

## Training in Designing Mathematics Learning Using Local Context of Wetland Environment Based on Realistic Mathematics Education (RME)

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### Abstract

The problem in several schools is that students experience learning loss due to the COVID-19 pandemic, so several generations of students are slowly learning. Apart from that, the 2022 AKM results are less than optimal because not all students are familiar with contextual problems. Therefore, training in designing mathematics learning using the local context of the wetland environment based on RME needs to be implemented. This service aims to develop the ability of teachers of SDI Sabila Muhtadin to design mathematics learning using the local context of the wetland environment based on RME to increase teachers' understanding and ability to design realistic learning. The method applied in this community service activity uses a PAR (Participatory Action Research) approach. The PAR cycle implemented is To Know, To Understand, To Plan, To Act, and To Change. The service team prepares material and delivers it via an offline workshop, while participants are also allowed to design learning with a local context and based on RME. The service results show an increase in teacher understanding regarding RME-based learning designs in the local context of the wetland environment, which is indicated by an increase in the average score from pre-test to post-test. Apart from that, most teachers have been able to develop mathematics learning plans based on RME in a local context. This is shown by the teacher's work in designing lessons sent to the service team. Thus, this service activity has successfully increased teachers' understanding and abilities in designing realistic learning.

## INTRODUCTION

As part of Indonesian society, known for its religious nature, the Banjar community also highly values Islamic religious education. This is evident from the emergence of various institutions establishing Islamic primary education. The establishment of the Sabila Muhtadin Grand Mosque in Banjarmasin, inaugurated on February 9, 1981, by Soeharto, contributed to the founding of the Sabila Muhtadin Islamic primary education, which would complement the function of the Sabila Muhtadin Grand Mosque as a centre for Islamic activities. The establishment of the Sabila Muhtadin Islamic educational institution, initiated by H. Mistar Tjokrokoesomo, the Governor of South Kalimantan at the time, was realized by Ir. H.M. Said. The first educational unit established was Sabila

Muhtadin Islamic Kindergarten in 1986, followed by the construction of the elementary school in 1989 and the junior high school in 1993. Sabilal Muhtadin Islamic Primary Education, which consists of Sabilal Muhtadin Islamic Kindergarten-Elementary-Junior High School, is managed by the Sabilal Muhtadin Islamic Education Institution in Banjarmasin ([Wahidah et al., 2021](#)).

Sabilal Muhtadin Islamic Elementary School (SDI) in Banjarmasin is located near the Sabilal Muhtadin Grand Mosque. The school is Sabilal Muhtadin Islamic Elementary School, commonly abbreviated as SDI Sabilal Muhtadin Banjarmasin, located at Jln. Jend. Sudirman No. 1, Antasan Besar Village, Central Banjarmasin District, Banjarmasin City, South Kalimantan Province, postal code 70114. This private elementary school is under the supervision of the Department of Education and has been accredited A since 2009.

The curriculum refers to the national curriculum with local curriculum features, such as Quranic studies, English, Arabic, and computer lessons. Sabilal Muhtadin Islamic primary education has gained recognition through its achievements at the regional and national levels. The support of adequate facilities and infrastructure likely contributes to these achievements. To this day, the development of Sabilal Muhtadin Islamic primary education has a competitive edge and can continue to grow despite competition from other schools based on integrated Islamic education ([Wahidah et al., 2021](#)).

The independent curriculum is the successor to the 2013 curriculum. SDI Sabilal Muhtadin has fully implemented the independent curriculum since the 2022/2023 academic year. At the same time, the COVID-19 pandemic began to subside, entering the transition phase known as the new normal. Concurrently, the government launched the Minimum Competency Assessment (AKM), which SDI Sabilal Muhtadin also implemented. Based on interviews with the principal and several teachers, the following issues were identified: (1) Learning loss experienced by students due to the COVID-19 pandemic, causing some generations of students to lag in following the lessons; (2) The less-than-optimal results of the 2022 AKM due to students' unfamiliarity with contextual problems.

The main problem at SDI Sabilal Muhtadin is the learning loss due to the suboptimal learning activities during the COVID-19 pandemic, which also resulted in the students' lower literacy and numeracy skills in the 2022 AKM. Therefore, teachers need to be refreshed regarding lesson planning, which can potentially improve students' literacy skills.

One approach that can be used is RME. The RME approach can positively impact students' mathematical literacy ([Agustina et al., 2022](#)). Furthermore, the RME approach positively affects students' learning outcomes and motivation ([Hasan et al., 2020](#)). This statement is also supported by ([Hidayat et al., 2019](#)), who revealed that the creative thinking ability of students using RME-based learning is better than those using conventional learning ([Anisa, 2015](#)). RME emphasizes using realistic contexts for students to start learning in the classroom. From this context, it develops towards formal mathematics through mathematical activities. Thus, it is hoped that the concepts constructed by students will stick more and be used in solving various problems. Therefore, the RME approach can be used as an alternative to address the issues of learning loss and students' low mathematical literacy at SDI Sabilal Muhtadin.

