PMRI-BASED COMMUNITY PARTNERSHIP PROGRAM FOR CHILDREN WITHOUT SCHOOLS IN BILALANG DISTRICT, BOLAANG MONGONDOW REGENCY

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Abstrak
Matematika sangat penting bagi setiap manusia karena berkaitan erat dengan masalah-masalah yang muncul dalam kehidupan sehari-hari. Namun, siswa percaya matematika hanyalah mata pelajaran akademis tanpa aplikasi dunia nyata. Artikel ini membahas tentang capaian pelaksanaan program kemitraan masyarakat bagi anak putus sekolah di Kecamatan Bilalang Kabupaten Bolaang Mongondow dengan menggunakan metodologi Pendidikan Matematika Realistik Indonesia (PMRI). Metode komitmen terdiri dari 1) Desain, 2) Implementasi, dan 3) Evaluasi Hasil. Menggunakan teknik desain awal, eksperimen pengajaran, dan analisis retrospektif, layanan ini juga mengembangkan materi pendidikan untuk anak putus sekolah. (1) Mitra memiliki pemahaman tentang filosofi dan karakteristik pembelajaran PMRI; (2) ketersediaan bahan ajar untuk anak putus sekolah berbasis pembelajaran PMRI; dan (3) tersedianya media/software yang dapat memvisualisasikan konsep matematika sehari-hari.
Kata kunci: PMRI, Anak Putus Sekolah, Pengabdian Masyarakat

Abstract
Mathematics is essential for every single human being because it is intimately related to the problems that arise in everyday life. However, students believe mathematics is merely an academic subject with no real-world application. This article discusses the outcomes of implementing a community partnership program for out-of-school children in the Bilalang subdistrict of the Bolaang Mongondow district using the Indonesian Realistic Mathematics Education (PMRI) methodology. The method of commitment consists of 1) Design, 2) Implementation, and 3) Results Evaluation. Using preliminary design techniques, teaching experiments, and retrospective analysis, this service also developed educational materials for school dropouts. (1) Partners have an understanding of the philosophy and characteristics of PMRI learning; (2) the availability of teaching materials for out-of-school children based on PMRI learning; and (3) the availability of media/software that can visualize everyday mathematical concepts.
Keywords: PMRI, School Drop Out Children, Community Service.

INTRODUCTION

Under the supervision of the Menara Perlindungan Semesta Foundation, the Menara Kasih Community shelters children of all ages who live on the streets. According to the data collected, there are approximately thirty members of the group who are still at school. About 45% of children drop out of school. Many factors cause dropping out of school. According to interviews with group leaders, economic factors contributed to many students dropping out of school. Even though there was BOS in schools where education was free, families still considered their finances, and some students still collected school administration fees.

Contributing factors include the cost of living, the demands of his family's needs, environmental factors, and the influence of his friends. They pushed each other to work and live on the streets. Students drop out of school because of a lack of interest in education, because the education level of their parents is still low and they do not attend school (Mujiati, 2018; Wassanhua, 2016). Street children drop out of school due to socioeconomic and parental factors (Amalina et al., 2013; Adawiyah, 2017). According to interviews, some street children take to the streets due to economic difficulties, while others do so to earn extra pocket money. Usually, children who take to the streets for a second reason do so because they need money (Yuliani et al., 2022; Saputri, 2023). The third justification is for recreational reasons. Because they want to play with their friends or because their parents encourage them to pursue their passion for music, street children do recreation.

However, street children's numeracy skills are still relatively low. Prior to mentoring, the observations revealed that grade III students needed to be more proficient in calculating addition results using the saving technique and subtracting results using borrowing, multiplication, and even dedication techniques. In contrast to kindergarten and elementary school students, number recognition is still required when writing numbers 6 and numbers 2 and 5; there are still problems that need to be fixed. For second graders, simple counting with one or two numbers still requires manual finger techniques, and if done in piles must be done more thoroughly; the results still need improvement.

