteria, construct aspect is 0,99 with very good criteria. Based on the data above, the criteria are very good overall regarding material, language, and construct aspects. The results of this study are supported by the opinion of Rezki et al. (2022) valid learning media is the best way to get information about students' abilities in accordance with learning objectives.

Practicality Test

The results of the analysis of the practicality test carried out on 27 students obtained the average practicality of the Student Worksheet as shown in the following table. Based on table 3, it was obtained that the practicality score of all Student Worksheet, students reached 81.55%, where this number was included in the very practical criteria (Sakdiyah & Annizar, 2021).

Table 3. Practical test

Worksheet	Practicality (%)	Criteria
Worksheet-1	82.13 %	Very Practical
Worksheet-2	80.68 %	Very Practical
Worksheet-3	81.85 %	Very Practical
Average	81.55 %	Very Practical

Effectiveness Test

The results of the analysis of student scores on the THB questions are calculated using N-gain analysis as shown in Figure 2. Based on Figure 2, the value of N-gain = 0.72 lies in the high category (Hake, 1998). Furthermore, to analyze the effectiveness of the Student Worksheet, it is examined through the students' learning outcomes on the posttest score. The results obtained are from a total of 27 students. 22 students get a score of 68 (minimum completeness criteria criteria score).

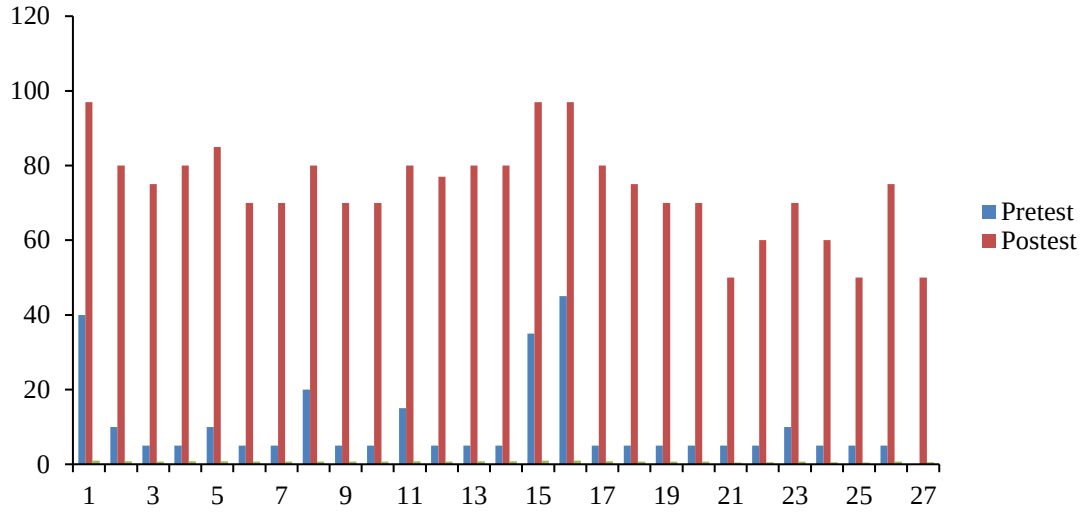


Figure 2. Analysis of N-Gain

The results of this study are supported by the results of research that has been done before, Palinussa (2013) found that the achievement and improvement of students' critical mathematical thinking skills with RME is better than conventional. RME has an impact on students' mathematical connections (Febriyanti, Bagaskorowati, & Makmuri, 2019) The problem-solving ability of students with RME is better than conventional (Ginting, et. al, 2018); student activities in RME learning affect student learning outcomes (Ardiyani, Gunarhadi, & Riyadi, 2018). the achievement and improvement of students' problem-solving abilities with the RME approach is better than conventional (Ginting, et.al, 2018; Taufina, 2019; Noviani, Syahputra, & Murad); Putri, Hasratuddin, and Syahputra (2019) found that RME teaching materials were effective in increasing students' spatial ability and motivation.

