DEVELOPMENT MATH PROBLEM CARDS BASED ON LOCAL WISDOM

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Abstract: *Mathematics has been studied by someone since childhood, so mathematics is almost daily learn by students. However, the context of mathematics subject is still general. Likewise, the practice questions or tests given are still glued to general textbooks. Elements of culture and local wisdom that are close to the student's environment are still rarely applied in schools. Whereas the scope of local wisdom is very broad so it is very possible to be a context for learning mathematics. Thus, it is hoped that students can more easily understand mathematics in the context of local wisdom that is close to their daily lives. This is in line with the government's policy in the "Kurikulum Merdeka", teachers should make the surrounding environment a source of learning. The purpose of this study was to develop a math problem cards based on local wisdom in Marabahan, Barito Kuala Regency. The scope of this research is the evaluation of mathematics learning. The research method uses R&D with a 4D development model. The research subjects were fourth grade students. The object of the research is a math problem card based on local wisdom. The data collection instrument used a validity sheet, a practicality sheet, and a student response questionnaire sheet. The data analysis technique uses averages and percentages. This research produces a math problem card based on local wisdom on geometry material, namely triangles and quadrilaterals. The developed math problem cards meet the valid and practical criteria, and get Excellent student responses.*

Key Words: Problem cards, mathematics, local wisdom

Introduction

Mathematics is one of the sciences that someone has learned since childhood. According to Piaget, there are 4 stages of child development which at elementary school age are at a concrete stage, which means elementary school students are still learning mathematics in a concrete way. At a more advanced level, students begin to enter the formal stage. This is in accordance with the notion of mathematics as a structured science, namely mathematical concepts are arranged hierarchically, structured, logically, and systematically starting from the simplest to the complex concepts.

Mathematics learning that has been done so far still tends to be textbook, not contextual and relates to culture (local wisdom). Lack of insertion or understanding of local culture and traditions in classroom learning will cause students to lack respect for the existing culture and grow in the environment around them (Astutik, 2017). Local wisdom that is integrated in mathematics learning makes it possible for students to be able to remember concepts from mathematics simply by relating these concepts to local culture. Several studies on ethnomathematics or local wisdom that are integrated with mathematics have not yet touched the realm of evaluating mathematics learning. Whereas the scope of local wisdom is very broad so it is very possible to be a context for learning mathematics. Several studies that

examine local wisdom have not led to evaluation. The research of Shalehah, et al (2021: 159) shows that there are mathematical concepts in Sultan Suriansyah building seen from the perspective of ethnomathematics, namely geometric shapes. These geometric shapes can be used in learning mathematics as teaching materials. Furthermore, research conducted by Agustina, et al (2021: 15) states that teachers can develop mathematics learning by utilizing culture. Some of these studies focus more on the learning process. Likewise with the research of Dewi, Jabar, & Gazali (2019), Risdiyanti & Prahmana (2018, Monica, Gazali, & Jabar (2019) on ethnomathematics which is explored from the point of view of various mathematical concepts contained in ethnomathematical discussions, both folk games, martial arts , as well as traditional dances.It has not touched on the use of ethnomathematics or local wisdom in the evaluation of mathematics learning.

One area in South Kalimantan, especially Barito Kuala Regency, has a variety of local wisdom. Both local wisdom that has been inherited for a long time and local wisdom that has just emerged or is formed based on the results of the interaction of the surrounding community with people from other regions. One of the areas in Barito Kuala Regency which has local wisdom inherited from the local wisdom as well as newly formed local wisdom is in the Marabahan. This local wisdom can be used as an object of research in mathematics learning. Thus, it is hoped that students can more easily understand mathematics in the context of local wisdom that is close to their daily lives. This is in line with the government's policy in the independent curriculum, teachers should make the surrounding environment a source of learning.

Based on the results of the researcher's interview with the homeroom teacher who teach mathematics for grade IV SDN Balukung 1 and SDN Bantuil 2, Barito Kuala Regency, until now there is no such thing as teaching materials or teaching materials evaluation tool based on local wisdom, especially the local wisdom of Marabahan. In addition to practice questions or test questions given to students also still fixated on the questions in the book. Students usually

only work on questions from the Student Worksheet (LKS) even the teacher only dictate the questions in the textbook and only replace the numbers with another number. In making indicators and teacher learning objectives still stuck in the category of remembering, understanding and applying. Questions what is made is also not in the form of problem solving or making students think critically and have not made students want to analyze the problem first before answering. So it is necessary to develop evaluation tools such as math question cards to integrate local wisdom into mathematics learning. The function and benefit of the question card is to visualize in a concrete way the arrangement, form and answer to the questions that will appear as a question script presented to students (Rofi & Fatkurochman, 2021). Theory triangles and quadrilaterals that are integrated with local wisdom will make it easier for students to apply learning in everyday life.