Observations of fourth and fifth graders show that they still need help understanding multiplication and division. Division is challenging because division can be made simpler, whereas multiplication cannot. This phenomenon shows street children need additional encouragement to understand and practice math skills. Even though they have studied the material at school, they need further instruction or assistance.

The challenging life of street children motivated the PKM team to take part in this activity. The children in the social barracks lived miserable life. They cannot afford additional paid study sessions. If this is not the case, then their understanding of the material still requires instruction. Because it promotes social encouragement and compassion, this community service activity is the best solution for their problems.

Usually, street children are not wild or disobedient. That is the wrong point of view. However, they are tough in facing life's challenges. Therefore, this positive attitude must be channeled positively so that individuals strongly desire to learn and practice skills. The numeracy skills of street children are improved through various community service activities. Raising awareness and motivation about the importance of knowledge as their future posed significant difficulties for the PKM team.

Mathematics is very important for every human being because it is closely related to problems that arise in everyday life. Therefore, teaching mathematics to students does not have to start with memorizing definitions, concepts, and mathematical formulas but with everyday problems (Hendriana, 2014; Arifah & Saefudin, 2017). Freudenthal argues that mathematics is an activity carried out by humans (Graciella & Suwangsih, 2016; Sutisna et al., 2016; Sugriani, 2019). This sentence represents a new approach to mathematics education. This sentence shows that mathematics is very closely related to human existence. Mathematics exists because humans are active, so it is impossible to separate mathematics from human activities (Fedi et al., 2021). Humans will face mathematics in geometry, social problems, and other problems at home, school, workplace, etc. (Sudirman et al., 2018).

Following Freudenthal's statement, the focus of teaching mathematics in schools must shift from real-world problems. However, students think mathematics is just an academic subject irrelevant to real life. Therefore, mathematics taught in schools is unnecessary in students' daily lives. A student with a high score in mathematics can only sometimes solve similar real-life problems.

The learning process is one of the problems of dropping out of school in Bilalang District, Bolaang Mongondow Regency. Observations show they need help understanding mathematics because they only learn through books and weekly tutoring. In addition, the learning process transfers more information from tutors to students. The majority of communication is still one-way. The tutor does not allow students to express opinions and find solutions independently. Individualism predominates in the learning process, which rarely employs group learners. In addition, students are usually taught mathematics in the abstract and unrelated to real-world contexts.

Based on these problems, innovation is needed in education. Innovations must bridge the gap between mathematics and students' real-world experiences to arouse students' interest in mathematics. Indonesian Realistic Mathematics Education (PMRI) is one of the innovations that can be implemented. PMRI is a movement in Indonesia to reform mathematics education. Therefore, this is a mathematics learning technique and an attempt to carry out social transformation.

Therefore, the PMRI Workshop is the ideal solution to the abovementioned problems. This is based on research findings by Purnomo et al. (2015) which show that PMRI workshops are relevant and meet teacher needs, and PMRI-based math materials meet teacher needs. PMRI workshop participants were very happy with the activities provided and enthusiastic about implementing PMRI in learning.

This paper will discuss the implementation of PKM Numeracy Skills for Dropout Prevention. Children with the PMRI Approach from design to implementation and analysis of the results of the PKM implementation.

METHOD

The solution to be achieved in this program is carried out in several stages with several different methods. Design, Implementation, and Results Analyses are the stages and procedures for implementing this community service. In addition, teaching materials for school dropouts were also developed using the PMRI approach and implemented in three stages: 1) Based on study groups, all community service activities are carried out using the Menara Kasih Community as a medium for learning and mentoring, planning, monitoring, and evaluating all community service activities. All community service activities related to human resources, learning processes, and publications are carried out simultaneously through training, outreach, and comprehensive learning assistance. 3) Based on educational potential by developing scientific thematic teaching materials based on local wisdom to improve literacy skills.

RESULT AND DISCUSSION

The implementation of the community partnership program activities was preceded by preparations carried out in coordination with Partner Schools, the Education Office, and teachers who were the subject of the service. As a result, it was agreed that Community Service was implemented at the Bilalang District Office as a model place for community service. Then a workshop was held at the Bilalang District Office and was attended by 44 dropout children from Bilalang District. This activity was also attended to and opened by Sangadi Bilalang 2 Village.