▪ CONCLUSION

Based on the results of developing a Student Worksheet based on Realistic Mathematics Education on statistical material in class VIII SMPN 7 Bengkulu City, it was concluded that the process of developing a Student Worksheet based on Realistic Mathematics Education refers to the 4D development model including (1) defining phase (Define) (2) design phase (Design) (3) development phase (Develop) (4) dissemination phase (Disseminate). The validity of the Student Worksheet based on Realistic Mathematics Education obtained an average score of Aiken's V index on the logical validity of 0.86, including the high category. Then, the assessment of the agreement between raters analyzed through the ICC (Intraclass Correlation Coefficients) obtained a score of 0.99 with a very good category. The practicality Student Worksheet based on Realistic Mathematics Education meets the very practical criteria with an overall score of 81.51% by students. The effectiveness Student Worksheet based on Realistic Mathematics Education meets the effective criteria. This can be seen from the N-gain score of 0.72, which is in the high category. Furthermore, the effectiveness of the Student Worksheet is examined through the recapitulation of the value of student learning outcomes. The results obtained are from a total of 27 students.

22 students get a score of 68 (minimum completeness criteria score). Thus, the criteria for completeness of student learning outcomes have reached 81.48%.

▪ REFERENCES

Ardiyani, S. M. (2018). Realistic mathematics education in cooperative learning viewed from learning activity. *Journal on Mathematics Education*, *9*(2), 301-310

Dickinson, P., & Hough, S. (2012). Using realistic mathematics education in UK classrooms. Manchester: Centre for Mathematics Education, Manchester Metropolitan University

Febriandi, R., Susanta, A., & Wasidi. (2019). validitas lks matematika dengan pendekatan saintifik berbasis outdoor pada materi bangun datar [the validity of mathematical worksheet with outdoor-based scientific approach on flat shape material]. *Journal of Basic Education Learning and Teaching*, *2*(2), 148-158.

Febriyanti, F., Bagaskorowati, R., & Makmuri, M. (2019). The effect of the realistic mathematics education (RME) approach and the initial ability of students on the ability of student mathematical connection. *International Journal for Educational and Vocational Studies*, *1*(3), 153-156.

Ginting, M. S., Prahmana, R. C. I., Isa, M., & Murni, M. (2018). Improving the reasoning ability of elementary school student through the indonesian realistic mathematics education. *Journal on Mathematics Education*, *9*(1), 41-54.

Hafiz, M., Kadir, & Fatra, M. (2017, May). Concept mapping learning strategy to enhance students' mathematical connection ability. In AIP Conference Proceedings (Vol. 1848, No. 1). AIP Publishing LLC.

Hasbi, M., Lukito, A., & Sulaiman, R. (2019). The realistic of mathematic educational approach to enhancing ability mathematical connections. *International Journal of Trends in Mathematics Education Research*, *2*(4), 179-183.

Hidayat, A., & Irawan, I. (2017). Pengembangan lks berbasis rme dengan pendekatan problem solving untuk memfasilitasi kemampuan pemecahan masalah matematis siswa [development of rme-based worksheet with problem solving approach to facilitate students' mathematical problem-solving ability]. *Journal of Scholar: Journal of Mathematics Education*, 51-63.

Ismunarti, DH, Zainuri, M., Sugianto, DN, & Saputra, SW (2020). Pengujian reliabilitas instrumen terhadap variabel kontinu untuk pengukuran konsentrasi klorofil-a perairan [instrument reliability testing on continuous variables for measurement of chlorophyll-a concentration in waters]. *Marina Oceanography Bulletin*, *9*(1), 1-8.

Ndiung, S., Dantes, N., Ardana, I., & Marhaeni, A. A. I. N. (2019). Treffinger creative learning model with rme principles on creative thinking skill by considering numerical ability. *International Journal of Instruction*, *12*(3), 731-744.

Ningsih, S. (2014). Realistic mathematics education: model alternatif pembelajaran matematika sekolah [realistic mathematics education: alternative model of school mathematics learning]. *Jpm Iain Antasari*, 73-94.

Noviani, J., Syahputra, E., & Murad, A. (2017). The effect of realistic mathematic education (RME) in improving primary school students' spatial ability in subtopic two dimension shape. *JEP*, 8(34), 112-126.

Palinussa, A. L. (2013). Students' critical mathematical thinking skills and character: Experiments for junior high school students through realistic mathematics

education culture-based. *Journal on Mathematics Education, 4*(1), 75-94.

