MATHEMATICS TEACHING RESEARCH JOURNAL
Vol 13, No 4
WINTER 2021

Developing Realistic Mathematics Problems Based on Sidoarjo Local Wisdom

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Abstract: Education currently only prioritizes mastery of scientific aspects and students' intelligence. Math problems are still related to fictitious general knowledge. For this reason, local wisdom-based learning is needed whose learning is packaged using objects, events, and various things that are close to students' lives to raise the local potential of regions in Indonesia. Therefore, the researchers developed Realistic Mathematics Problems Based on Local Wisdom (RMPBLW) Sidoarjo. The question is expected not only as a measuring tool for students but also as a step in character building by introducing local cultures to students. The purpose of this study was to develop mathematical problems based on Sidoarjo's local wisdom on valid and reliable flat-shaped materials. This type of research is research and development or Research and Development (R&D). This study uses 3 stages of test tests, namely expert validation to test the feasibility of the questions, test the practicality in terms of readability of the questions with small group students, and test the validity of the items and the reliability of the questions with quantitative methods. This study produced 15 mathematical questions based on Sidoarjo's local wisdom on flat-shaped material that had been declared valid with an $r_{value} > r_{table}$ *(0.4438) and was declared reliable with a reliability value of 0.97.*

INTRODUCTION

The success of the implementation of learning can be measured by the existence of a test of learning outcomes, especially in the cognitive aspect. Learning outcomes tests are generally carried out by giving a series of questions according to learning achievement indicators. This is done to obtain information related to understanding and mastery of student learning. However, the Mathematics questions that are studied and worked on are still about general knowledge and rarely involve the content and context that is often experienced around students. So there need to be questions that are developed based on the content and context that surrounds students.

Along with the development of the curriculum in Indonesia, in addition to making students proficient in science, learning carried out in schools should also instill the values of the nation's character. This is according to Law Number 20 of 2003, Article 3, which explains that the

development of capabilities and character formation, as well as forming a dignified nation's civilization, is a function of national education (National Educational Department, 2003). Character formation is closely related to character building and character education. People with character have a personality, a sense of character, and a pattern of behavior (Samrin, 2016).

But in reality, the formation of character and cultural values of the nation in students is still rarely applied in learning mathematics. This can be seen from the lack of students who know and recognize their own regional culture, especially in Sidoarjo. Whereas in essence, character education is an educational system that seeks to instill noble values to school members which include components of knowledge, awareness or willingness, and actions to implement these values.

One form of implementation of character education is to apply local wisdom-based learning. With local wisdom-based learning, local potential in Indonesia can be raised (Prasetyo, 2013). The implementation of local wisdom in learning can also make the nation's morality increase, the quality of education increases, and the quality of implementation and educational outcomes also increases. (Chairiyah, 2017)

So important and strategic is the value of local wisdom in nation-building, it is very natural that character education focuses its studies on extracting local wisdom values that live in Indonesian society and culture with Bhinneka Tunggal Ika. As it is known, that the traditions and culture contained in local wisdom play an important role in developing the personality of the younger generation in which each tradition has superior values. Especially in Sidoarjo, students who are living in Sidoarjo must know Sidoarjo's local wisdom itself, one of which is through education.

Local wisdom is a view of life and knowledge as well as various life strategies in the form of activities carried out by local communities in responding to various problems in meeting their needs. Sidoarjo local wisdom is the result of the Sidoarjo community through their experiences and traditions and is not necessarily experienced by other communities. Therefore, each region must have its local wisdom or culture. There are several of Sidoarjo’s local wisdom that can be related to mathematics, especially in junior high school material. Sidoarjo local wisdom such as Batik Jetis (traditional painting in a piece of cloth in Jetis village), Kirab Tumpeng Pitu (caravan of seven rice cones), Lelang Bandeng (milkfish auction tradition), Nyadran (the tradition of cleaning the tomb of elders), Wayang Silat (puppet silat), Ludruk (Java’s traditional theater), Reog Cemandi (the traditional art of Cemandi village), Tari Banjar Kemuning (traditional dance of Banjar Kemuning village), Ruwat Desa (the tradition of praying for the safety of the village). (Anggraeni et al., 2019).

Once the importance of local wisdom is known to students, so there is a need for learning that is tied to local wisdom, one of which is the development of local wisdom-based ones. If we know, Sidoarjo's local wisdom can be applied to various mathematical materials, but in this study it is more on flat-shaped materials, namely Batik Jetis, Kirab Tumpeng Pitu, Ruwat Desa, and Nyadran.

The application of local wisdom can be done through development based on the cultural context and local wisdom of Sidoarjo.

The questions based on the cultural context and local wisdom of Sidoarjo are closely related to real problems that are close to students' lives because apart from being a tool, mathematics is also a human activity. One approach that has characteristics that are close and relevant to everyday life is Realistic Mathematical Education (RME). Traffer stated that RME is a learning theory that connects human activities with existing reality (Fadlila & Sagala, 2021). RME has characteristics that are close and relevant to the daily activities of the students themselves so that it enables students to see the mathematics that comes from everyday life. Treffers and Freudenthal explain that the process of rediscovering mathematical concepts is related to the search for patterns and relationships starting with realistic problems, trying to describe with language and symbols created by yourself, modeling, symbolizing, schematization, and defining which also starts with realistic problems and goes on. Overtime can find a way that can be used to solve similar problems without resorting to the help of realistic problems (Natalia, 2017).

