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Development of QR Code-Based Pocket Book Media on Solar System Materials to Increase The Science Literacy of Primary School Student

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ABSTRACT

This study aimed to overcome challenges in learning Natural Sciences (Science) and increase the scientific literacy of Grade VI students at SDN 1 Sumbergedong, Trenggalek Regency, by developing a QR Code-based Pocket Book on the solar system material. The research method used is R&D and follows ADDIE's steps to develop valid, practical and effective learning media. Validation results from material experts, media experts, and teachers show a very high level of validity, 93.56%. In comparison, small-scale and large-scale trials show a high level of practicality with an average of 98.25%. Evaluating the effectiveness of using N-Gain resulted in a significant increase in student understanding by 80%. Thus, the QR Code-based Pocket Book is an innovative alternative that has the potential to increase elementary school students' scientific literacy, overcome media limitations, and enrich the learning experience with interactive multimedia technology. It is very suitable for use in solar system learning materials.

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INTRODUCTION

Natural Science is one of the core lessons contained in the education curriculum in Indonesia, especially at the basic education level (Mustaghfiroh, 2020). Science is a series of concepts that are organized systematically, with applications related to natural phenomena. Science learning is structured and developed through scientific methods, such as observation and experimentation, making it crucial (Werdiningsih, 2021). Therefore, science learning has a major impact on education and technological development, providing students with an understanding of principles and concepts their

relationship to the environment, technology, society, and natural phenomena (Harefa, D., & Sarumaha, 2020). However, there are still significant challenges in improving science literacy among Indonesian students. The results of the PISA (Program for International Student Assessment) study stated that the science literacy skills of Indonesian students are still lagging behind, which is ranked 70 out of 78 participating countries (OECD, 2019). Thus, there is a need for innovation and development of learning strategies to improve students' science literacy. Use of learning media is one of the interesting innovations and can create an effective learning atmosphere because it can provide information from various references to students.

The learning media has an essential role in supporting the student learning experience. Learning media is a device that can support teachers to deliver learning materials so that they can realize success in learning activities (Anugraheni & Kristin, 2018; Erayani & Jampel, 2022; Sutrisna, 2021). The use of innovative learning media that utilizes technological advances can create a pleasant learning situation for students and a more effective interactive learning process (Abdullah et al., 2021; Annisa, 2019). The learning process carried out using learning media can help develop student learning outcomes and is useful for facilitating learning activities so that learning activities can run effectively and efficiently (Laily et al., 2022; Aulia et al., 2023). However, based on observations of learning conditions in elementary schools, the limited learning media, students' lack of interest in the material being taught, and students' low science literacy skills are the main highlights.

Based on the initial observations that have been carried out in class VI SDN 1 Sumbergedong, the results obtained that the available media is still minimum and the lack of IT-based media development. When science learning takes place, teachers use media to assist in the delivery of material. However, teachers must bring their own materials to be used as media from home because the media available at school is still incomplete. During the learning process, students observe and are directly involved in the use of media. At the end of the learning process, students were asked by the teacher to provide criticism of the media that had been used. The observation results show that grade VI SDN 1 Sumbergedong in learning science no longer uses thematic but per-load. This is because students must focus on preparing for the School Examination (US) which is still carried out per-load. So that the books used for learning in class no longer use thematic books but Erlangga publisher package books.

The results of interviews with grade VI teachers show that teachers use learning media such as teaching aids but the limited media at school is the main obstacle. In using the media, students actively follow but students are easily bored and lose focus when using media that is less interesting and when using new media, most students do not have a clear understanding of its use and differences in students' basic abilities are another obstacle. In addition, teachers experience a little problem in teaching abstract material such as the solar system because the Erlangga package book used does not meet the visual needs of students. Therefore, teachers use globe media to provide an overview of the appearance of the earth to students.

Based on the distribution of questionnaires of the needs of grade VI students at SDN 1 Sumbergedong, Trenggalek Regency, the following results were obtained: (1) all students like the books used at school because there are many pictures and colors, (2) 66% of students consider the material contained in the book to be incomplete, (3) 83% of students feel that they do not understand by learning material from books alone, (4) 93% of students want to learn independently using books other than books at school, (5) all

students feel they need additional explanations such as videos, illustrations or pictures to understand the material, and (6) 93% of students feel happy and excited when learning using a smartphone.