Then the workshop participants received material from the service team on the Indonesian Realistic Mathematics Education Approach (PMRI), which included the philosophy and principles of PMRI learning, the characteristics of PMRI, the use of simple visual aids in PMRI learning, and how to develop teaching materials based on the PMRI approach.

Figure 1. The atmosphere of material presented by the Service Team

After the presentation by the service team, the teacher gets assistance in implementing PMRI learning with the following 3 activities.

Activity 1. Define a Bigger Box

This activity aims to introduce participants to the steps that can be taken to guide students to explore students' sense of volume. One indicator that students have a sense of volume is when they realize that they can find out the volume of a geometric shape by filling in other objects in that shape. At the beginning of the lesson, the teacher (workshop facilitator) gives realistic problems to the participants or students to stimulate them to think and start working.

Problem:

"Mom has two cake boxes of different sizes which she plans to fill with layer cakes. One of the cake boxes which is bigger in size will be taken to the gathering and the other one will be given to the neighbors. Which box do you choose to bring to the social gathering?"

Then the teacher allows the participants to discuss in groups to exchange opinions about the problems given. Each group was facilitated with 2 cake boxes almost the same size. One box is longer, and the other is taller. The teacher also prepared 2 types of duplicate layer cakes made of cork of different shapes and sizes. However, duplicate cakes were not given directly to the participants. This is deliberately done with the aim that the students themselves will realize that they have to fill the city with something to compare its volume. In addition, another objective is to explore students' creativity in thinking of other ways to determine which box is bigger.
At the end of this activity, the teacher asks students to conclude the learning material that has been studied, namely, to find out the capacity and compare two geometric shapes (beams or cubes). We can use units such as cakes.

The resulting conjecture:

Predict the possible answers to this activity:

Some participants said the white box was bigger, and some said the red box was bigger. Possible ways for students to determine the volume of the two boxes or to determine which box is larger are:

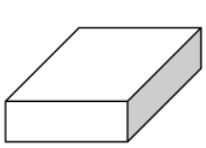
- Participants fill in both boxes with duplicate cakes of the same size
- Participants fill both boxes with duplicate cakes of different shapes and sizes.
- Participants measure the length, width, and height of the sides of the box.

Class Discussion

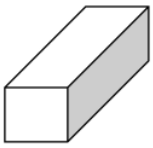
After discussing in their respective groups, participants were asked to present their group's work results in front of the class. Participants are allowed to respond to the results of their group mates' work resulting in class discussions guided by the teacher. If there are students who fill both boxes with cakes of different sizes, the teacher will ask leading questions and ask the opinion of other groups. Students will be asked to argue mathematically. Alternatively, give plausible reasons based on mathematical evidence.

Activity 2. Recognizing Unit Cubes as Units in Determining Building Capacity

In this activity, the presenter presented a problem to the participants: comparing two boxes in the shape of a block filled with cakes (duplicate cakes) whose sizes were also different in each box. For example, in box 1, there are 23 pieces of cake A, and in box 2, there are 48 pieces of cake B. Then the presenter asked which box was bigger. Each participant was allowed to discuss with their group to determine the solution to the question. Furthermore, the answers from each group were discussed in class discussion, followed by concluding together.



Kue A



Kue B

Activity Goals

This activity aims to introduce participants to the steps that can be taken in guiding students to get to know a unit cube as a unit in determining the volume of a geometric shape.

The resulting conjecture

Predictions of the participants' possible answers to this activity are as follows:

- some participants said Box B was bigger than Box B because Box B contained more cakes than Box A.
- some participants say that Box A is bigger than Box B because Box A is wider than Box B

- some participants say that box B is bigger than box A because box B is taller than box A.
- some participants said that the two boxes, A and B, could not be compared by comparing the number of cakes in the boxes because the two boxes were filled with cakes of different sizes.