It is known that learning using the RME approach can improve students' literacy skills (Sumirattana et al., 2017), students' mathematical communication skills (Habsah, 2017; Sa'id et al., 2021), higher-order thinking skills (Fadlila & Sagala, 2021), and also the problem-solving ability and mathematical confidence (Yuanita et al., 2018). The real world is the starting point for the development of mathematical concepts (Doorman et al., 2007). Muchlis' research revealed that the mathematical problem-solving ability of students who studied with a Realistic Mathematics approach was significantly better than students who studied with a conventional approach (Efrida et al., 2012). In learning mathematics with the Realistic Mathematics Education approach, mathematical concepts are obtained through students' thinking processes, so this approach is a student-centered learning strategy (Danoebroto, 2013). The real world is the starting point for the development of mathematical concepts.

Based on the advantages of applying RME in mathematics learning, it is necessary to have an instrument to support the implementation of RME learning, namely the development of questions. However, to find out more about the importance of developing questions in RME, it is necessary to review the stages of the thinking process adopted by RME as shown below.

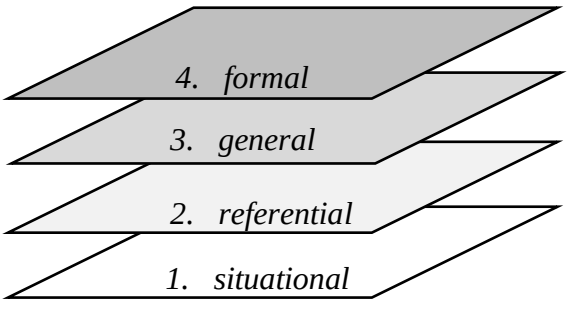


Figure 1. Levels in Model Development (Bakker, 2004; Gravemeijer & Bakker, 2006)

In Figure 1 it can be seen that situational is the initial level in the model development stage, where development and the model are still developing in the context of the problem situation using. Furthermore, at the second level, students begin to build a model to describe the context situation or known as the model of. Furthermore, at level three, the developed model has led to the search for solutions. Furthermore, at the last level, students have used symbols and mathematical representations, which is the stage of formulating and affirming mathematical concepts built by students. These stages are very appropriate when students are faced with situations that are very close to everyday life, one of which is problems related to local wisdom where students live. These stages are very appropriate when students are faced with situations that are very close to everyday life, one of which is problems related to local wisdom where students live. This study aims to describe the process and results of developing Realistic Mathematics questions based on valid and reliable Sidoarjo local wisdom. The problem development process in this study is based on the Plomp development model which consists of four phases, namely: initial investigation phase, design phase, realization phase, test phase, evaluation, and revision.

METHOD

According to the purpose of this study, which is to produce valid and reliable Realistic Mathematics Problems Based on Local Wisdom (RMPBLW), the development of questions in this research uses the Plomp model which consists of 1) initial investigation phase, 2) design phase, 3) realization phase/ construction, 4) test, evaluation, and revision phase, and 5) implementation phase. This research was only carried out until the test, evaluation, and revision phases because this research was carried out in a pandemic condition where not all schools carried out learning in schools.

In the initial investigation phase, an investigation was conducted on the local wisdom of Sidoarjo related to the content of flat shapes. The investigation was carried out by examining various sources in the form of relevant online articles discussing Sidoarjo local wisdom. In the design phase, the researcher designs questions by adjusting the context and content of the questions. At this stage, the researcher chose to develop multiple-choice questions to facilitate the analysis of the validity and reliability of the questions. Then in the realization/construction phase, the researcher made the questions according to the plan to produce the first question instrument (RMPBLW I).

At the test, evaluation, and revision stages, the researcher validated RMPBLW I to 3 validators. The three validators are experts in the fields of geometry and education, so all three were asked to validate the feasibility of the items based on content, context, and also language accuracy. Instrument validation was carried out through a qualitative questionnaire which contained a

validator's statement regarding the feasibility of the questions and suggestions for improvement in each question. The results of the expert validation were used to revise the first instrument of question and corrected it to become the second instrument of question (RMPBLW II).

Next, a test of the readability of RMPBLW II was conducted on 5 students who were selected based on the grade level corresponding to the context of the question. The five students were given a question readability questionnaire to determine whether students were able to read and understand the meaning of the questions or not. If there are questions that have not been able to be read by students, then revisions are made again to produce the third instrument of question (RMPBLW III).

RMPBLW III was then tested on 20 junior high school students to measure the validity and reliability of RMPBLW III. The selection of 20 students was adjusted to the suggestions of the research partner teachers, all of which represented the students' ability level. In addition, the condition of partner schools has not yet fully carried out learning activities so that researchers can only try out the third question instrument on 20 students. The problem is tested for students twice at different times or known as the test-retest method. Furthermore, the analysis of validity was carried out by the matter of using the Pearson Product Moment correlation with $\alpha = 0.05$ and an analysis of reliability using Alpha Cronbach.

Broadly speaking, the implementation of this research can be seen in the following development flow chart.

