Development Mathematics Education of Rural Context

Anderson L. Palinussa¹, Juliana S. Molle², Megy Gasperz³
*Corresponding author, e-mail: anderson.palinussa@fkip.unpatti.ac.id

Abstract
The development of mathematics education in a rural context is an attempt to address the reality of education. Efforts are made by utilizing the context of the real world or daily life of students tailored to the environment.

One approach to learning that is considered appropriate is Indonesian Realistic Mathematics Education (RME). This learning is in accordance with the real context of the rural environment by utilizing the environment so as to produce appropriate teaching materials and used in learning to construct students knowledge.

Key words: Development, Mathematics Education, Rural Context

Introduction
Because of the importance of education for every child of the nation, causing the distribution of education should be done. But in reality, many gaps are happening, thus implicating to the quality of education. The eastern region of Indonesia has always been the main focus, especially Maluku, which is a province of a thousand islands that fall into the category of 3T areas (foremost, outermost and underdeveloped). Mathematics learning has been more student-oriented in urban areas and ignores students in rural areas, due to lack of facilities. In developed countries like America, the survey shows that the three main challenges that cause low quality education in rural areas are low teacher salaries, social isolation and geographical isolation (Schwarzebeck, Retfield, Morris and Hammer, 2003).

The Indonesian Realistic Mathematics Education (Indonesian RME) is one of the learning approaches considered appropriate in developing mathematics in the rural context (Palinussa, 2010). Similarly, Frudental (in Gravemeijer, 1994), suggests that mathematics must be related to the reality of life and mathematics is a human activity. This means, that mathematics must be close to the students and relevant to the situation of everyday students. The Indonesian RME begins with contextual problems. Furthermore, contextual problems are outlined so that the mathematical elements contained therein can be recognized. Through the introduction of these elements, students can translate them into their own mathematical models. By using contextual problems to solve student problems, teachers must design their own learning materials that are relevant to the student's life based on the applicable curriculum without having to follow the textbook as a reference.

A. Discussion
1. Development of Indonesia's Education and School Reality in Rural Areas

The educational gap in Indonesia causes rural schools to be of poor concern, among others: 1) roads to rural schools, 2) inappropriate school buildings, 3) inadequate learning support facilities, and 4) teachers limited is not proportional to the number of students. The factors above have an impact on the quality of education, especially in Maluku. Lots of rural schools are still left behind according to the above factors, in the absence of equal distribution of education conducted by the government. Unlike urban schools that have more teachers, even one subject has two or more teachers and adequate facilities and infrastructure.

The government's efforts to address the educational disparities in rural areas are with the SM3T program (Bachelor of Education in the foremost, outermost and underdeveloped areas) and has been running from 2012. The newly completed graduate students in remote villages devote themselves to one year in there to get sufficient experience as a stock before going to follow the Professional Teacher Program, to become a professional teacher. Maluku became one of the goals for
the SM3T program namely Southwest Maluku District and Aru Islands District. New, since 2017, Faculty of Teacher Training and Education, Pattimura University in Maluku entrusted to organize Professional Teacher Program.

Education is a planned, programmed and sustainable effort to help students develop skills both from the cognitive, affective and psychomotor aspects. The development of students’ potential is a systematic process to condition students to have life ability and skills, among others: 1) personal skills to recognize oneself, 2) rational thinking skills, 3) social skills, 4) academic skills, and 6) vocational skills (Sujarwo, 2006).

In line with the objectives of education, it is necessary to strive for an education system through a learning process that is capable of forming the personality and skills of the superior students, i.e. believing and cautious to God Almighty, creative, capable, skilled, honest, trustworthy, disciplined, be responsible and have high social solidarity. This learning process can be done through a relevant learning approach. The learning approach is not merely rote memory but with a learning approach that allows the integrated humanitarian values in personality and behavior during the learning process (Sujarwo, 2006).