Based on the needs analysis, it appears that SDN 1 Sumbergedong needs learning media in the form of solar system material books combined with attractive images. The learning media developed in this study is a QR Code-Based Pocket Book. Facilities at school really support the use of QR Code because there is wifi and all students already have mobile phones. The development of QR code-based pocket book media that presents solar system material through the R&D (Research and Development) method and follows the ADDIE (Analyze, Design, Development, Implementation, and Evaluation) steps so that the research method is systematically arranged by combining print and electronic media. So that the QR code-based pocket book media is designed to provide complete information, interesting supporting images, AR, and learning videos that enrich students' learning experience. This research is expected to make a positive contribution in improving students' science literacy, as well as providing interesting and effective learning alternatives in this technological era.

Pocket book is the result of innovation that has the advantage of having a space theme that is in harmony with the content of the material in it, has an attractive design for elementary students, is practical in indoor and outdoor use, and has very broad insights stored in the QR code in the form of 3D images, AR, and learning videos on each sub-material. QR Code-based Pocket Book is also developed to improve students' science literacy. Science literacy is a capacity to utilize scientific abilities, knowledge, and skills.

METHOD

The method used in this research is R&D (Research and Development). This research is to develop products and test the validity of the products produced by following the ADDIE (Analyze, Design, Develop, Implement, Evaluate) stages. This model is suitable for developing various types of learning media products, one of which is teaching materials developed by Sugihartini & Yudiana (2018). Sources of research data were obtained from teaching material experts, material experts, teachers and grade VI SD Negeri 1 Sumbergedong as many as 20 students. For data collection through interviews, observations, documentary studies, questionnaires, and written tests. The ADDIE Model development research design scheme is shown in Figure 1.

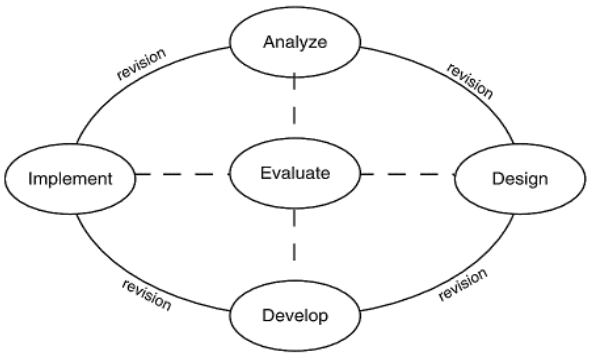

Figure 1 ADDIE Development Research Design Scheme (Branch, 2021)

Based on Figure 1, the first step is to analyze. At the analysis stage, the problems that arose at SD Negeri 1 Sumbergedong were analyzed through direct observation of students, interviews with grade VI teachers, questionnaires, and tests. Observations were

made to find out the infrastructure and the entire process of learning activities in class VI. Interviews were conducted with grade VI teachers of SD Negeri 1 Sumbergedong to find out the potential and problems experienced during science learning. The interview instrument includes aspects of student conditions, learning, and science literacy with indicators of questions such as difficulties experienced by students, factors that cause student learning difficulties, what learning media are commonly used in learning, obstacles when using learning media, opinions about pocket book learning media for science literacy and so on. Some of the questionnaires used are potential and problem questionnaires, material expert validation questionnaires, media expert validation questionnaires, user validation questionnaires, and student response questionnaires. Students were also given tests in the form of pre-test and post-test to determine students' science literacy skills on solar system material.

The second stage is design which includes designing pocket books that are tailored to the results of the needs analysis. The design of the pocket book starts from conceptualizing, outlining the material to be presented, and the visual design of the media. The pocket book concept is a combination of print and electronic media. The pocket book media contains space theme animations, learning video materials and 3D images linked to QR codes, instructions for use, material summaries, role playing, and evaluation questions. At the design stage, the research instruments were prepared in the form of validation instruments for material experts, media experts, users and student response questionnaires.