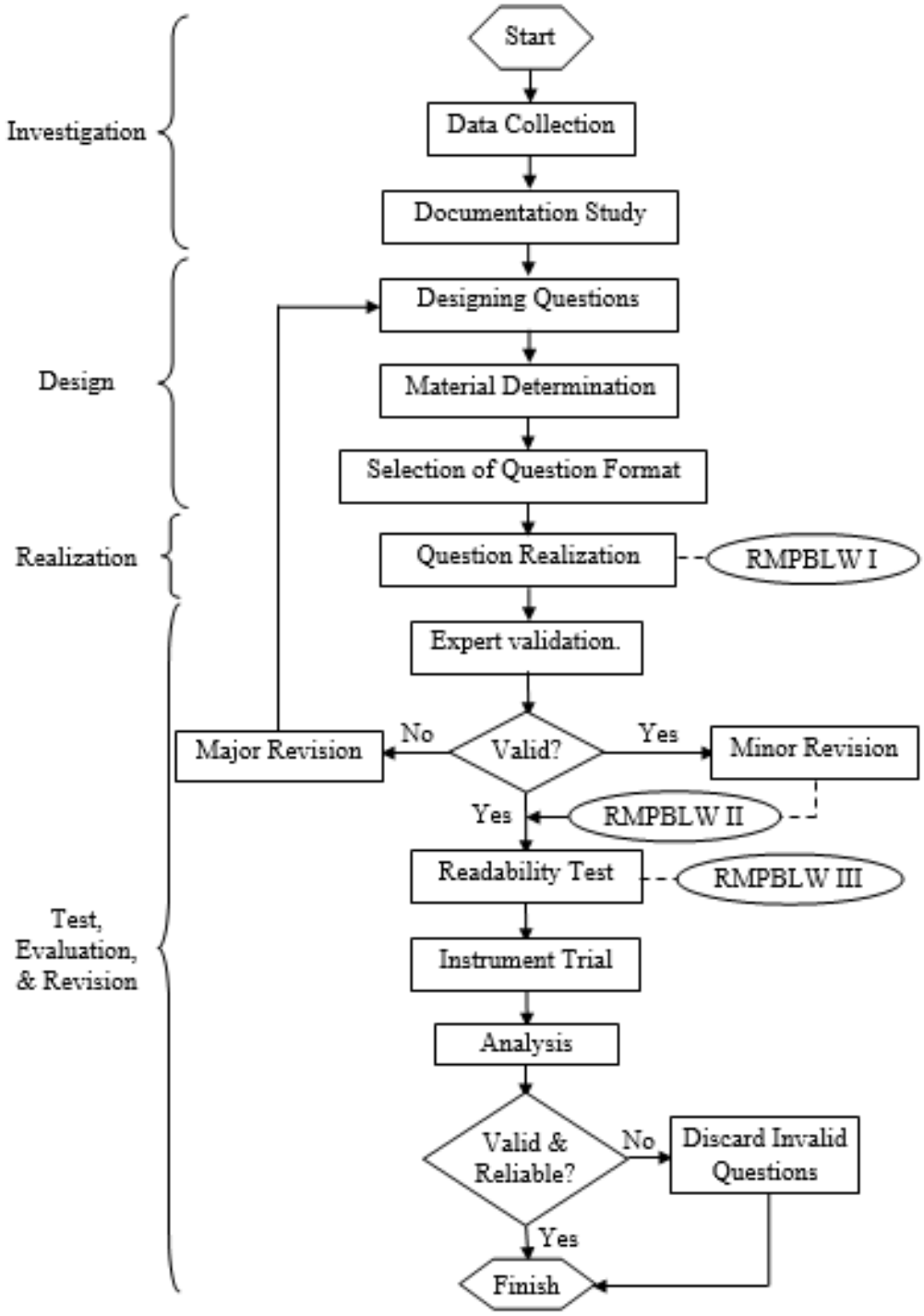


Figure 2. Development Flow

RESULT AND DISCUSSUION

1) Preliminary Investigation

At the initial investigation stage, data on local wisdom was obtained which was analyzed from various sources and as presented in the following table.

Resources	Local Wisdom
Baharudin & Nugraha. 2013. Masyarakat Kampoeng Batik Jetis Sidoarjo: Antara Mempertahankan Batik Tulis Sebagai Produk Budaya Lokal dan Kontribusi Ekonomi: Seminar Nasional & Workshop: Peningkatan Inovasi dalam Menanggulangi Kemiskinan. Surabaya Wardani, Kusuma. 2015. Menggali Potensi Sentra Industri Kreatif Sidoarjo, Jawa Timur. Dalam Proceeding Seminar Nasional: Peran Strategi Seni & Budaya dalam Membangun Kota Kreatif. Universitas Negeri Malang. Aliyah, dkk. 2020. Komunikasi Ritus dalam Tradisi Nyadran di Sidoarjo. Kanal: Jurnal Ilmu Komunikasi. Vol 9 No 1. Universitas Muhammadiyah Sidoarjo.	Batik Jetis Village
Utami & Hutama. Mei 2018. Tindak Tutur Dalam Tradisi Nyadran (Nglarung Sesaji) di Dusun Kepetingan Desa Sawohan Kecamatan Buduran Kabupaten Sidoarjo: Kajian Pragmatik. Jurnal Ilmiah: FONEMA, Vol 1. Nomor 1. Universitas Dr. Soetomo Surabaya. Sangadji, dkk. Juni 2015. Kajian Ruang Budaya Nyadran Sebagai Entitas Budaya Nelayan Kupang di Desa Balongdowo – Sidoarjo. Jurnal RUAS, Vol 13 No 1. Universitas Brawijaya Malang.	Nyadran and Ruwat Desa
Indrassusiani, Renyta. Maret 2018. Partisipasi Masyarakat Dalam Melestarikan Tradisi *Kirab Tumpeng Pitu* Sebagai Kearifan Lokal di Dusun Njaretan Kelurahan Urangagung Kecamatan Sidoarjo Kabupaten Sidoarjo. Universitas Islam Negeri Sunan Ampel. Surabaya	Kirab Tumpeng Pitu

Table 1. List of Sidoarjo's Local Wisdom Information

Table 1 is the data containing several local wisdom that can be used to develop questions on flat-shaped materials.

