

QR CODE Assisted Mathematics Pocket Book for Grade IV Elementary School

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Abstract

This study aims to determine the level of validity and practicality of the learning media "*QR Code - assisted Pocket Book*" in mathematics lessons on polygons for grade IV Elementary School 1 Megang Sakti. This research is development research using the ADDIE development model. Based on the results of the assessment analysis conducted by three experts, namely: linguist, media expert, and material expert. The validators stated that the QR Code -assisted Pocket Book "in the polygon material mathematics lesson for grade IV SD Negeri 1 Megang Sakti has met the valid criteria with an average score of 0.87 with the High criteria. As for the practicality of the QR Code -assisted pocket book in mathematics lessons, the polygon material for class IV of the State Elementary School 1 Megang Sakti meets the very practical criteria with an average score of 96%, so it can be concluded that the QR Code -assisted pocket book meets the valid, practical criteria. and can be used in learning.

Keywords: Keywords, Keywords, Keywords

INTRODUCTION

Education is a very important element in human life. Education is also a learning process for students to be able to understand and understand critical thinking through teaching and training efforts. (Fauzia, 2018) said that education is a process of improving human quality both in terms of knowledge, attitudes, and skills by following certain procedures so that it can be useful for himself, his family, society, nation and state. In other words , education is a process of interaction between students and teachers in learning activities. Education in a country will be more developed if the education of its citizens is managed and organized properly, one of which is by conducting development research.

Development research in education is a very important thing to develop and facilitate an educational product such as media, teaching materials, strategies, methods, models, and pocket books. this is in line with the opinion (Hamzah, 2019) argues that research and development is research that is used to produce certain products , and test their effectiveness. With the development of learning tools, it is expected to be a solution to problems that occur during the learning process. In addition, the development of learning tools can also realize the optimal achievement of learning objectives. learning problems that are often found are mathematics learning, because mathematics learning is considered difficult by students plus

the media used is inadequate. (Vandini, 2015) Mathematics is a structural science that deals with abstract concepts. Mathematics studies certain symbols and can be used in almost all branches of science. Mathematics lessons must be mastered by every student because mathematics has an important role in other sciences such as science, technology and even in everyday life. One way to support the mathematics learning process is to use learning media.

Learning media includes humans, materials or studies that build conditions that enable students to acquire knowledge, skills, or attitudes (Satria, 2020) . In addition, learning media are facilities, methods, and techniques used in order to identify communication and interaction between educators and students in the learning process at school (Tafonao, 2018) In the selection of learning media, it is necessary to pay attention to the accuracy of choosing the media that will be used in the learning process. In the learning process, there are several types of learning media including the following: 1) Visual Media, 2) Audio Visual Media, 3) Computers, 4) Microsoft Power Point, 5) Internet, and 6) Multimedia, (Wati, 2016). In the world of education itself, many workers use visual learning media. The learning media itself is made to help teachers to easily deliver material. One of the material that is difficult for students to understand is mathematics. Mathematics is one of the important subjects to be mastered at school because of its use in everyday life. The importance of the role of mathematics makes mathematics taught at every level of education. Mathematics provides a very important value for elementary school to university students because it makes a positive contribution to intellectual development to deal with increasingly advanced changes (Mulyono et al., 2020) . Based on the results of observations and interviews conducted on 08 January – 15 January 2021 by the author with a fourth grade teacher at SD Negeri 1 Megang Sakti, the author found problems with students when the teacher's mathematics learning process only used student books so that students had difficulty understanding the material being taught. delivered by the teacher. In addition, the learning method used by the teacher is by using the lecture method. The lecture method, which is the "favorite" of lecturers in teaching, is not enough to arouse students' interest in learning and tends to make students feel unmotivated, unfocused and not concentrated in learning (Lontoh & Sihombing, 2021).

Teachers are also less inspired in meeting the needs of students so that an innovative learning process is not created. based on observations. teachers only use textbooks from the government in learning. Therefore, pocket books can be an option to be used in the teaching and learning process.. Pocket books are media that have often been used in the delivery of the material being taught. A pocket book is a small book in which there are writings and pictures