Community service, as an effort to overcome learning loss, has also been conducted in several regions of Indonesia. In the Mandalika Special Economic Zone (KEK), West Nusa Tenggara, a community of elementary school teachers, was formed to address the learning loss caused by COVID-19 ([Jiwandono et al., 2023](#)). Another effort was carried out in Pati, Central Java, through a workshop on increasing the creativity of elementary

school teachers in teaching ([Hardini et al., 2022](#)). In Pariaman, West Sumatra, quantum learning training was conducted to overcome students' learning loss ([Putri et al., 2022](#)). Another community service in the form of learning assistance was carried out in Bangka Belitung to address post-pandemic learning loss ([Fahlevi & Hilhamsyah, 2023](#)).

To overcome learning loss, one of the problems faced by the partner, training on designing mathematics lessons using the local context of the wetland environment based on RME was conducted in this community service. The RME approach was chosen to improve students' mathematical literacy skills, which are tested in the Minimum Competency Assessment (AKM). This community service aims to enhance the ability of SDI Sabilal Muhtadin teachers to design mathematics lessons using the local context of the wetland environment based on RME to improve teachers' understanding and ability to design realistic learning.

## METHODS

### The Method Used

Teachers need to receive training or material refreshments on designing mathematics lessons based on RME. Therefore, the method applied in this Community Service activity used the PAR (Participatory Action Research) approach. The PAR cycle implemented included To Know, To Understand, To Plan, To Act, and To Change ([Afandi et al., 2022](#)).

### Work Procedure

The implementation of this Community Service activity follows the PAR cycle. The detailed activities are as follows:

**To Know:** At this stage, the community service team approached SDI Sabilal Muhtadin's principal and teachers to understand the current conditions related to teaching in the school.

**To Understand:** In this stage, the community service team delved into the problems faced by SDI Sabilal Muhtadin teachers in conducting mathematics lessons.

**To Plan:** Based on the problems identified, the community service team, together with SDI Principal Sabilal Muhtadin, planned activities to address the issues encountered by the teachers.

**To Act:** The actions implemented include concrete activities to solve the problems and are aligned with the planning prepared jointly by the community service team and the Principal of SDI Sabilal Muhtadin. The stages of implementing the community service activities are:

- a. Preparing materials on RME, its characteristics, and its implementation in teaching.
- b. Presenting the material.
- c. Conducting discussions on the presented material with Q&A sessions.
- d. Participants create a product in the form of a mathematics lesson plan.
- e. Guiding participants during the practical session of lesson plan preparation.
- f. Analyzing and evaluating the sharing of the participants' work results.

**To Change:** In this stage, the community service team reflected on the activities that motivated and stimulated the participants to solve their problems independently and sustainably.

### Partner Participation in Program Implementation

In relation to the work procedures outlined above, the participant's participation in the implementation of this program included:

- a. Acting as the Host during the discussion/presentation sessions held offline.

- b. Providing the facilities and infrastructure for the activities (room, LCD projector, sound system, and tables and chairs).
- c. Attending all the scheduled activities.

### **Evaluation of Implementation and Program Sustainability**

Evaluation was conducted to measure the achievement of the implemented program. In this community service activity (PkM), the target is to see an increase in the participants' average understanding of RME, with 75% of the teachers being able to design mathematics lesson plans based on the wetland environment's cultural context according to RME principles. To measure these achievements, the community service team prepared instruments such as pre-test and post-test questions to assess the teachers' understanding of RME-based teaching through Google Forms. In addition, the team also provided opportunities and guidance to participants in designing RME-based lesson plans to gauge how many participants can correctly create such lesson plans.

Program sustainability is maintained by establishing good communication between the team and the school for periodic consultations if needed. Consultations can be conducted offline or online and at flexible times. Thus, it is hoped that the design of RME-based lesson plans becomes a positive habit for teachers to support enhancing students' numerical literacy skills.

## **RESULTS AND DISCUSSION**

The face-to-face community service activity titled "Training on Designing Mathematics Lessons Using the Local Context of the Wetland Environment Based on RME for Teachers at SDI Sabilal Muhtadin in Banjarmasin City" was held on Friday, August 18, 2023, and Saturday, August 19, 2023, in the SDI Sabilal Muhtadin Hall, Banjarmasin. The face-to-face activity was attended by 51 out of 68 registered participants, teachers of grades 1 to 6. Not all participants could attend due to illness or other obligations. The activities were conducted face-to-face over two days. The first day focused on in-depth material discussions. The event began with an opening ceremony, including speeches by the community service team leader and the head of SDI Sabilal Muhtadin. The first presentation was delivered by Taufiq Hidayanto, S.Pd., M.Pd., titled "Local Wisdom-Based RME in the Implementation of the Merdeka Curriculum." The second presentation was delivered by Kamaliyah, M.Pd., titled "Designing Mathematics Lessons Using the Local Context of the Wetland Environment Based on Realistic Mathematics Education (RME)." A snippet of the material presentation on the first day is shown in Figure 1.



Figure 1 Material presentation

Figure 1 shows the process of material delivery during the first meeting. Before the material was presented, a pre-test was conducted to measure participants' understanding of RME and its teaching methods.