2) Fase Design

After identifying local wisdom that can be applied to the flat shape material, the next step is to design the content and form of the questions given. In this development, the questions developed are in the form of multiple-choice questions. The questions were developed in the form of multiple choice because multiple-choice questions have advantages, namely practicality in scoring and minimizing errors in scoring (Susongko, 2013). Azwar stated that multiple-choice questions have higher objectivity and generally have satisfactory reliability (Kadir, 2015). In addition, students

generally tend to like working on multiple-choice questions compared to essay questions (Tozoglu et al., 2004). The design can be seen in the Table 2.

Local Wisdom	Context	Content	Number of Question
Nyadran	• Making a part of a boat	- Area measurement	1, 2
	• Provision of Space	- Area measurement	3, 4, 6
Ruwah Desa	• Seat Position	- Distance measurement	5
	• Carnival Path	- Mileage	7
		- Time	8
Kirab Tumpeng Pitu	• Making Tumpeng (Rice Cone)	- Area measurement	9, 10
	• Preparing the place of celebration	- Area measurement	11
		- Lots of stuff	12, 13
Batik Jetis	• Making a batik	- Number of patterns	14
		- Area measurement	15

Table 2: Problems Design According to Content/Material

The design of the questions is adjusted to the content/language, construction, and language as follows.

a) Content/Material
   - A clear scope of questions and answers
   - Conformity with the Core Competencies and Basic Competencies of Mathematics in 7^{th} grade
   - Suitability competence (urgency, relevance, continuity, and accuracy of daily use)

b) Construction
   - Formulation of the sentence on the question using the word question.
   - Interrelated concepts.
   - There is clear instructions/information on how to do the questions.
   - If there are tables, pictures, graphs, or the like presented legibly, clearly, and functionally.
   - Suitability with the general level of understanding of students in 7^{th} grade.

c) Structure of Language
   - Consistent with Improved Spelling.
   - The questions are not complicated and do not contain multiple interpretations.

An analysis of the local wisdom that exists around Sidoarjo students is carried out so that the questions developed can be felt real by students and are often encountered by students. So that students do not feel unfamiliar with the questions being worked on. In addition, with questions

that adapt local wisdom around students, students will enjoy and enjoy learning mathematics more (Sa'id et al., 2021).

3) Realization/Construction

At this stage, the resulting sheet produced RMPBLW Phase I is prepared at the design stage and adjust aspects of the content/materials, construction, and language. The results of the RMPBLW Phase I was 15 numbers multiple-choice.

4) Test, Evaluation, dan Revision

a) Expert Validation

At this stage, validation was carried out to 3 expert validators where all three assessed the feasibility of this realistic question in terms of content/material, construction, and language. The three validators provide qualitative assessments and provide suggestions for improving the RMPBLW phase I. The results of the feasibility test according to the validators and suggestions for improving the RMPBLW phase I.

Validator Code	Number of Qustions Without Revision	Number of Qustions With Revision	Suggestion	Result
P-1	2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15	1, 7	- No. 1: Revision of question contex. - No. 7: Revision of question instruction	Valid with minor revision
P-2	5, 10, 13	1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 14, 15	- No. 1, 2, & 12: Revision of question contex. - No. 7: Revision of question instruction - No. 3, 4, 6, 8, 9, 11, 14, 7 15: Revision of question information content.	Valid with minor revision
P-3	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	1	- No. 1: Revision of question information content.	Valid with minor revision

Table 3: Expert Validation Results and Suggestions for Improvement of RMPBLW

Based on the results of expert validation, most of all questions were feasible in terms of content/material, construction, and language. There are suggestions for improving content/materials, namely on questions number 1, 2, 6, 8, 9, 12, 14, and 15, and suggestions for improving the construction of questions on numbers 1, 2, 3, 4, 7, and 11. In general, improvements related to image changes, questions, and sentence structure.

The accuracy of the content and the construction of the questions need to be considered so that the results of the RMPBLW become more realistic and can be easily understood by students. The validity of the content is needed, especially on things that have just been developed and the validity of the constructs also needs to be considered to see the feasibility of transforming ideas and concepts according to the existing reality. (Taherdoost, 2016)

b) 1st Revision

At this stage, improvements were made to RMPBLWphase I adjusting the suggestions from the validator and the suitability of the questions with the level of mathematical ability of 7th-grade students in Sidoarjo in general. The following are the questions before and after revision that were included in the RMPBLW phase II.

Before Revision	**After Revision:**
To commemorate the Nyadran tradition which is held every month before the fasting month, people in Balongdowo Village, Buduran District, Sidoarjo make boats that are used to sail to perform Nglarung Sesaji Rituals (tradition of drowning offerings). The lid of the boat is in the shape of a curved rectangle. What is the area of the lid of the boat if it is 6 meters long and 2 meters wide? a. 10 m^2 c. 12 m^2 e. 14 m^2 b. 11 m^2 d. 13 m^2	 *Source: PNGWing* To commemorate the Nyadran tradition which is held every month before the fasting month, people in Balongdowo Village, Buduran District, Sidoarjo make boats that are used to sail to perform Nglarung Sesaji Rituals (tradition of drowning offerings). The residents will make boats with lids. The lid of the boat is in the shape of a curved rectangle. What is the area of the lid of the boat if it is 6 meters long and 2 meters wide? a. 10 m^2 c. 12 m^2 e. 14 m^2 b. 11 m^2 d. 13 m^2


Source: PNGWing

Table 4: Revision of Problem Number 1

In question number 1, improvements were made by adding the sentence “Local residents will build a boat with a lid”. Improvements were made to the construction section of the question to better provide students with an understanding of the need for caps on boats.