Method

The type of research used in this research is research and development (R&D). Development research is research that produces designs or products in an effort to solve actual problems and test the effectiveness of these products (Sugiyono, 2012: 407). This study uses the 4D Thiagarajan research model. This study aims to produce a product, namely a valid and practical mathematical question card based on local wisdom with a 4D research model, namely Define, Design, Develop, and Desseminate (Thiagarajan, 1974: 5). This research was conducted in the fourth grade of SDN Balukung 1 and SDN Bantuil 2, Barito Kuala Regency, from May to June 2022. The trial subjects of the research on the development of local wisdom-based math question cards on the material of geometry, namely triangles and quadrilaterals, were 33 students consisting of 13 students of class IV at SDN Balukung 1 and 20 students in class IV at SDN Bantuil 2. Data collection instruments were used to measure aspects of validity, practicality, and also student response. Validation sheets are used to obtain assessments from material experts and linguists, to determine the validity of the products developed by researchers. The practicality questionnaire sheet was used to obtain data from the fourth grade teacher, to determine the practicality of the product being developed. Meanwhile, student response questionnaire sheets were used to determine student responses to the developed question cards.

The data analysis technique of validity and practicality uses the average score.

$$\bar{x} = \frac{1}{M} \times \frac{\sum_i^n x_i}{n}$$

The guidelines for the validity and practicality criteria used are as follows.

***Table 1**. Guidelines for Validity Criteria*

Interval	Category
X > 3.4	Very Valid
2.8 < x 3.4	Valid
2.2 < x 2.8	Quite Valid
1.6 < x 2.2	Less Valid
x 1.6	Invalid

***Table 2**. Practical Criteria Guidelines*

Interval	Category
X > 3.4	Very Practical
2.8 < x 3.4	Practical
2.2 < x 2.8	Practical enough
1.6 < x 2.2	Less Practical
x 1.6	Impractical

While the response data analysis uses the percentage of responses. The following is a guideline for the response criteria used.

***Table 3**. Response Criteria Guidelines*

Percentage (%)	Category
X > 3.4	Very Practical
2.8 < x 3.4	Practical
2.2 < x 2.8	Practical enough

Results and Discussion

1. The results of question validation, practicality, and student responses

The validation of this math problem cards was carried out by 4 validators who were lecturers of Mathematics Education with the results as shown in Table 4.

***Table 4**. Results of Question Card Validation*

Validator	Average score
Validator 1	3.9
Validator 2	3.6
Validator 3	4.3
Validator 4	5
Average ($\bar{x}$)	4.2
Category	Very Valid

As for the practical aspect, the assessment was carried out by 2 fourth grade teachers, the instrument on the practical aspect consisted of 10 questions. The results of the practicality assessment are presented in Table 5.

***Table 5**. Practical Analysis*

Validator	Average score
Teacher 1	3.2
Teacher 2	4
Average	3.6
Criteria	Practical

Furthermore, to find out students' responses to the question cards, the researchers distributed response questionnaires that were filled out by students after they finished using the question cards. Student response data analysis was carried out by 33 fourth grade students consisting of 13 students of SDN Balukung 1 and 20 students of SDN Bantuil 2. Researchers distributed questionnaires to students with 10 questions to obtain data on aspects of student responses to the developed question cards. The results of the analysis of student responses to the developed question cards were obtained based on the results of calculations carried out by researchers, the product developed got a percentage of 91.67%. So it can be concluded from the analysis of student responses to the question cards categorized as very good.

2. Analysis of the results of validity, practicality, and student responses

Validity data analysis was carried out by four validators, namely material experts and linguists. In conducting the validation, the researcher distributed a questionnaire sheet to the validator with 15 questions for material experts and 12 for linguists. For the assessment score criteria using a Likert scale, namely, 4 = very good, 3 = good, 2 = quite good and 1 = poor. In addition to questions, there are also sections that need to be improved and suggestions or comments for improvement on the question card. There are some improvements as well as suggestions and comments. The part that needs to be fixed on the question card is the adjustment of local wisdom images with the material. Suggestions and comments on the sentences on the question cards are clarified whether to determine the type of square and rectangular shapes, determine the area or perimeter of the shapes. As for the triangular material, The part that needs to be fixed on the question card is the adjustment of local wisdom images with the material. Suggestions and comments on the sentence on the question card clarified whether to determine the type of triangle or calculate the perimeter and area of a triangle