Prastowo, A. (2015). Panduan kreatif membuat bahan ajar inovatif [creative guide to making innovative teaching materials]. Jogjakarta: DIVA Press.

Pratiwi, D. D. (2016). Pembelajaran learning cycle se berbantuan geogbra terhadap kemampuan pemahaman konsep matematis [learning cycle se assisted by geogbra on the ability to understand mathematical concepts]. AL-Jabar, 191-202.

Pratiwi, R., & Waziana, W. (2018). The effect of realistic mathematics education on student's mathematical communication ability. *Malikussaleh Journal of Mathematics Learning, 1*(1), 31-35

Putri, A. (2018). Analisis kemampuan pemeahan masalah rutin dan non rutin pada materi aturan pencacahan [analysis of routine and non-routine problem solving ability in the material of enumeration rules]. *Tambusai Education Journal*, 890-896.

Putri, S. K., & Syahputra, E. (2019). Development of learning devices based on realistic mathematics education to improve students' spatial ability and motivation. *International Electronic Journal of Mathematics Education, 14*(2), 393-400.

Qurohman, M. T. (2018). Think to talk write learning mathematics tool hands on activity. International Journal of Trends in Mathematics Education Research, 1(3).

Retnawati, H. (2016). Analisis kuantitatif instrumen penelitian [quantitative analysis of research instruments]. Yogyakarta: Parama Publishing.

Safitri, A., Surya, E., Syahputra, E., & Simbolon, M. (2017). Impact of Indonesian realistic mathematics approach to students mathematic disposition on chapter two composition function and invers fungtion in grade xi ia-1 sma negeri 4 padangsidimpuan. *International Journal of Novel Research in Education and Learning, 4*(2), 93-100.

Sakdiyah, H., & Annizar, A. M. (2021). Pengembangan lkpd berbasis kearifan lokal masyarakat pesisir pantai puger pada materi perbandingan [development of lkpd based on local wisdom of puger coastal communities on comparative material]. Aritmatika, 116-124.

Sari, A., & Yuniati, S. (2018). Penerapan pendekatan realistic mathematics education (rme) terhadap kemampuan pemahaman konsep matematis [application of realistic mathematics education (rme) approach to the ability to understand mathematical concepts]. *Scholar Journal: Journal of Mathematics Education*, 71-80.

Sari, D. P. (2020). Penerapan matematika dalam kehidupan sehari-hari di sman 6 tanggerang selatan [application of mathematics in daily life at sman 6 tangerang selatan]. *Proceedings of Senantias*, 1363-1371.

Sari, S. K. (2017). Pengembangan desain pembelajaran statistika berbasis it menggunakan pendekatan realistic mathematics education untuk kelas viii smp [development of it-based statistics learning design using realistic mathematics education approach for class viii junior high school]. *Jurnal Nasional Pendidikan Matematika*, 290-304.

Siregar, H. S., & Harahap, M. S. (2019). Efektivitas kemampuan repsesentasi matematis siswa menggunakan pendekatan realistic mathematics education (rme) di sma negeri 1 angkola timur [the effectiveness of students' mathematical representation ability using realistic mathematics education (rme) approach at sma negeri 1