as well as an alternative to packaging information by taking into account the element of efficiency of use that can be stored in a pocket and easy to carry everywhere. Pocket books also help students more easily understand the material presented. A pocket book is a small book, which can be stored in a pocket and easy to carry and read anytime and anywhere (Ali, 2019) . According to (Sulistiyani et al., 2013) The functions of a pocket book or pocket book are: 1) Attention function, pocket book media is printed in small packaging and full color so that it can attract and attention students to concentrate on the content of the material written in it, 2) Affective Function, Writing formulas on pocket book media and there are pictures in the description of the material so that it can increase students' enjoyment in learning, 3) Cognitive Functions, Writing formulas and pictures can clarify the material contained in the pocket book so that it can facilitate the achievement of learning objectives, 4) Compensatory function, Writing material in a short pocket book and clearly can help students who are weak in reading to understand the material in the text and recall it, 5) Psychomotor function, Writing short and clear pocket book material can make it easier for students to memorize it, 6) Evaluation function, Assessment of students' ability in understanding the material can be done by do the evaluation questions that are available t on the pocket book The existence of this pocket book is effectively used as a companion book for student learning to increase student interest in learning (Fembriani, 2021).

Seeing the conditions in the field, the author must make a teaching material in the form of a pocket book that can help teachers in teaching and make students more interested and make it easier for students to learn mathematics and can be used to study anywhere. Not only that, the pocket book that teachers and students want is an interesting pocket book that is different from pocket books in general, as there are only formulas, but a book with clear pictures in each material explained. In addition, a pocket book that was compiled and designed specifically based on QR-Code was also found to facilitate students in learning. Quick Response Code or commonly called QR Code is a technology-based learning media. QR Code or two-dimensional barcode that is used to display text to users, open web pages or URLs, save contacts and much more that makes it easier for someone to store data. (Adna & Mardhiyana, 2019) , Quick Response Code (QR Code) is a two-dimensional image that displays one that contains information both vertically and horizontally.

Based on the results of research (Sulistiyowati, 2017) with the title Development of a pocket book for mathematics subjects on geometry and arithmetic for SD/MI academic year 2017/2018 that pocket books for mathematics subjects are valid and appropriate to be used in

the learning process. Based on the assessment data obtained for the pocket book product for mathematics subjects, geometry and arithmetic as follows: the results of the assessment of material experts in the mathematics pocket book obtained an average value of 3.21 , the assessment of media experts who were given an assessment of the pocket book was 3.23 . Meanwhile, the small group test results obtained an average of 3.39 with the criteria of "very interesting" and the field test obtained an average score of 3.46 with the criteria of "very interesting". Based on the data obtained, the pocket book for mathematics subjects, geometry and arithmetic, was developed suitable for use in the learning process. Based on these problems, the authors are interested in developing a learning media entitled: "A pocket book of mathematics with the help of QR Code in the fourth grade of elementary school".

METHOD

This research uses a quantitative approach with ADDIE development mode. The development model used in this research is the ADDIE development model. This development research procedure goes through five steps, namely: Analysis, Design, Development, Implementation, and Evaluation . In this study, Data collection technique used was observation, data collection using teacher and student response questionnaires. Questionnaires are given to students to determine student responses to the developed test instrument (Sugiyono, 2018). This questionnaire contains several questions which are then answered by the respondents. In other words, the questionnaire is a list of questions that will be given to other people who are willing to provide responses or answers according to user requests or according to questions. In this research, the questionnaire is divided into 2 types, namely the teacher and student practicality questionnaire and the validation questionnaire.

Validation questionnaire which aims to determine the validity of the QR Code -assisted pocket book . The instrument used to analyze the validity of the pocket book is an assessment questionnaire that is intended for linguists, media experts, and material experts. To calculate the average score and the average total score of all aspects assessed using the following formula:

Giving the validity value with the following formula:

$$V = \sum S / [n(c - 1)]$$

(Azwar, 2013)

Description:

$$s = r - l0$$

l0 = low validity score (in this case = 1)

c = low validity score (in this case = 4)

r = number given by an assessor

n = number of validators

$$\text{Average score} = \frac{\text{total score}}{\text{number of subject}}$$

Table 1 Category of Pocket Book Validation Average Score

Correlation coefficient	Interpretation of validity
> 0.80	High
0.60 $V < 0.80$	High enough
0.40 $V < 0.60$	Enough
0 $V < 0.40$	Bad

Source: (Febriandi *et al.*, 2019)

Pocket Book Practicality Test

QR Code -based pocket book . To calculate the average score and the average total score of all aspects assessed using the following formula:

The value of practicality is given by the following formula:

$$V_p = \frac{TSEp}{S-max} \times 100\%$$

Description:

VP: Practicality Validity

TSEp : total practicality empirical score

S-max : maximum expected score

$$\text{Average score} = \frac{\text{total score}}{\text{number of subject}}$$

Table 2 criteria for practicality of pocket books.