Activity 3. Estimating the Number of Unit Cubes in a Three-Dimensional Grid

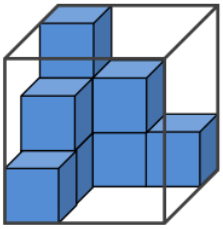
In this activity, the speaker shows a transparent cube-shaped box and asks the participants to determine the capacity of the box. The questions raised by the presenters included, "Can we determine what the capacity of this box is? What way can we go?". The activity was continued by randomly inserting several unit cubes into the box and asking the participants to count the number of unit cubes that had been filled and the number of unit cubes that were still needed to fill the box. After a brief discussion on determining the solution to the problem, the activity continued with group work. The participants were asked to work on the LKS containing the problem. The presenter facilitates each group with a cube-shaped box and a limited number of unit cubes according to the number of problems. Participants are directed to discuss with group members within ± 15 minutes and continue with a presentation of the results of the group's work in front of the class.

Activity Goals

The purpose of this activity is to introduce participants to the steps that can be taken in guiding students to be able to estimate and determine the number of unit cubes in a geometric shape and to train students' spatial abilities in seeing 3D shapes so that it makes it easier for them to understand the meaning of volume.

The resulting conjecture

As previously stated, at the beginning of the lesson, the instructor gave a problem, namely determining the number of irregular unit cubes in a transparent cube-shaped box. The image below illustrates the condition of the transparent box and the unit cube shown by the presenter.



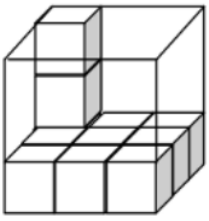
From this activity, it is possible to emerge several possible answers from the participants and different strategies which we can write in the form of a conjecture of the participants' thoughts, namely:

- Some participants answered that there were 9-unit cubes filled in the box.
  Participants who answer this question know about space, especially their spatial abilities.
- Some participants answered that there were 7- or 6-unit cubes.
  Participants who gave this answer only saw the number of unit cubes as they appeared in 2D.
- Some participants answered that there were 15-unit cubes in the transparent box.
  Participants who answered like this still saw and understood the shape of space in 2D.

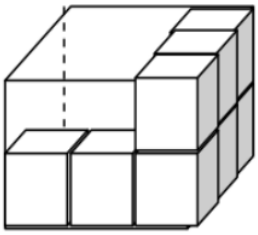
The questions and statements contained in the Worksheet are:

The other forms of problems given in the LKS are as follows

1. How many unit cubes can be filled in the box? Explain your calculations!

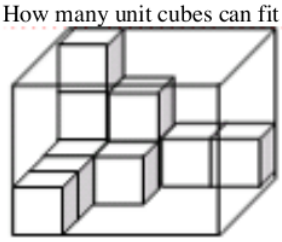


2. How many unit cubes can be filled in the box below until it is full? Justify your methodology!



3. How many unit cubes must be added to the box below? Explain your calculations!

4. How many unit cubes can fit in the box until it is full? Explain your calculations!



Class Discussion

In class discussion activities, all the results of the participant's answers were discussed to get a conclusion about the learning that had been done. All participants' answers and strategies are discussed so that they can determine which strategy is more effective for them. The conclusions that can be concluded in class discussion activities are:

- The number of filled unit cubes in a geometric shape is the volume of that geometric shape.
- The number of unit cubes that are filled in geometric shapes in the form of blocks or cubes can be calculated using

CONCLUSION

The conclusions that can be drawn from implementing this PKM include: (1) Out-of-school children who are community service partners understand the philosophy and characteristics of PMRI learning; and (2) RPP, LAS, and PMRI-based test questions are available. (3) Availability of media/software to visualize everyday mathematical concepts. Based on the results of the activity implementation, the following recommendations are made: (1) Tutors should always use the PMRI approach to facilitate mathematics learning; (2) Always look for contexts and media that can support learning mathematics. (3) Expanding PMRI learning to other fields of mathematics. (4) Utilizing the Mathematics MGMP forum to disseminate knowledge and technology obtained through this PKM activity.

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