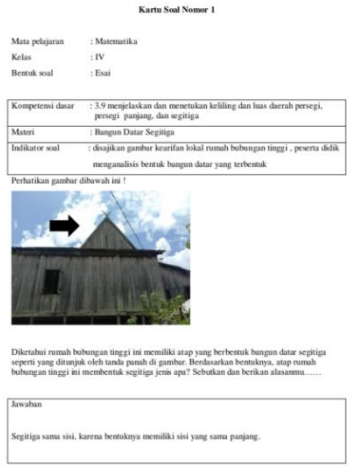
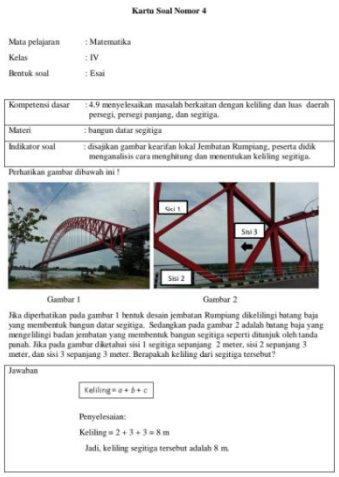
Data analysis on the practicality of the question cards was carried out by fourth grade teachers at SDN Balikung 1 and SDN Bantuil 2. Researchers distributed questionnaires to teachers with 10 questions to obtain data on the practicality aspects of the question cards developed on June 11, 2022. For this assessment score using a scale Likert, namely, 4 = strongly agree, 3 = agree, 2 = disagree and 1 = disagree. Based on the results of the questionnaire filled out by the teacher about the practicality of the question cards developed, they are categorized as very practical.

Analysis of student response data was carried out to 33 fourth grade students at SDN Balikung 1 and SDN Bantuil 2. Researchers distributed questionnaires to students with 10 questions to obtain data on aspects of student responses to the question cards developed. The research was conducted on June 11, 2022. For the criteria The assessment uses a Likert scale, namely, 4 = strongly agree, 3 = agree, 2 = quite agree and 1 = disagree. Based on the results of the questionnaire, all students were categorized as very good.

3. Product Revision

Product revision is a stage to provide a comparison between the product before it was revised and after it was revised. Researchers get comments and suggestions to improve the product developed by the validator. For the triangle material, the product revision requested is to improve the shape of the triangle according to the definition. As for the quadrilateral material, the requested product revision is related to the question editor. The results sample of the product revision according to the validator's suggestions for the triangle material are shown in Table 6 below.

***Table 6**. Revision of Triangle Material Products*

Information	Question Card	
	Before Revised	After Revised
The writing "in" is replaced “on”. Based on the shape? If you really want an equilateral triangle answer, why not directly based on the length of the side of the triangle. So the child will measure the existing picture.		
Just replace picture number 2 with one that clearly shows that it's an isosceles triangle.		

While the product revision results for square and rectangular materials are presented in Table 7 below.

Based on the results of research conducted by researchers in the development of local wisdom-based math question cards at SDN Balukung I and SDN Bantuil 2, such as the data collection stage, planning, to the development stage which includes validation by experts to test the validity of the question cards by filling in the questions according to the grid. -lattice. The product is said to be valid if the product produced is in accordance with the curriculum and has a relationship with one another. The results of the development (product) are said to be valid if the product is based on adequate theory (content validity) and all components of the learning product are related to each other consistently (construct validity) (Rochmad, 2012). The results of the products developed are categorized as very valid. It means, validity refers to the degree to which the intervention design is based on state-of-the art knowledge and the various components of the intervention are related to one another (Akker, 1999: 10). In terms of practicality, this question card is feasible or practical to use, the result of a practicality questionnaire from the teacher. The practicality of the product can also be seen

from whether the teacher can carry out learning in the classroom. Nieveen (1999) states that to measure the level of practicality can be seen from whether teachers and other experts consider that the material is easy and can be used by teachers and students. While the results of student responses, the analysis of student responses in this study was determined by a student response questionnaire. Questionnaires are used to determine student responses to the developed product.

On the math problem cards that were developed there are questions about the material of triangles and quadrilaterals which are presented in the form of cards. The developed math question card is used as a variation in presenting questions and making it easier for students to understand learning. This is in line with the research results of Nada, et al (2020) that the question cards make it easier for students to understand math problems compared to just using existing textbooks. In addition, the results of research by Permatasari, P. et al (2013) stated that card-assisted learning can improve learning achievement and increase student interest in participating in learning. This shows that learning mathematics can train and grow ways of thinking systematically, logically, creatively, and consistent and develop a persistent and confident attitude in solving problems (Prabowo, 2011). In mathematics, one of the learning objectives is a practical goal. This practical goal is related to the development of students' abilities to use mathematics to solve problems related to everyday life (Nuryati and Darsinah, 2021).

Conclusions

Based on the results of research and discussion, the product development was obtained in the form of a material math question cardGeometry is triangles and quadrilaterals. The developed math question cards meet the valid and practical criteria, and get very good student responses.Thus, the results of developing question cards based on local wisdom in Marabahan, Barito Kuala for all of these materials can help students understand concepts and build their own knowledge and play an active role in learning mathematics.