Interval mean score	Clarification
81% - 100%	Very practical
61% - 80%	Practical
41% - 60%	Practical enough
21% - 40%	Less practical
0% - 20%	Not practical

Source: Riduan Dalam (Lestari *et al.*, 2021) .

RESULTS AND DISCUSSION

Results

After the research was conducted by distributing validation questionnaires to 3 validators, namely the linguist validator with 12 questions, the media expert validator with 17 questions and the material validator with 9 questions. Then examined one by one and given an assessment according to the respondents' answers. The average score obtained from the assessment of 3 validation questionnaires is 0.87 . This value was obtained from filling in the research questionnaire which provided the following information: 5 (very good), 4 (good), 3 (good enough), 2 (not good) and 1 (not good).

Table 3 results of data analysis of linguists using *Aiken's V*

No	Rating Points	score	<i>Aiken's V</i> figure	<i>Aiken's V</i> Coefficient Criteria
1	Correct sentence structure	4	0.75	High enough
2	Sentence effectiveness	4	0.75	High enough
3	Term standard	4	0.75	High enough
4	Understanding of information	5	1.00	High
5	Image and illustration accuracy	5	1.00	High
6	Conformity with the intellectual development of students	5	1.00	High
7	Conformity with the emotional development of students	4	0.75	High enough
8	Grammatical accuracy	4	0.75	High enough
9	Spelling accuracy	4	0.75	High enough
10	Consistency in the use of symbols	4	0.75	High enough
11	The language in the Pocket Book is easy to understand	4	0.75	High enough
12	The language used is in accordance with PUEBI	4	0.75	High enough
Amount V average		51	9.75 0.81	High High

Table 4 results of media expert data analysis using *Aiken's V*

No	Rating Points	score	<i>Aiken's V</i> figure	<i>Aiken's V</i> Coefficient Criteria
1	Pocket Book Compatibility	5	1.00	High
2	Size suitability with the contents of the Pocket Book	5	1.00	High
3	The appearance of the layout elements on the front, back and back covers harmoniously has rhythm and unity and is consistent	5	1.00	High
4	Harmonious layout element colors and clarify function	4	0.75	High enough
5	The font size of the Pocket Book title is more dominant and proportional compared to the size of the Pocket Book, Author's Name	5	1.00	High
6	Pocketbook title color contrasts with background color	5	1.00	High
7	Don't use too many letter combinations	5	1.00	High
8	Describing the content or teaching materials and revealing the character of the object	5	1.00	High
9	Shape, color, size, proportion of objects according to reality.	4	0.75	High enough
10	Placement of elements of layout	5	1.00	High
11	Consistent Layout by pattern	5	1.00	High
12	Clear paragraph separation	4	0.75	High enough
13	Print area and proportional margins.	5	1.00	High
14	Spacing between text and illustrations is appropriate	5	1.00	High
15	The placement of titles is clearly consistent and proportional	5	1.00	High
16	Word cutter sign	4	0.75	High enough
17	Able to reveal the meaning of the object	High	1.00	High
Amount V average		81	High 0.94	High High

Table 5 results of material expert data analysis using *Aiken's V*

No	Rating Points	score	<i>Aiken's V</i> figure	<i>Aiken's V</i> Coefficient Criteria
1	Material equipment	5	1.00	High
2	Material breadth	4	0.75	High enough
3	Material depth	5	1.00	High
4	Accuracy of data and facts	4	0.75	High enough
5	Example and case accuracy	5	1.00	High
6	Image and Illustration accuracy	5	1.00	High
7	Examples of questions in each learning activity	4	0.75	High enough
8	Bibliography	5	1.00	High
9	Student Engagement	4	0.75	High enough
Amount		41	8.00	High
V average			0.88	High

Table 6 Results of Data Analysis of the Validator's Overall Assessment

No	Validator Name	Score Earned			<i>Aiken's V</i> coefficient criterion
		Langu age	Media	Theory	
1	Agung Nugroho, M. Pd.	0.81	-	-	High
2	Leo Charlie, M. Pd.	-	0.88	-	High
3	Dwi Marwoto, S. Pd. elementary school.	-	-	0.94	High
Amount		0.81	0.88	0.94	High
Average			0.87		High

After the research was conducted by distributing response questionnaires to 9 respondents, namely 3 students (one to one) and to 6 people (Small group) with 8 questions. Then examined one by one and given an assessment according to the respondents' answers. The average score obtained from the student's practicality questionnaire assessment is 100%. Meanwhile, the teacher's practicality questionnaire with 10 questions obtained an average score of 88%. This value was obtained from filling out research questionnaires that provided the following information: 5 (very practical), 4 (practical), 3 (pretty practical), 2 (less practical) and 1 (not practical).