The third stage is development by developing products that have been prepared in accordance with learning needs, in addition to paying attention to design aspects and the content of existing materials so that they are in accordance with the needs of students. Products that are ready are then consulted with the supervisor and then product validation is carried out by material experts, media experts and grade VI teachers.

The fourth stage is implementation, which is the activity of testing QR code-based pocket book learning media. Testing was carried out twice, first on a small scale to 5 students and second large-scale testing with a total of 20 students with various levels of ability. Product testing by giving response questionnaires to students to find out the practicality of pocket book products that are developed and suitable for use as learning media. The fifth stage is evaluation, which is an activity carried out by collecting input and recommendations related to learning media that has been developed from users, teachers, material experts, and media experts.

This research and development uses qualitative data and quantitative data. Qualitative data was obtained through suggestions and input from material experts, media experts, users, and students. Quantitative data was obtained from validation questionnaires of material experts, media experts, and users as well as student response questionnaires. Quantitative data was analyzed using quantitative analysis techniques including validity test, practicality test, and product effectiveness test. The validity test to determine the feasibility of the product to be developed, analyzed using a Likert scale. Likert scale has levels ranging from very positive to very negative with 4 categories. The descriptor assessment form using the Likert scale is shown in Table 1.

Table 1 Likert scale on expert and user validation questionnaires

Criteria	Score	Category
If 3 descriptors are met	4	Very good
If 2 descriptors are met	3	Good
If 1 descriptors are met	2	Not good
If no descriptors are met	1	Not very good

The scores are then summed up in each aspect with the formula proposed by Sugiyono (2017) as follows:

$$V_{exp} = \frac{T_{se}}{T_{sh}} \times 100\% \quad (1)$$

Description:

V_{exp} = Expert Validation
T_{se} = Total empirical score achieved
T_{sh} = Total maximum expected score

Based on the results of the calculation of the percentage of quantitative data above, it is then described according to the category of validation results in Table 2 and products are considered valid and can be used if the percentage reaches 70%.

Table 2 Validation Result Category Criteria

Achievement Level	Category	Test Decision
86 – 100 %	Highly valid	Product can be used without revision
70– 85 %	Moderately valid	Product can be used, but with minor revisions
60 – 69 %	Less valid	The product is recommended not to be used as it needs major revisions
0 – 59 %	Invalid	Product must not be used

Source: Sugiyono (2017)

The practicality test was conducted to determine the practicality of the product to be used by students by giving a student response questionnaire to the pocket book. The results of the student response questionnaire were analyzed using the Guttman Scale. The Guttman scale is used to obtain strong answers from respondents. The highest score of the Guttman Scale is 1 for the answer "Yes" and the lowest score is 0 for the answer "No". Furthermore, to measure the practicality of the pocket book product, it can be processed using a formula sourced from Arikunto in Arif (2015). The formula for analyzing the questionnaire is as follows:

$$P = \frac{\sum x}{N} \times 100\% \quad (2)$$

Description:

P = Percentage score
$\sum x$ = Total score obtained
N = Maximum score amount

The results of the calculation of the percentage of quantitative data are then described in Table 3, if the results reach 70% and above, the product is said to be practical and feasible.

Table 3 Product Practicality Criteria

Achievement Level	Practicality Criteria	Test Decision
86 – 100 %	Highly practical	Product can be used without revision
70 – 85 %	Practical enough	Product can be used, but needs minor revision
60 – 69 %	Less practical	The product is recommended not to be used as it needs major revisions
0– 59 %	Impractical	Product must not be used

Source: Sugiyono dalam Akbar (2015)

The product effectiveness test was carried out through giving pretests and posttests to determine the level of student understanding before using the product and after using the product then the value approach using N-Gain analysis to determine the increase in the value of pretest and posttest results (science literacy test). The N-Gain formula used is as follows.

$$\mathrm{N(g)} = \frac{score\ posttest - score\ pretest}{score\ ideal\ -\ score\ pretest} \quad (3)$$

With the information N (g) is the N-Gain value and the ideal score is the maximum value of the test given. After the N-Gain results are obtained, proceed by calculating student scores using the N-Gain category in the table below.