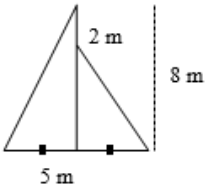
Before Revision	After Revision
Following is the shape of the boat sail that will be used by the people of Sawohan Village, Buduran District, Sidoarjo to commemorate the Nyadran tradition (Nglarung Sesaji). The screen is made of cloth. If people want to make the screen themselves, then how many square meters of fabric is needed?  a. 25 m^2 c. 35 m^2 e. 45 m^2 b. 30 m^2 d. 40 m^2	following is the shape of the boat sail that will be used by the people of Sawohan Village, Buduran District, Sidoarjo to commemorate the Nyadran tradition (Nglarung Sesaji). The screen is made of cloth. If people want to make the screen themselves, then how many square meters of minimum fabric area is needed?  a. 25 m^2 c. 35 m^2 e. 45 m^2 b. 30 m^2 d. 40 m^2

Table 5: Revision of Problem Number 2

In question number 2, improvements were made to the questions and provided more real picture illustrations so that students could understand the meaning of the questions better.

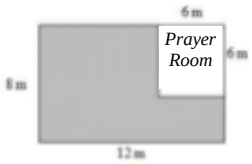
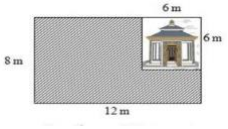
Before Revision	After Revision
The Ruwat Desa tradition in Sidoarjo is held every year. One of them by holding a thanksgiving in a large place. Below is one of the places used for the Ruwat Desa event. If the shaded part is a thanksgiving place, then how wide is it?  a. 56 m^2 c. 58 m^2 e. 60 m^2 b. 57 m^2 d. 59 m^2	The Ruwat Desa tradition in Sidoarjo is held every year. One of them by holding a thanksgiving in the village field. Below is one of the places used for the Ruwat Desa event. If the shaded part is a thanksgiving place, then how wide is it?  a. 56 m^2 c. 58 m^2 e. 60 m^2 b. 57 m^2 d. 59 m^2

Table 6: Revision of Problem Number 3

In question number 3, improvements were made by replacing the phrase “in a wide area” with the phrase “in the village field” and adding a more realistic picture.

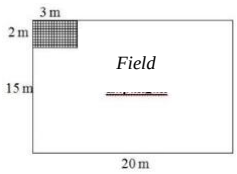
Before Revision	After Revision
One of the neighborhoods in Bluru Kidul Village will hold a Ruwah Desa celebration in an empty rectangular field measuring 15 m × 20 m. The field will be covered with a carpet measuring 3 m × 2 m. How much carpet (shaded area) is needed to cover the entire field?  a. 50 carpets b. 51 carpets c. 52 carpets d. 53 carpets e. 54 carpets	One of the neighborhoods in Bluru Kidul Village will hold a Ruwah Desa celebration in an empty rectangular field measuring 15 m × 20 m. The field will be covered with a carpet measuring 3 m × 2 m. How much carpet (shaded area) is needed to cover the entire field? a. 50 carpets b. 51 carpets c. 52 carpets d. 53 carpets e. 54 carpets

Table 7: Revision of Problem Number 4

In question number 4, improvements were made by deleting the image according to the suggestions from the validator. Then, there are improvements to the question instructions, namely "Look at the picture below to answer questions number 5 and 6!" be "Look at the picture below to answer questions number 7 and 8!".

Before Revision	After Revision
If it takes me 1 minute to walk 50 m, then how long will it take to circle the road? a. 75 minutes b. 80 minutes c. 85 minutes d. 90 minutes e. 95 minutes	The activity committee wants to estimate the time it will take. If it takes me 1 minute to walk 50 m, then how long will it take to circle the road? a. 75 minutes b. 80 minutes c. 85 minutes d. 90 minutes e. 95 minutes

Table 8: Revision of Problem Number 8

In question number 8, improvements were made by adding the sentence "The activity committee wants to estimate the time needed". The addition of this sentence is so that students can understand the need to estimate the time so that the event can go according to plan.

Before Revision	After Revision
Every hamlet in Urangagung sub-district, Sidoarjo made a cone for the celebration of the Tumpeng Pitu Kirab tradition. They  are competing to make & decorate the cone as beautiful as possible. One of them is like the picture on the side. The picture is a picture of a cone when viewed from above. The circle has the smallest radius of 8 cm. If each circle has a different radius of 2 cm for each level, then calculate the largest area of the cone! a. 615 cm^2 c. 617 cm^2 e. 619 cm^2 b. 616 cm^2 d. 618 cm^2	Every hamlet in Urangagung sub-district, Sidoarjo made a cone for the celebration of the Tumpeng Pitu Kirab  tradition. They are competing to make & decorate the cone as beautiful as possible. One of them is like the picture on the side. The picture is a picture of a cone when viewed from above. The circle has the smallest radius of 8 cm. If each circle has a different radius of 2 cm for each level, then what is the area of the largest tumpeng rice circle? a. 615 cm^2 c. 617 cm^2 e. 619 cm^2 b. 616 cm^2 d. 618 cm^2

Table 9: Revision of Problem Number 9

In question number 9, improvements were made to the construction of the question, namely from the sentence "then calculate the largest area of the cone!" be "then what is the area of the largest tumpeng rice circle?".