Table 7 the results of the data analysis of the practicality of students in the *one to one* trial

No	Item Rating to-	Respondent			Practical validity	Criteria
		1	2	3		
1	1	1	1	1	100%	Very Practical
2	2	1	1	1	100%	Very Practical
3	3	1	1	1	100%	Very Practical
4	4	1	1	1	100%	Very Practical
5	5	1	1	1	100%	Very Practical
6	6	1	1	1	100%	Very Practical
7	7	1	1	1	100%	Very Practical
8	8	1	1	1	100%	Very Practical
Average		100%			Very Practical	

Table 8 the results of the data analysis of the practicality of students in the *Small Group* trial

No	Item Rating to-	Respondent						Practical validity	Criteria
		1	2	3	4	5	6		
1	1	1	1	1	1	1	1	100%	Very Practical
2	2	1	1	1	1	1	1	100%	Very Practical
3	3	1	1	1	1	1	1	100%	Very Practical
4	4	1	1	1	1	1	1	100%	Very Practical
5	5	1	1	1	1	1	1	100%	Very Practical
6	6	1	1	1	1	1	1	100%	Very Practical
7	7	1	1	1	1	1	1	100%	Very Practical
8	8	1	1	1	1	1	1	100%	Very Practical
Average		100%						Very Practical	

Table 9 Recapitulation of overall assessment data results
practicality of teachers and students

No	Evaluator	Number of Statement Items	Earned Score	Percentage	Criteria
1	Mulyadi, S. Pd. 3 4th grade	10	44	88%	Very Practical
2	students of SDN 1 Megang Sakti 6 fourth grade	8	24	100%	Very Practical
3	students of SDN 1 Megang Sakti	8	48	100%	Very Practical
Average			96%		Very Practical

Discussion

From the results of the tests carried out, it was found that the assessment of media development by media experts obtained an average of 0.81 or high and was declared valid.

This is feasible for trials without revisions. Meanwhile, for linguists, the average obtained is 0.87 or high and is declared valid. This is feasible for trials without revisions. and for material experts obtained an average of 0.94 or high and declared valid. It is worthy of trial without revision. Based on the data on filling out the questionnaire by the three validators, it shows that in developing the improved media, the calculation of the data filling in the questionnaire that obtained an average score of 0.87 with the "high" criterion can be interpreted that the development of a QR Code -assisted pocket book is valid and feasible to use. (Festiawan & Arovah, 2020) based on three aspects of assessment in the form of material, display and language aspects get a score of 91% with an A and enter the "very good" category

Implementation of the practicality test at the one to one stage consisting of 3 people and a small group (small group) consisting of 6 people, a total of 9 students with high, medium and low abilities. Based on the results of the overall practicality assessment from teachers and students obtained, it can be concluded that the responses of students and teachers to the QR Code -assisted pocket book for polygon material are practical with an average score of 96%.

CONCLUSION

Based on the results of research and development of QR Code -assisted Pocket Books in Class IV Mathematics Lessons at State Elementary School 1 Megang Sakti, it can be concluded that this development research resulted in QR Code-assisted pocketbooks in Mathematics Lessons on Multifaceted Materials. This research was conducted using the ADDIE development model which consists of 5 stages, namely Analysis , Design , Development , Implementation , and Evaluation . The quality of the pocket books developed are as follows:

1. This research has succeeded in developing a QR Code -assisted pocket book design for mathematics lessons using Microsoft Word software and the Canva application. At the stage of designing this pocket book, the researcher made it according to the initial design that had been prepared by the researcher. This QR Code -assisted pocket book product is intended for fourth grade students of State Elementary School 1 Megang Sakti. In addition, the researcher also added a QR code containing soft files of materials and pictures that matched the context of the material contained in the pocket book and the researcher also used attractive colors in the pocket book design so that students were interested in learning to use a QR -assisted pocket book. Code.

2. The developed pocket book obtained an average score of 0.87 and was categorized as "Valid" which was determined based on the results of pocket book research by the three validation experts (linguists, media experts, and materials experts).
3. The developed pocket book obtained an average score of 96% and the pocket book was categorized as "Very Practical" which was determined based on the results of the analysis of the practicality sheet for teachers and fourth graders of SD Negeri 1 Megang Sakti on the pocket book that had been developed.

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