Table 4 N-Gain Value Categorization

N-Gain Value	Category
N(g) < 0,3	Low
0,7 > N(g) ≥ 0,3	Medium
N(g) ≥ 0,7	High

Source: Sundayana (2015)

Based on the results of the N-Gain score, the value classification for each gain criterion is then converted into a percentage. If the results reach more than 76% then the product is said to be effective for student literacy. The N-Gain effectiveness interpretation categories are shown in Table 5 below.

Table 5 Categorization of N-Gain Scrore Effectiveness Interpretation

Percentage (%)	Interpretation
<40	Ineffective
40 – 55	Less effective
56 – 75	Moderately effective
>76	Effective

Source: Rusilowati & Pangestu (2022)

RESULT AND DISCUSSION

Result

The results of the development of the QR Code-based Pocket Book will be presented according to the five stages of the ADDIE development model. The first stage of analysis was carried out in class VI of SD Negeri 1 Sumbergedong, Trenggalek Regency. Needs analysis activities are carried out for potential and problem analysis, curriculum analysis, and analysis of learner characteristics. Based on the analysis of potential and problems through interviews with Mrs. Christin Yunita as a 6th grade teacher at SD Negeri 1 Sumbergedong, the results show that teachers use learning media but the media is still limited, teacher obstacles in preparing the media, and students often lose focus if the learning media is less interesting. Based on the results of curriculum analysis, it explains that in science lessons the material that often has obstacles during the learning process is solar system material. While the analysis of the character of students from the questionnaire found that all students liked books with lots of pictures and colors, 66% of students considered the material contained in the book to be incomplete, all students felt that they needed additional explanations such as videos, illustrations or pictures to understand the material, and 93% of students felt happy and excited when learning using smartphones. So based on the results of the analysis, teachers and students need media in the form of books that can support the learning process of science, especially solar system material. The learning media can be integrated with cellphones via QR code so that it matches the characteristics of students. The learning media chosen to be developed is a pocket book.

In the design stage, it starts from designing the content which consists of lesson 1 discussing the meaning of the solar system, planetary characteristics, and planetary classification. Learning 2 contains material about satellites, asteroids, meteoroids,

comets, and there are role-playing activities. The pocket book concept developed is media presented with a combination of print and electronic media. The pocket book contains space theme animations, learning video materials and 3D images linked to QR codes, instructions for use, material summaries, role playing, evaluation questions on solar system material. Pocket book learning media is designed using software such as Canva, Corel Draw X-7 graphic design processor and printed using A6 paper (14.8 cm x 10.5 cm). Pocket books are also equipped with learning videos relevant to solar system material that can be accessed through the youtube platform. Figure 2 is the appearance of the QRcode-based pocket book that has been completed in the design.

Figure 2 QR Code Based Pocket Book Display

The next stage is development, the product is consulted with a supervisor and then a validation test is carried out by material experts, media experts, and users, namely grade VI teachers of SDN 1 Sumbergedong, Trenggalek Regency. The following is a recapitulation based on the validation test that has been carried out by material experts, media experts, and users.

Table 6 Recapitulation of Validation Results

Number	Assessment Item	Percentage of Validation Rating(%)			Avarage(%)
		Material Expert	Media Expert	User (*Teacher*)	
1.	Content Eligibilty	87,50	100	100	95,83
2.	Presentation Feasibility	75	100	100	91,66
3.	Linguistic Appropriateness	100	87,50	87,50	91,66
4.	Graphics Feasibility	100	91,66	100	97,22
5.	Product Content	-	-	100	100
6.	Product Design	-	-	100	100
7.	Produk Usability	-	-	75	75
Avarage		**90,62**	**94,79**	**94,64**	
				93,35	
Category				**Very Valid**	
Information				**Can be used without revision**	

Based on table 6 that the product of pocket book media development gets an average of 93.35% so that the media development is very valid with the test decision can be used without revision. The next stage is implementation which is carried out as a product trial. Product trials were conducted twice, namely small-scale product trials and large-scale

product trials. Based on the results of the small-scale trial, students were more enthusiastic about learning using the pocket book developed. This is in accordance with the characteristics of class VIA students at SD Negeri 1 Sumbergedong that all students already have cellphones and are able to operate them and most of them prefer to learn using cellphones. While the trial activities on a large scale obtained a very good response from students of class VIA SD Negeri 1 Sumbergedong. In the implementation of learning, students become more active, happy, and eager to learn using the pocket book developed. The variety of learning media in the form of pocket books developed is appropriate because it looks at the potential and problems and characteristics of students.