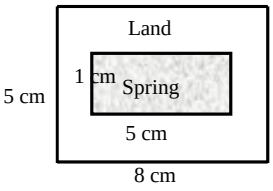
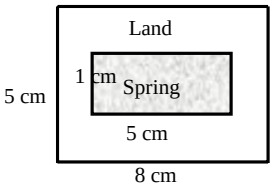
Before Revision	After Revision
See the picture below to answer questions number 11 – 13! In Njaretan hamlet, Urangagung sub-district, Sidoarjo, every month, the local people carry out the tradition Tumpeng Pitu Kirab,  which is to make 7 cones which will be paraded around the village. The existence of traditions these due to the discovery of "Situs Sendang Agung" (the Great Spring Trip) by one of the residents, and the residents believe that water is efficacious. If the land surrounding the well is to be tiled, what is the area of the land? a. 31 m^2 c. 33 m^2 e. 35 m^2 b. 32 m^2 d. 34 m^2	See the picture below to answer questions number 11 – 13! every month in Suro, people in Njaretan hamlet, Urangagung sub-district, Sidoarjo, carry out the tradition Kirab Tumpeng Pitu,  which is to make 7 cones which will be paraded around the village. The existence of traditions these due to the discovery of "Situs Sendang Agung" (the Great Spring Trip) by one of the residents, and the residents believe that water is efficacious. If the land surrounding the well is to be tiled, what is the area of the land? a. 31 m^2 c. 33 m^2 e. 35 m^2 b. 32 m^2 d. 34 m^2

Table 10: Revision of Problem Number 11

In question number 11, improvements were made by changing the sentence "In the hamlet of Njaretan, Urangagung, Sidoarjo every month of Suro" to "Every month of Suro, the people in Hamlet Njaretan, Kelurahan Urangagung, Sidoarjo, carry out the tradition of Kirab tumpeng Pitu". This improvement is done so that students do not get confused when reading the narrative questions.

Before Revision	**After Revision**
How many tiles are needed to cover the entire soil around the well if 1 tile is 50 cm × 50 cm? a. 110 tiles d. 140 tiles b. 120 tiles e. 150 tiles c. 130 tiles	How many boxes of tiles are needed to cover the entire soil around the well if 1 tile is 50 cm × 50 cm and 1 box contains 4 tiles? a. 30 boxes d. 45 boxes b. 35 boxes e. 50 boxes c. 40 boxes

Table 11: Revision of Problem Number 12

Improvements to question number 12 are done by changing the question that originally asked for the number of tiles needed to "how many boxes of tiles are needed" by adding a description of the contents of 1 box of tiles. This is done so that students can know that when buying tiles it is not possible to buy units but several boxes.

Before Revision	**After Revision**
Batik Jetis Village is one of the traditional batik production sites in Sidoarjo. One of them is Batik Jetis which is a typical batik of Sidoarjo. In addition to written batik, there is also a stamped batik. The image above is an example of its creation. If 1 batik motif measures 10 cm × 20 cm, how many batik patterns can fill 1 piece of cloth with the same motif? a. 300 patterns d. 450 patterns b. 350 patterns e. 500 patterns c. 400 patterns	Batik Jetis Village is one of the traditional batik production sites in Sidoarjo. One of them is Batik Jetis which is a typical batik of Sidoarjo. In addition to written batik, there is also a stamped batik. The image above is an example of its creation. If 1 batik motif measures 10 cm × 20 cm, how many batik patterns can fill 1 piece of cloth with the same motif? a. 300 patterns d. 450 patterns b. 350 patterns e. 500 patterns c. 400 patterns

Table 12: Revision of Problem Number 14

In question number 14, changes are made to the size of the cloth from 4m × 2m to 2m × 1m.

c) Readability Test Phase and 2nd Revision

This legibility test stage was carried out on July 20, 2021, by visiting the homes of 5 readability test subjects. The five subjects came from 5 different schools in the Sidoarjo area. The activity was

carried out by providing RMPBLW phase II and a questionnaire sheet to get comments from students regarding students' understanding of the questions and the clarity of pictures. At this stage, there are only responses to question number 4 while the other 14 questions have been considered suitable for use because they did not receive responses from the 5 students regarding the readability and understanding of the questions. The suggestion for question number 4 is that there is a hint of "shaded part" while there is no picture in question number 4. So it is necessary to make improvements to question number 4. Following are the results of the improvement of the questions after the readability test.

Before Revision	**After Revision**
One of the neighborhoods in Bluru Kidul Village will hold a Ruwah Desa celebration in an empty rectangular field measuring 15 m × 20 m. The field will be covered with a carpet measuring 3 m × 2 m. How much carpet (shaded area) is needed to cover the entire field? a. 50 carpets c. 52 carpets e. 54 carpets b. 51 carpets d. 53 carpets	One of the neighborhoods in Bluru Kidul Village will hold a Ruwah Desa celebration in an empty rectangular field measuring 15 m v 20 m. The field will be covered with a carpet measuring 3 m × 2 m. How much carpet is needed to cover the entire field? a. 50 carpets c. 52 carpets e. 54 carpets b. 51 carpets d. 53 carpets

Table 13: Revision of Problem Number 4

The results of the improvement of the questions from the readability test were then compiled into RMPBLW phase III which was then used to test the validity and reliability of the items.

d) Validity and Reliability Test

Test the validity and reliability of the items carried out thorough tests given to 20 subjects for two tests. This method is known as the retest method. The tests were conducted respectively on 23 and 25 July 2021. The test was carried out for 45 minutes. The following is a table recapitulation of student answers.