angkola timur]. Jurnal MathEdu, 7-18.
Sugiyono, S. (2016). Metode penelitian pendidikan [educational research methods]. Bandung: Alfabeta.
Sulianto, J. (2008). Pendekatan kontekstual dalam pembelajaran matematika untuk meningkatkan berpikir kritis pada siswa sekolah dasar [contextual approach in mathematics learning to improve critical thinking in elementary school students]. Pythagoras, 14-25.
Sumirattana, S., Makanong, A., & Thipkong, S. (2017). Using realistic mathematics education and the DAPIC problem-solving process to enhance secondary school students' mathematical literacy. Kasetsart Journal of Social Sciences, 38(3), 307-315.
Susanta, A., Koto, I., & Susanto, E. (2022). Teachers' ability in writing mathematical literacy module based on local context. Education Quarterly
Susanta, A., Sumardi, H., & Zulkardi, Z. (2022, January). Development of mathematical literacy problems using bengkulu context. In Eighth Southeast Asia Design Research (SEA-DR) & the Second Science, Technology, Education, Arts, Culture, and Humanity (STEACH) International Conference (SEADR-STEACH 2021) (pp. 182-188). Atlantis Press
Susanta, A., Susanto, E., & Maizora, S. Rusdi. 2021. Analisis kemampuan siswa smp/mts kota bengkulu dalam menyelesaikan moal matematika timss [analysis of the ability of bengkulu city junior high school/mts students in solving timss mathematics questions]. Jurnal THEOREMS, 5(2), 131-139.
Susanto, E., Rusdi, R., & Susanta, A. (2021). Pembelajaran matematika realistik berbasis budaya masyarakat bengkulu dalam meningkatkan komunikasi matematis mahasiswa [realistic mathematics learning based on bengkulu community culture in improving student mathematical communication]. Jurnal Pendidikan Matematika Raflesia, 6(1), 39-49.
Swanson, D., & Williams, J. (2014). Making abstract mathematics concrete in and out of school. Educational Studies in Mathematics, 86(2), 193-209.
Swanson, D., & Williams, J. (2014). Making abstract mathematics concrete in and out of school.Educational Studies in Mathematics, 86(2), 193-209.
Taufina, T., Chandra, C., Fauzan, A., & Syarif, M. I. (2019, December). Development of statistics in elementary school based rme approach with problem solving for revolution industry 4.0. In 5th International Conference on Education and Technology (ICET 2019) (pp. 716-721). Atlantis Press.
Thiagarajan, S., Semmel, D. S., & Semmel, M. I. (1974). Instructional development for training teachers of exceptional children. Indiana: Indiana University.
Trianto. (2012). Model pembelajaran terpadu: konsep, strategi, dan implementasinya dalam kurikulum tingkat satuan pendidikan (ktsp) [integrated learning model: concepts, strategies, and implementation in the education unit level curriculum]. Jakarta: Bumi Aksara.
Umbaryati. (2016). Pentingnya LKPD pada pendekatan scientific pembelajaran. PRISMA [The Importance of LKPD in the Scientific Approach to Learning. PRISM], Prosiding Seminar Nasional Matematika, 217-225.
Wahyudi, M., Joharman, M., & Ngatman, M. (2017, October). The development of realistic mathematics education (rme) for primary schools' prospective teachers. In

International Conference on Teacher Training and Education 2017 (ICTTE 2017) (pp. 730-742). Atlantis Press.

Wang,G., Zhang, J., & Zhou, J. (2013). Characteristics of efficiency of mathematical instructional behavior. Journal of Mathematics Education, 6(1), 56-59.

Wibowo, A., Hanifah, & Muchlis, E. E. (2019). Perbandingan hasil belajar matematika peserta didik menggunakan pendekatan realistic mathematics education dengan pendekatan saintifik di smp negeri 14 kota bengkulu [comparison of students' mathematics learning outcomes using a realistic mathematics education approach with a scientific approach at smp negeri 14 bengkulu city]. PENDIPA, 125-131.

Wulandari, N., Patta, R., & Kadir, A. (2021). Analisis kreatifitas guru kelas dalam menyusun lembar kerja peserta didik (lkpd) mata pelajaran matematika masa pandemi covid-19 [classroom teacher creativity analysis in compiling student worksheets (lkpd) for mathematics subjects during the covid-19 pandemic]. Jurnal Perseda, 120-127.

Yunipiyanto, M. R., Trisnaningsih, & Pujiati. (2020). pengembangan lembar kerja peserta didik (lkpd) berbasis masalah untuk meningkatkan kemampuan berpikir kritis dalam proses pembelajaran ekonomi [development of problem-based student worksheets (lkpd) to improve critical thinking skills in the economic learning process]. Jurnal Studi Sosial, 1-15.

Zakaria, E., & Syamaun, M. (2017). The effect of realistic mathematics education approach on students' achievement and attitudes towards mathematics. Mathematics Education Trends and Research, 1(1), 32-40.

Zaki, R. (2017). Validation of instrument measuring continuous variable, advances in statistical methodologies and their application to real problems. Intech open Science. pp : 217-237.