The final stage in this research and development is the evaluation stage. In this stage the developed product is reviewed to eliminate the indicated errors in the previous stages. The use of QR code-based pocket books on solar system material in learning can improve the science literacy of grade VI elementary school students. This can be measured from the pretest and posttest assessments conducted with all VI grade students totaling 20 students. The following are the results of the recapitulation of pretest and posttest scores by students presented in table 7.

Table 7 Recapitulation of Pretest and Posttest Scores

No	Name	Value		*N-Gain*	Category
		Pretest	***Posttest***		
1.	AM	50	80	0,6	Medium
2.	AA	60	90	0,7	High
3.	CR	50	90	0,8	High
4.	CA	50	100	1,00	High
5.	DA	40	90	0,8	High
6.	DP	40	80	0,6	Medium
7.	FR	50	80	0,6	Medium
8.	FS	40	100	1,00	High
9.	IP	50	90	0,8	High
10.	ME	70	100	1,00	High
11.	MK	40	70	0,5	Medium
12.	RM	50	90	0,8	High
13.	RD	40	80	0,6	Medium
14.	SS	50	100	1,00	High
15.	SA	50	100	1,00	High
16.	TNH	40	90	0,8	High
17.	Y	70	100	1,00	Medium
18.	MN	60	90	0,7	High
19.	AFN	60	90	0,7	High
20.	W	60	100	1,00	Medium
Total		**1020**	**1810**	**16,0**	
Average		**51**	**90,5**	**0,8**	**High**
Qualification					**Effective**

The final results obtained that the QR code-based pocket book product for solar system material to improve the science literacy of elementary school students is very valid with an average score of 93.56%, very practical with an average score of 99.25%. Then, the effectiveness value using the N-Gain test with an average of 0.8 with an interpretation of the effectiveness of the percentage of 80%, so that the media is very effective in the learning process of science content. The use of cellphones to access material in pocket books still requires supervision from the teacher so that the learning carried out can run optimally, effectively and efficiently.

Discussion

Validity of QR Code-Based Pocket Book Media on Solar System Materials to Improve Science Literacy of Elementary School Students

Product validity is based on an assessment according to material experts, media experts and teachers to get results in a very valid category. As conducted by Rohmah, (2020), Sulasriani (2021), and Choirina (2023) obtained validation results that the Pocket Book was declared valid, and was suitable for use as teaching material in learning. There are several aspects of assessment in product validation based on material experts including content feasibility, presentation feasibility, linguistic feasibility, and graphical feasibility. The aspect of content feasibility has 2 assessment indicators, namely the suitability of the material with KD and the content of the QR code. The assessment results show that the material contained in the QR code-based pocket book of solar system material is in accordance with KD 3.7, namely explaining the solar system and the characteristics of the members of the solar system and for KD 4.7 making a model of the solar system. The QR code contained in the pocket book contains learning videos that are in accordance with KD and learning objectives. The results of the assessment of the feasibility aspect of the content get a percentage score of 95.83% so that the contents of the pocket book can be said to be very feasible. In accordance with the opinion of Anditasari (2018: 107) the media used in the learning process must be tailored to the material and the needs of students.

The presentation feasibility aspect assesses the material presentation techniques contained in the pocket book. The material in the QR code-based pocket book has been arranged systematically and interestingly, and the material between subchapters has been related. Pocket books have also been equipped with practice questions and instructions for using QR codes that contain learning videos, AR, and 3D images. According to Darhim (in Rahmawati, 2013: 226) that in understanding a material it is necessary to present material that is simple, interesting, easy to understand, and in accordance with student conditions, which is very important to give a sense of pleasure. The results of the assessment of the presentation feasibility aspect get a percentage score of 95.83% so that the presentation of the pocket book can be said to be very feasible.