Subject	23 July																25 July															
	Score															Sum	Score															Sum
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
S-1	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	3	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	4
S-2	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2
S-3	1	0	0	1	0	0	1	1	1	0	1	1	1	0	0	8	1	0	0	1	0	0	1	1	1	0	1	1	1	0	0	8
S-4	1	0	0	1	0	0	1	1	0	1	0	0	0	0	0	5	1	1	0	1	0	0	1	1	0	0	1	1	0	0	0	7
S-5	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	4	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	4
S-6	1	0	1	1	1	0	0	1	1	1	1	0	1	0	0	9	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	10
S-7	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	3	0	0	0	1	1	0	1	0	0	1	0	0	0	0	0	3
S-8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
S-9	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	2
S-10	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	4
S-11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	3
S-12	1	1	1	0	1	0	1	0	0	1	0	1	0	0	0	7	1	1	1	0	1	0	1	0	0	1	1	1	0	0	0	8
S-13	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	4	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1	4
S-14	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
S-15	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
S-16	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	9	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	9
S-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	3
S-18	0	0	1	1	0	1	0	1	1	1	0	1	1	0	1	9	1	0	1	1	1	1	0	1	1	1	1	1	1	0	1	12
S-19	1	0	0	1	1	0	0	0	0	0	0	1	0	0	0	4	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	3
S-20	1	0	0	1	1	0	0	0	1	1	0	0	0	0	0	5	1	0	0	1	1	0	0	0	1	1	1	0	0	0	0	6
Total	12	2	8	11	7	4	7	4	6	10	4	6	6	1	5		13	5	8	11	7	5	7	6	10	9	9	9	6	1	5	

Table 14: Student's Answer Recapitulation

From table 17, it can be seen, there were 3 questions, that can be solved well by the students, namely questions number 1, 4, and 10 (in the first test stage), and questions numbered 1, 4, 9, 10, 11, and 12 (in the second test stage). This can be seen from the number of students who answered the questions correctly, reaching more than 50% of students who took the test. In table 17 also, it can be seen that there were questions that did not change, many students answered correctly and there were questions that increased the number of students answered correctly after the retest was held. Like question number 9, from 9 students who answered correctly, 10 students answered correctly. Then questions number 2, 7, 8, 11, and 12 also experienced an increase in the number of students who answered correctly even though questions numbers 2, 7, and 8 had not reached 50% of students who answered the questions correctly. There is also question number 10 which experienced a decrease in the number of students who answered correctly, from 10 students to 9 students.

The following are examples of student answers who answered correctly on the number of questions that could be answered correctly by more than 50% of students and the answers of students who

answered incorrectly on the number of questions that could be answered correctly were less than 50% of students.

