

## PMRI-Based Teaching Materials Using the Context of Karate Sports in Elementary School Students during the COVID-19 Pandemic

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### Abstract

The COVID-19 Pandemic has brought many obstacles for education in Indonesia. The learning process moves from school to learning at home. To increase students' interest in learning mathematics during the COVID-19 pandemic, it is necessary to design new innovations such as the use of the context of karate in mathematics learning. This study aims to develop learning materials using the context of karate based on Indonesian Realistic Mathematics Education with the topic arithmetic operations. This research is a development research using Plomp model. Three stages are used in the development of the Plomp model: 1) Initial research stage; 2) Prototype stage; 3) Assessment stage. In the initial stages, researchers conducted the data collection and gathered information through observation. In the second stage, the researcher designed the product and evaluated their validity through the expert team. In third stage, the researchers made a revision based on evaluation from the expert team and redo the validation assessment until the expert team states the product is valid for use in learning. Lesson plan of modules, teaching materials, and learning videos are stated valid with an average value of three validators 73.

**Keywords:** *context; Covid-19; development; Karate; Plomp model; PMRI*

### 1. INTRODUCTION

Covid-19 is a new type of disease caused by a novel virus called coronavirus (Yuliana, 2020). A large number of schools, universities, institutions, are closed due to the health crisis that occurs in the world (Purwanto, 2020). The learning process at school is replaced by online learning, in which students learn at home through online platform without any face-to-face interaction with the teacher. Such

learning is not effective enough because there are many obstacles faced by students in the learning process especially with no direct explanation from the teacher (Puwanto, 2020). Mathematics learning requires appropriate methods, so students can understand it easily during the Covid-19 pandemic

Mathematics is very important to learn from the elementary school (Melva, 2019). Mathematics learning is a

teaching and learning process designed by the teachers to develop students' critical thinking and to improve their ability in new knowledge (Susanto, 2013). Students' abilities and creativity should be developed, so they will have the ability to obtain, manage, and use information in the era that is always changing, uncertain and competitive (Kenedy, 2019). Therefore, mathematics needs to be taught from elementary school in order to improve students' ability to connect mathematics with the context of everyday life.

Innovation in the learning process during Covid-19 pandemic is needed to increase students' motivation, especially elementary school students (Dina, 2020). The use of appropriate teaching materials is one good way to develop students' abilities and creativity in learning. Without using teaching materials, the learning process is less effective (Wulida, 2018). Based on observations made on 2-23 October 2019 on third grade students at SDN 22 Koto Tengah Kab. Agam, it was found that 80% of students were more motivated to learn by using new things that attracted their attention compared to the learning process that the teachers normally used. This problem can be used as a reference to make teaching engaging and interesting learning materials. The teaching materials are the resources used by teachers in the learning process in the classroom (Wahyudi, 2016).

The use of karate context is one context that can increase students' motivation in learning mathematics

especially during the Covid-19 pandemic period (Nizar, 2018). Previously, there have been several studies using karate in PISA theory using the PMRI approach to improve students' learning outcomes in grade X at the high school level (Nizar, 2018). Then, the research on mathematics learning used the context of athletic sports in PISA theory and PMRI approach for high school students (Pratiwi, 2018). Another research on PMRI approach used lottery coupons as a learning context to improve the learning outcome of junior high school student (Yanty, 2016). In this present study, the researcher conducted a study on mathematics learning with the topic arithmetic operations for the third grade students using the context of karate during the COVID-19 pandemic period.

*Pendidikan Matematika Realistik Indonesia* (Indonesian Realistic Mathematics Education) is a learning approach related to the real context of daily life that students have experienced (Fitra, 2018). PMRI can make students think more critically because the learning is directly related to the environment around them, and the teachers only plays a role to provide the materials that will be used in the learning process (Septiana, 2018). PMRI is applicable to be used in the learning process using the context of karate because it is based on things around students' environment.

Based on the analysis of several previous studies, the researchers was informed that there is no study using the context of karate for the topic of arithmetic operations. Thus, this study

made an attempt to develop valid teaching materials for elementary school students during the Covid-19 pandemic period. By using the context of PMRI-based karate, this study aims to develop mathematics teaching materials for elementary school in the context of karate with the topic of arithmetic operation for use in the Covid-19 pandemic period.

## 2. METHOD

This research uses development research with Plomp model consisting of three stages; 1) the initial research stage, 2) the prototype stage, 3) the assessment stage (Plomp, 2013). In the initial stage, the researcher first analyzed the curriculum and then matched the mathematics materials of the arithmetic operations with the sports context. After that, the initial evaluation data of teachers and students taken at the time of observation are collected and the initial design of the product or module as teaching material begins. At this stage, related information is also collected through observation by providing online observation sheets to one teacher and twenty-four students.