Based on the linguistic feasibility aspect, there are 3 indicators which include the accuracy of writing, sentence accuracy, and sentence clarity. The sentences used in the pocket book are correct. The accuracy of writing and clarity of sentences are also very clear and precise. According to Widjajanti (2008:3) the use of language, writing, sentence structure, vocabulary, and clarity, which in the media must be appropriate so that it can be understood by students. The results of the assessment of the linguistic feasibility aspect get a percentage score of 100% so that the language used in the pocket book can be said to be very feasible.

In the assessment of the feasibility aspects of graphics contains 3 indicators, namely the type of writing is easy to read, there are pictures supporting the material, the color selection is not flashy, varied, and easy to see. The results of the percentage of the average score of the material expert validation get 100% and the QR code-based pocket book of solar system material is said to be very valid and suitable for use in learning.

Validation conducted by media experts to assess the level of validity and validity of QR code-based pocket books as learning media. The aspects assessed include content feasibility with indicators of video suitability with the material. The results of the content feasibility assessment get a percentage score of 100% so that the contents of the pocket

book are considered very feasible. The second aspect is the feasibility of QR code presentation with the results of obtaining a percentage score of 100% so that the presentation of the QR code is very feasible. The third assessment aspect is the feasibility of language which has indicators of accuracy of writing and accuracy of sentences. The percentage score is 100% so that the language used in the pocket book is very feasible. The fourth aspect of assessment is the feasibility of graphics with indicators of pocket book size, cover design, and pocket book content design. The results of the acquisition of a percentage score of 100% so that the pocket book is said to be very feasible.

The average percentage score of media expert validation is 92.85% so that the QR code-based pocket book of solar system material is said to be very valid and suitable for use in learning. The suggestions and input from media experts are for the video in the solar system collection to be replaced because it cannot be opened, the instructions for use are given a link to the video tutorial for using the QR code. The test decision obtained is that the product can be used with minor revisions.

This QR code-based pocket book has functioned as a good learning media, this is in line with Untari's statement (2017: 262), namely, the functions of learning media are: (1) effectiveness and efficiency in teaching and learning activities. QR code-based pocket books can be said to be effective and efficient because they can attract students' reading interest, are easy to use, and practical because they can be carried everywhere, (2) increase student learning motivation. Based on research that has been conducted, it is proven that the QR code-based pocket book can increase student motivation in learning, (3) variations in learning methods. Learning methods that can be applied when using Pocket books are discussions, demonstrations / role playing, and exercises, (4) increase student activity in learning activities. This QR code-based pocket book is equipped with 3D images, AR, and learning videos that can encourage students to be active in digging up information.

There are 7 aspects assessed based on user validation by teachers which include product content with a percentage score of 100% with descriptors; (1) pocket book in accordance with student characters, (2) pocket book makes student activities increase and fun, (3) pocket book is appropriate when applied in the 2013 curriculum. The three descriptors are in line with Yusuf's opinion (2015: 193) that in the 2013 curriculum students need learning media designed according to the needs of the students themselves to train creative thinking in understanding the subject matter. The second aspect is product design with a percentage score of 100% so that the pocket book design is said to be very feasible. The third aspect is the usefulness of the product with a percentage score of 75% so that the product is said to be suitable for use.

Furthermore, for the feasibility aspect of the content obtained a percentage of 100% so that the contents of the pocket book are very feasible to use in learning. The presentation feasibility aspect obtained a percentage of 100% so that the presentation was said to be very feasible. The linguistic feasibility aspect obtained a percentage of 87.5% and the graphic aspect obtained a percentage of 100%. The percentage result of the teacher as a user is 95% so that the QR code-based pocket book of solar system material is said to be very valid and feasible to use in learning.