The second day focused on practising lesson planning and presenting the lesson plans that participants had created. Meanwhile, the community service team provided feedback and comments on the lesson plans presented by the participants. The activities concluded with a closing ceremony, including speeches by the community service team leader and the head of SDI Sabital Muhtadin. Documentation of the activities on the second day is shown in Figure 2.



Figure 2 Participants conducting a discussion on designing RME-based lessons

Figure 2 shows the group discussion process in designing RME-based lessons. Participants were divided into groups according to the classes they teach, with about 3-4 people in each group. Each group was then allowed to present the results of their discussion and receive feedback from the community service team. After the presentations, participants were given a post-test and a response questionnaire on implementing the community service. Figure 3 presents an example of a learning trajectory in the form of an iceberg using the RME approach.

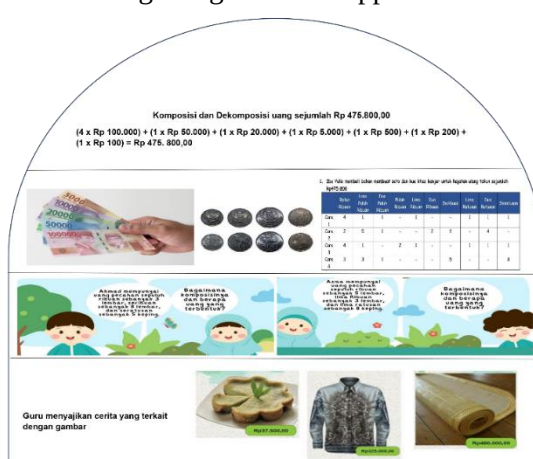


Figure 3 example of a learning trajectory created by training participants

Figure 3 presents the design of a learning trajectory on the composition and decomposition of money. It shows that the lesson begins with the context of the prices of local commodities in South Kalimantan, such as Kue Bingka, Baju Sasirangan, and Lampit (mats). Students are then guided to analyze the composition and decomposition of money in formal mathematical form.

The test results on understanding related to RME showed improvement, illustrated in the diagram in Figure 4.

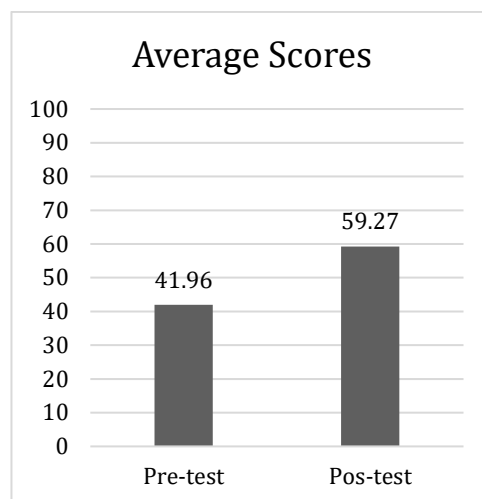


Figure 4 Average scores of pre-test and post-test

Based on the results shown in Figure 4, there is an increase in the score of 17.31 points. Although the average score is still moderate, this training has positively impacted teachers' understanding of RME. The average score is still relatively low because most participants (76.5%) had never attended training on the RME theme, so they considered this training a new experience. Another achievement is that 42 participants (82.3%) could create RME-based lesson plans. This indicates that the training conducted was successful. At the end of the activity, participants responded to the training, and it was found that 65% of participants felt that this material was very necessary to be delivered, and all (100%) felt that the material provided was up-to-date. This indicates that participants responded positively to the material given.

This is consistent with the community service conducted by Mananggal et al. (2022; Sholahudin, 2017), which reported that RME-based training increased participants' understanding of RME and was positively received. The positive response is supported by the statement by Chisara et al. (2018), which revealed that mathematics education needs to be contextual, relating to everyday problems. With this contextualization, RME-based learning can enhance students' mathematical literacy skills (Istiana et al., 2020; Mananggal, 2022).

### CONCLUSION

This community service aimed to develop teachers' ability at SDI Sabilal Muhtadin to design mathematics lessons using the local context of wetland environments based on RME. The method or approach used in this community service activity was in the form of training. The community service team prepared the materials and delivered them in face-to-face sessions, while participants were also allowed to design local context-based lessons using RME. The results of the community service showed that most teachers could create local context-based RME mathematics lesson plans. This is evidenced by the improvement in teachers' understanding of RME, and the teachers have submitted their RME-based lesson plans to the community service team.

SDI Sabilal Muhtadin needs similar SDI Sabilal Muhtadin and also needs to engage in similar community service efforts in other subjects, so additional training is necessary.

Furthermore, the training needs to be synchronized with the administrative requirements of the new curriculum, namely the Kurikulum Merdeka (Independent Curriculum).

### CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

### AUTHOR CONTRIBUTIONS STATEMENT

Conceptualization: CFP, TH, and K; methodology: TH and K; data collection and tabulation: MTR and MD; formal analysis: CFP, TH, and K; writing—preparation of the original draft: TH.

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