References

Agustina, W., Gazali, R. Y., Chairani, Z., & Nareki, M. L. (2021). Ethnomathematics panting music exploration. *Psychology, Evaluation, and Technology in Educational Research*, *4*(1), 8–17. Retrieved from https://petier.org/index.php/PETIER/article/view/94/35

Astutik, Endang Poetri. (2017). Pengembangan Perangkat Pembelajaran Berbasis Kearifan Lokal Masyarakat Usin Banyuwangi Melalui Model Penemuan Terbimbing pada Pokok Bahasan Trapesium Untuk Meningkatkan Kemampuan Komunikasi Matematika Siswa. University of Jember.

Dewi, S., Jabar, A., & Gazali, R. Y. (2019). Etnomatematika pada Perlengkapan Tari Bagipang Masyarakat Pantai Hambawang Timur. *Math Didactic: Jurnal Pendidikan*

Matematika, *5*(1), 13-22. Retrieved from https://jurnal.stkipbjm.ac.id/index.php/math/article/view/467

Monica, N.D., Gazali, R.Y., & Jabar, A. (2021). Eksplorasi Etnomatematika pada Seni Bela Diri Kuntau Kalimantan Selatan. *Prosiding Seminar Nasional MIPATI*, *1*(1). Retrieved from https://jurnal.stkipbjm.ac.id/index.php/mipati/article/view/1545

Nuryati & Darsinah (2021). Implementasi Teori Perkembangan Kognitif Jean Piaget dalam Pembelajaran Matematika di Sekolah Dasar. *Jurnal Papeda* 3(2). Retrieved from file:///C:/Users/P24T/Downloads/1186-Article%20Text-2830-1-10-20210721.pdf.

Rofi, S., Fatkurochman, H. (2021). Penyusunan Soal Terintegrasi Kisi-Kisi Soal Berbasis Aplikasi Sederhana bagi Guru di MTs Baitul Arqom. UM Jember Online Journal, 1(1), 23-30. Retrieved from http://jurnal.unmuhjember.ac.id/index.php/ABDI/article/viewFile/5320/3293

Sheila Shalehah, Abdul Jabar, & Rahmita Yuliana Gazali. (2021). ETNOMATEMATIKA PADA GEDUNG SULTAN SURIANSYAH. *Prosiding Seminar Nasional MIPATI*, *1*(1). Retrieved from https://www.stkipbjm.ac.id/mathdidactic/index.php/mipati/article/view/1544

Nada, L.Q., Salsabila, W.T., Susilawati, S. (2020). Efektivitas Pembelajaran STAD Berbantuan Kartu Soal pada Materi Komposisi Fungsi untuk Menumbuhkan Literasi Matematika. *Seminar Nasional Pendidikan Matematika Tahun 2019,* 1(1), 293-300. Retrieved from https://proceeding.unikal.ac.id/index.php/sandika/article/view/422/347

Permatasari, P., Wijonarko, Handayanto ,A. (2016). Pengaruh Model Pembelajaran Make A Match dengan Media Kartu Soal dan Model Pembelajaran Rotating Trio Exchange Dengan Media Modul Pembelajaran Terhadap Hasil Belajar Matematika Pada Pokok Bahasan Matriks Kelas X Semester II SMK Negeri 1 Demak Tahun Ajaran 2012/2013. *Aksioma: Jurnal Matematika dan Pendidikan Matematika,* 7(2),. Retrieved from http://journal.upgris.ac.id/index.php/aksioma/article/view/1419/1218

Thiagarajan, S. Semmel, S.D. & Semmel, M.L. (1974). *Instructional Development for Training Teachers of Exceptional Children.* Indiana: Indiana University Bloomington. Retrieved from https://files.eric.ed.gov/fulltext/ED090725.pdf

Rochmad. (2012). Desain Model Pengembangan Perangkat Pembelajaran Matematika. *Jurnal Kreano*, 3(1), 59-72. Retrieved from https://journal.unnes.ac.id/nju/index.php/kreano/article/view/2613/2672

Prabowo, A. (2011). Rancang Bangun Instrumen Tes Kemampuan Keruangan Pengembangan Tes Kemampuan Keruangan Hubert Maier dan Identifikasi Penskoran Berdasar Teori *Van Hielle*. *Jurnal Kreano,* 2(2): 72-87. Retrieved from https://journal.unnes.ac.id/nju/index.php/kreano/article/view/2618/2673

Risdiyanti, I.; Prahmana, R.C.I. (2018). Etnomatematika: Eksplorasi dalam Permainan Tradisional Jawa. **Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang**, [S.l.], 2(1), 1-11. Retrieved from https://e-journal.ivet.ac.id/index.php/matematika/article/view/562

Sugiyono, 2012. Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung: C.V.Alfabeta.