The second stage was the formulation of the lesson plan including determining what types of learning activities would be carried out during learning using the sports context. Then, the learning module was designed by collecting several materials that would be made into teaching materials, taking pictures for the module, and designing worksheets and questions. The next step

in this third step is making a learning videos. The researcher designed the learning video, took the video, and edited it into a complete and interesting learning video. The final step in the second stage is a product feasibility assessment designed for a team of three experts. The assessment was done through online validation sheets.

In the third stage, after the product has been validated by three teams of experts, the researcher was informed about its drawbacks and the necessary improvements to the learning materials developed. After the revision or improvement of the product based on the results of validation, the researcher returned the expert team to revalidate the revised product. This step was repeated until the product was declared valid by the expert.

## 3. RESULTS

This research was initiated before the current Covid-19 pandemic situation. In accordance with the stages contained in the Plomp model, at the initial research stage the researchers collected information and designed teaching materials about arithmetic operations for grade III students. From the results of observations by filling out the evaluation sheet on one person and twenty four students as well as interviews with the teacher, researchers got information that the learning material was less creative and less effective before the Covid-19 pandemic. This results in a lack of student motivation, so that it has an impact on learning processes and

outcomes (Yullys, 2019; Lestari et al., 2019). Therefore, it is necessary to develop teaching materials on arithmetic operations for third grade students.

After the learning material was designed (Figure 1), it now entered at the prototype stage, where the researcher makes a validation sheet and answer key for the developed learning material. This validation sheet is used to evaluate the developed learning material. Through the results of the evaluator's validation, the researcher could find out what should improve from the product that had been developed.



Figure1. Cover of the Learning Module



Figure 2. Screenshot of the Learning Video

The third stage is namely the assessment stage by validating the teaching materials to be developed. The validation used in this study consisted of validation of lesson plans, validation of

learning materials, and validation of learning videos (Figure 2). The result of this validation was valid because all components contained in the learning model were well developed. The validator team was YH as material expert, Yis design expert, AE lesson plan expert, and Y learning video expert. The validation assessment for the lesson plan is presented in table 1.

Table1. Score for Lesson Plan Validation from all Expert Team

Expert Team	Score	Category
YH	24	Valid
Y	20	Valid
AE	24	Valid
Average Score	72	Valid

The validation assessment for the learning material is presented in Table 2.

Table 2. Score for Learning Material Validation from all Expert Team

Expert Team	Score	Category
YH	24	Valid
Y	24	Valid
AE	24	Valid
Average Score	72	Valid

The validation assessment for the learning video is presented in Table 3.

Table 3. Score for Learning Video Validation from all Expert Team

Expert Team	Score	Category
YH	24	Valid
Y	28	Valid
AE	24	Valid
Average Score	72	Valid

The results of the validation in table 1 obtained the number of values from the three validators with the number 72, 72 in table 2, and in table 3 also with the total value of 72. After that the value is accumulated with the final average of 72, namely the valid category. This value is in the range of 61 - 75 in the valid category. can be found in table 4. validity range

Table 4. Criteria for Determining the Level of Validity

Range	Category
15-30	Invalid
31-45	Less Valid
46-60	Quite Valid
61-75	Valid
75-90	Very Valid

Thus, it can be concluded that the learning material developed is valid for use in the learning process.

#### 4. DISCUSSION

The developed learning materials, lesson plans, worksheets, and learning videos are valid, so they can be used for third grade elementary school students especially during the Covid-19 pandemic period. The arithmetic operation material was chosen because this learning material is suitable for development, because it is in the learning syllabus in the third grade of elementary schools. In this material, there is also a lack of teaching materials that the teacher will use in learning. During the observation, the teacher only focuses on the textbook without giving explanations to students.

With the development of learning materials using the karate context, it can increase students' motivation to participate in the learning process (Minanti, 2019). Karate is not just a means of self defense or sports but also as a tool for implementing mathematics learning.



Figure 3. Rules of Point Calculation in Karate Match

Figure 3 illustrates the relationship between karate and mathematical operations in which the karate point uses arithmetic operation. Research using the context of the sport of karate includes research that is rarely done, especially the sport of karate in the development of teaching materials in mathematics. As for learning by using sports context, several research just developed the materials for high school and middle school students. For this reason, this research was developed for elementary school students.

According to PMRI theory, the learning process is conducted based on things directly related to students' daily activities (Fitra, 2017), so karate can be

used as a learning context because children directly learn by using karate.

## 5. CONCLUSION

Based on the findings of this study, it can be concluded that new innovations in mathematics learning during the Covid-19 pandemic are necessary. The use of sports contexts is among the latest innovations in the development the learning materials for mathematics. Karate can be connected to mathematics learning with the topic of arithmetic operations. This point is what connects the two contexts. Therefore, PMRI is very compatible in the context of karate in the development of learning materials.

After a validation test by a team of experts and several revisions, the learning material developed is valid for use in learning mathematics. From the validation results, the total value of the three validators was obtained with the final average number of 72, which is in the valid category. This value is in the range of 61 - 75 in the valid category. Despite this Covid-19 condition, the researcher faced few obstacles in their study, but the researchers managed to test the validity of the developed product, and it was considered valid by the expert team.

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