In the same way, if we look at the reality of rural education it is not easy to develop students’ skills, as education in rural areas appears to be very different from that in urban education. The facts show that the school buildings in rural areas are not yet feasible and have not provided a sense of comfort to students while attending the learning process, as well as rural educational facilities that are still very minimal compared to educational facilities in urban areas (V. L. Griffiths, 1982). This gap is what causes the development of education in the rural areas always lags behind and often overlooked. Therefore, there should be government attention in education censorship.

Article 31 of the 1945 Constitution mandates that education is a right for every citizen, and basic education shall be followed by every citizen and financed by the government. Based on the above opinion, the government is obliged to finance basic education for all students and must coincide with the improvement of the quality of education by preparing educators, facilities and adequate infrastructure throughout the country especially rural areas that previously received less serious attention.

2. Indonesian Realistic Mathematics Education (Indonesian RME) in Rural Context

One of the learning approaches that is relevant to the rural context is the learning that relates the experience that students have with the students’ daily life or the real-world context is Realistic Mathematics Education (RME), developed in Indonesia by sembiring et al (2007) under the name of Indonesian Realistic Mathematics Education (Indonesian RME).

Frudental (1991), states that mathematics must be closer to reality and mathematics is a human activity. This means that math must be close to the student and relevant to the context. The principle of reinventing ideas and mathematical concepts stems from informal problem-solving procedures. Meanwhile, the process of rediscovering mathematical ideas and concepts through mathematization either vertically or horizontally. Efforts are made through the context of the real world or realistic. Realistic not only on the real or the reality but also on something that can be imagined by students (Slettrnhaar, 2000).

The same thing is stated by Soejadi (2001) that, Realistic mathematics learning is basically the utilization of reality and environment that students understand to expedite the process of learning mathematics better than the past experience owned by students. Furthermore Soejadi explained that what is meant by reality is the real or concrete things that can be observed and understood by the students through imagining. While the environment is a daily environment or where students are located both schools, families and communities that can be understood by students is the daily environment.

De Lange (1987), proposes the process of developing concepts and ideas beginning with the real world and ultimately reflecting the results obtained in mathematics back to the real or real world. The following figure is a conceptual mathematical cycle, the “real world” not only as a source of development of ideas and concepts but also as an area for reapplying mathematics as conceptual mathematization.

![Figure 1: Conceptual Mathematization (De Lange, 1987)]
Learning begins with the giving of contextual problems that are easily understood by the students, then the students are given the widest opportunity to solve the problem in their own way according to the scheme they have in mind. That is, students are given the opportunity to reflect, interpret, and find appropriate strategies. In that case, the liveliness of the students takes precedence, the teacher only acts as a facilitator. Students are free to issue their ideas, communicate their ideas with each other. Teachers help (limited) students to compare those ideas and lead them to make decisions about which ideas are most appropriate, efficient and understandable to them. In relation to mathematics as a human activity, students have been given the widest opportunity to rediscover ideas and concepts of mathematics independently as a result of students' experiences in interacting with real (contextual) problems. After forming and finding mathematical concepts, students use them to solve subsequent problems as applications reinforce conceptual understanding.

Indonesian RME is closely related to the students' daily life according to the real world context. Therefore, the rural context is deemed relevant because of the lack of existing facilities and infrastructures that cause teachers to be more proactive and creative in developing learning tools that are appropriate to the circumstances, environment and condition of the students. Palinussa (2010) suggests that learning mathematics in a rural context is a learning that is designed to construct student knowledge that begins from the real-world context or the student's daily life. Therefore, relevant learning is Indonesian RME and therefore requires creativity and selection of appropriate material.

3. Development of Relevant Learning Material with Indonesian RME approach in Rural Context

Teaching materials consist of two words teaching and materials. Teaching materials are a set of learning tools or tools that contain learning materials, methods, limitations and how to evaluate systematic and interesting design in accordance with the daily life of students in order to achieve the expected goals (Chomsin and Jasmadi, 2008).