Practicality of QR Code-Based Pocket Book Media for Solar System Materials to Improve Science Literacy of Elementary School Students

The pocket book product developed and validated is also measured for the practicality of the product. The results of the practicality of the pocket book product

produced are based on the assessment of student responses. Based on small-scale trials of QR code-based pocket book products on solar system material to improve the science literacy of elementary school students conducted in class VI SDN 1 Sumbergedong with a total of 5 students who have different abilities. The results of the assessment of small-scale pocket book product trials obtained a practicality result of 100%. Referring to Sugiyono in Akbar (2015) these results can be interpreted in the value range of 86%-100% which means that it can be categorized as very practical with the test decision can be used without revision.

The large-scale trial of QR code-based pocket book products on solar system material to improve the science literacy of elementary school students was conducted in class VI SDN 1 Sumbergedong with 20 students. The results of the assessment of the large-scale pocket book product trial obtained a practicality result of 98.25%. Referring to Sugiyono in Akbar (2015) these results can be interpreted in the value range of 86%-100% which means that it can be categorized as very practical with the decision to use the test without revision. Thus, pocket book products can be used by students anytime and anywhere according to each student's solar system material. Pocket book products that are practical to use in learning increase students' learning motivation because they can learn using their respective smartphones.

Effectiveness of QR Code-Based Pocket Book Media on Solar System Materials to Improve Science Literacy of Elementary School Students

The use of QR code-based pocket books on solar system material in learning can improve the science literacy of elementary school students. This can be measured from the pretest and posttest assessments conducted with all VI grade students totaling 20 students. The results of improving the science literacy of solar system material in class VI before being given learning using pocket book media, the average pretest result was 51 with the highest score of 70 and the lowest score of 40. At the time of the posttest after being given learning using pocket book media, the average score rose to 90.5 with the highest score of 100 and the lowest score of 70. This has increased, because at the time the pretest was conducted all students got a score that was classified as low. The amount of improvement that occurs in each student is also different. This can be shown by the magnitude of the N-Gain value obtained with the lowest value of 0.5 for 1 student and the highest of 1.00 for 7 students. According to Inzana (in Pravitasari, 2015) this occurs because the potential, characteristics of social regions, and the diverse cultures of Indonesian society and students will certainly have an influence on learning aspects as well as students' science literacy skills.

The level of effectiveness of pocket book media can be known through the N-Gain Score test. This test measures the increase in science literacy before and after treatment. N-Gain Score test to determine the effectiveness of the treatment given. Based on the N-Gain Score test, the N-Gain value reached 0.8. The N-Gain value is greater than 0.7, so it is included in the high category (Sundayana, 2015). Then the N-Gain value in percentage form is 80%. In accordance with the interpretation of the effectiveness of N-Gain according to Hake in (Pangestu, et al., 2021), the pocket book media can be said to be effective because the percentage is greater than 76%. The acquisition of students' science literacy achievements before and after studying the pocket book is in Figure 3 below.