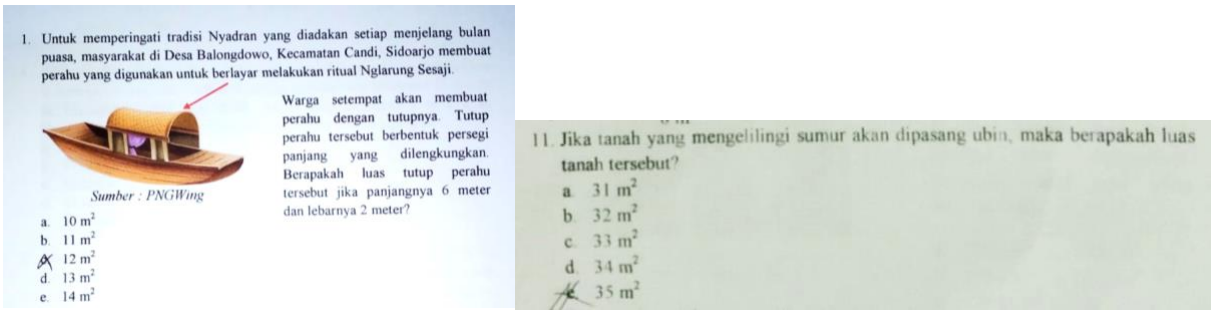


Figure 4. Example of Student Answers Who Answered Correctly

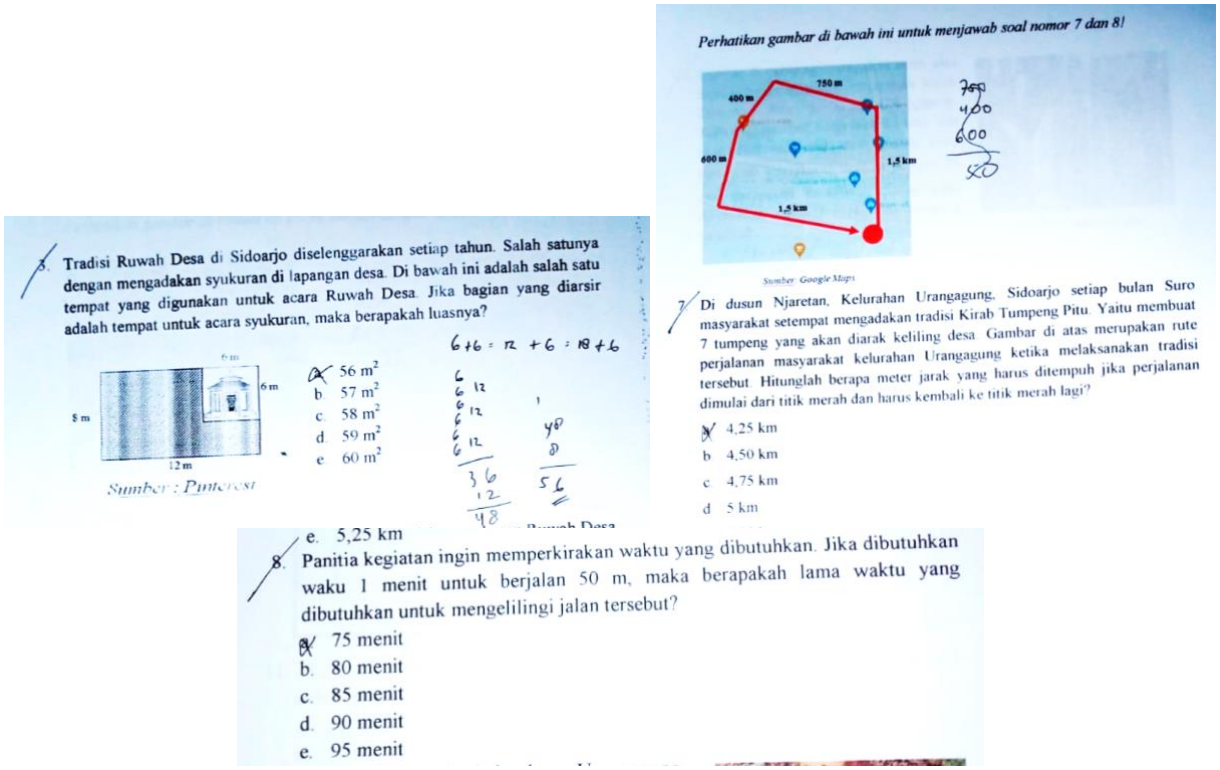


Figure 5. Example of Student Answers Who Answered Wrong

From the students' answers shown in Figure 18 and Figure 19, students were able to solve problems related to the perimeter and area of simple flat shapes. However, students will answer incorrectly on a flat shape question whose context is expanded. Like question number 4, it asks about the size of the prayer room page but there are still many students who answer wrongly. Then from the students' answers to question number 7, it can be seen that students have not been able to solve the

problem if the unit of measure is made differently. Then students also have difficulty answering questions about flat shapes with the context of area and circumference associated with time.

Although there are still students who have not correctly completed the questions given, the validity and reliability of the items must be considered. The results of the item validity test for both the first and second tests are presented as follows.

Number of Question	r_{value} 1st Test	r_{value} 2nd Test	Description	Reliability of 15 Questions
1	0.4870	0.5696	Valid	
2	0.5252	0.4820	Valid	
3	0.5651	0.5196	Valid	
4	0.5876	0.5213	Valid	
5	0.5079	0.5495	Valid	
6	0.6038	0.4820	Valid	
7	0.4770	0.4634	Valid	
8	0.4565	0.6481	Valid	0.97
9	0.5174	0.4790	Valid	
10	0.4988	0.5516	Valid	
11	0.6619	0.5791	Valid	
12	0.4853	0.4965	Valid	
13	0.5495	0.5883	Valid	
14	0.5642	0.5934	Valid	
15	0.5016	0.5136	Valid	

Table 15: Results of Validity and Reliability Test Items (α = 0.05).

Based on table 4 above, 15 questions that have been developed and tested on students can be used because all questions have reached valid and reliable values. This is indicated by the r_{value} of each question being greater than the r_{table}, where the r_{table} of 20 samples = 0.4438 and the reliability value of 0.97, which indicates that all the questions developed are in the very high category. In this study there were no questions whose results were invalid. If there is a possibility that the question is invalid, then the question will not be analyzed further (Santoso et al., 2017). The validity and reliability of the questions or all the instruments used in learning are indispensable in learning (Md Ghazali, 2016; Yue Li, 2016) so that it can be applied according to the purpose (Sireci & Faulkner-Bond, 2014).

CONCLUSIONS

Good question development is needed in measuring students' abilities. Content and context need to be considered in preparing questions. The development of questions related to local wisdom can be studied by studying relevant literature regarding the implementation of local wisdom in each region, in this study precisely the local wisdom of Sidoarjo. The results of the assessment are used

to determine the context that will be applied in the development of questions and adapted to the competencies to be assessed, in this case, the content of the questions. In addition, the selection of the form of questions developed must also adjust to the accuracy of measurement and students' readiness in working on the questions. In this study, the type of multiple-choice questions was chosen because the scoring measurement was more objective and more attractive to students in the process.

Validation testing by experts is needed in the question development process. In this study, the development of this RMPBLW has reached the conditions suitable for use based on the results of expert validation and readability tests. However, improvements based on expert advice are needed to produce better questions. From the results of the analysis of the validity and reliability of the RMPBLW, it has also been found that it meets the valid and reliable criteria for each item that has been developed. This is indicated by the value of the validity of each item that exceeds the value of $r_{table} = 0.4438$ and the reliability value reaches 0.97. With this condition, the developed RMPBLW can be used in the field as a form of implementation of questions based on local wisdom and supports the implementation of mathematics learning that puts forward realistic questions.

Based on the results of the last trial, it was found that students tend to have not shown their abilities in-depth, especially in terms of processes, so researchers need to do further research. For further research, the form of the question instrument given can be in the form of a combination of multiple-choice questions accompanied by a place to write down the problem-solving procedures for each question. So that the form of multiple-choice questions can be used to get an objective score, and the addition of a place to write down the problem-solving procedures is expected to measure students' cognitive abilities more deeply. In addition, the questions based on local wisdom which are applied in learning make students more familiar with local wisdom, especially local wisdom in Sidoarjo, so that students are easier to understand and solve problems because they are related to students' daily lives. It is known that the application of local wisdom based on mathematics problems can improve students' understanding of mathematics problems. (Kaunang et al., 2018)

This RMPBLW also still requires further research, namely on the matter of discriminating power and the level of difficulty of the questions that have not been seen. In addition, further action is needed, especially in terms of the effectiveness of applying questions based on local wisdom in learning and assessing students' cognitive abilities. However, the feasibility of using and the validity and reliability of the items provide a discourse that realistic questions based on local wisdom can be applied well in learning mathematics.

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