In line with the above opinion, Majid (2009) argued that teaching materials are all forms of materials used to assist teachers in the implementation of teaching and learning activities in self-designed classroom based on the curriculum without having to follow the textbook. The teaching materials may be written materials and unadvertent teaching materials. A teaching material must meet the learning instructions, competencies to be achieved, supporting information, exercises, work manuals that may be worksheets and evaluations.

The same is stated by Yaumi (2013), states that technically the learning materials can be designed as a reference teacher in front of the class as well as a guide for students in learning activities to achieve the purpose of learning. Teaching materials are prepared with the aim of helping learners in obtaining alternative learning in addition to textbooks that are sometimes difficult to get by the learners. Besides, it is also to facilitate the teacher in carrying out the learning process.

Based on the above opinion, it can be concluded that the teaching materials is a set of materials that teachers prepare to help students in learning in accordance with the curriculum, not necessarily based on textbooks and relevant.

The purpose of preparation of teaching materials are:
1. Provide teaching materials that fit the curriculum and needs of students by taking into account the characteristics and needs of students
2. Assist students to acquire relevant learning materials
3. Make it easier for teachers to learn relevant lessons.

The standard development of PMRI teaching materials as proposed by Fajar and Mustajab (2010) is as follows:
1. The teaching materials are prepared in accordance with the applicable curriculum.
2. Teaching materials use realistic or real problems to motivate students and help students learn math.
3. The teaching materials contain a variety of interrelated mathematical concepts so that students acquire meaningful and intact mathematical knowledge.
4. Teaching materials contain enrichment materials that accommodate different ways and thinking skills of students.
5. Teaching materials are formulated/presented in such a way that encourages/motivates students to think critically, creatively, and innovatively and interact in learning.

Based on the above opinion, it indicates that the relevant teaching materials and in accordance with the rural context are the teaching materials with realistic approach which put forward the real-world context and the students' daily so that the students are able to understand based on their initial knowledge.
4. **Teaching Materials with Rural Contexts**

The picture below is the museum and the old house on the island of Saparua. This museum stores historical objects. Meanwhile, the old house is the residence of the villagers. Based on these two images, students are expected to remember and mention the visible form of the building, according to the type of two-dimensional figure that looks like a triangle and quadrilateral to be learned.

<table>
<thead>
<tr>
<th>Museum</th>
<th>Old House</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Museum Image" /></td>
<td><img src="image2" alt="Old House Image" /></td>
</tr>
</tbody>
</table>

1. Look at the Museum and old house picture above
   
a. Based on the picture, mention part of the image that looks like two-dimensional figure?
   
   **Answer:**

   
b. Redraw the two-dimensional figure in the column below?
   
   **Answer:**

   
c. Mention the two-dimensional figure that is not visible on the picture and draw it!
   
   **Answer:**
2. Class of SMP Negeri floor tiles are shaped as below.
   a. Notice the floor of your classroom. What does your classroom look like?

   Answer:

   b. Redraw the geometry according to your answer.

   Answer:

   c. How many tiles are needed to cover your classroom?

   Answer:

   d. What is the broad formula from the base of your classroom?

   Answer:
3. Look at the school picture below

School area is rectangular with size 60000 m$^2$ will be made fence with distance of each pole 2 m.
Determine:

a. School length and width according to your understanding.

Answer:

b. How many poles are needed to make the fence above

Answer:

B. Conclusion

Realistic Mathematics Education Indonesia (RME Indonesia) is a learning that is designed based on real-world context or student's daily life, especially in rural context. This is an attempt or a way for teachers to be more creative in developing and designing alternative teaching materials to help students understand in real terms and determine material that suits the model and approach used, so that it is easy to understand.

REFERENCES

Materials*. Jakarta : Depdiknas
Yogyakarta : PPPTK