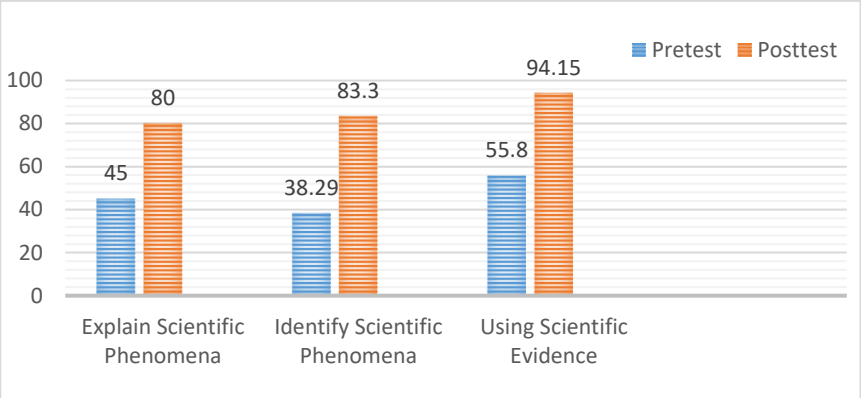

Figure 3 Students Science Literacy Achievement

Figure 3 shows students' science literacy skills in the area of scientific competence. Based on the figure, students' science literacy skills in the aspect of scientific competence showed that the highest competency indicator achieved by students in this study was the indicator of using scientific evidence, followed by the indicator of identifying scientific phenomena and the indicator of explaining scientific phenomena. The achievement of science literacy skills on the indicator of using scientific evidence received a score of 94.5%. The ability to identify scientific phenomena achieved by 83.3% was shown by students with the ability to recognize issues and key characteristics of phenomena contained in literacy question instruments that might be investigated scientifically. The competency aspect of explaining scientific phenomena achieved by 80% with a "good" achievement category is shown by the ability of students to apply the scientific knowledge they have understood in solving science literacy questions on the concept of solar system material.

This can happen because the pocket book media has been theoretically tested through validation by experts with an average result of 93.56% with very valid criteria such as in research by Puspitasari (2021) related to pocket book media on various kinds of energy sources for class VI. In addition, the pocket book media developed has also met the criteria for practicality with an average of 99.25%. Similar to research conducted by Choirina (2023) on booklet media for multiplication, division, and grade II currency material which received a positive response from students of 96% and pocket book media is said to be practical.

Latip (2015) stated that the aspects contained in the nature of science are part of the dimensions of science literacy, namely context, knowledge, and science competence. The first dimension is knowledge, the pocket book product developed can improve students' science literacy in the knowledge dimension. According to Mayer (2015), the use of a combination of text, images, and animation in interactive learning media makes it easier for students to understand the content being studied. These results are in line with research conducted by Latip (2015) that the use of a combination of text, images, and animation in learning media makes it easier for students to understand the content being studied.

The second dimension is the competency dimension, PISA assesses students' ability to answer a question and solve a problem using scientific evidence and theory (OECD, 2019). In the QR code-based pocket book, students are trained to be able to explain phenomena scientifically, solve problems based on appropriate data and evidence, and by using appropriate procedures in conducting scientific investigations. This is in line with

Mayer's (2015) research that simulations and games can help students visualize objects and processes that cannot be displayed directly.

The third dimension is the context dimension. The context dimension in the PISA assessment is framed in a broader life situation and is not limited to life at school (OECD, 2019). In the pocket book developed there are issues or problems that exist in the community. According to Gilbert (2011), using context as a direct application of the concepts learned by students makes it easier for students to understand the concepts learned.

Increased student science literacy is also obtained after understanding the learning video in the QR code which contains solar system material with examples of scientific phenomena in outer space. Not only that, there are 3D and AR images and role playing that can help students visualize concretely the various planets. The increase in science literacy is also reflected in the learning response of students who have scientific understanding and are able to answer questions about scientific phenomena regarding solar system material. This is a series of learning processes that apply science procedures that can improve science literacy. Students who are accustomed to thinking with scientific logic will have extensive scientific knowledge so that it can be used to translate questions about science easily, gain new insights, be able to explain events scientifically, and conclude everything based on facts (OECD, 2019).

From the description above, it shows that the use of pocket book media based on QR code solar system material is able to improve the science literacy of elementary school students in terms of product trials that have been carried out. The assessment of science literacy in the aspects of content, context and knowledge has been fulfilled and the results of pretest and posttest calculations get very good results. Thus, QR code-based pocket book media can be an alternative learning media that is feasible and practical to use in learning activities as an effort to improve the science literacy of elementary school students.

CONCLUSION

The development of a QR code-based pocket book gets a validity value of 93.56% very valid and feasible criteria according to the assessment by material experts, media experts, and teachers. The practicality of the QR code-based pocket book reached 98.25% with very practical criteria. The questionnaire results from students obtained the percentage of QR code-based pocket books reached 100% in small-scale trials and 98.5% in large-scale trials so that the products developed were very practical for students. Based on the effectiveness of pocket book media from the pre-test and post-test results, the N-Gain calculation results show an average value of 0.8 with an effectiveness interpretation category of 80% so that the QR code-based pocket book media is effectively used to improve the science literacy of elementary school students.

Thus the QR code-based pocket book of solar system material for grade VI SD students is very valid, very practical, and effective so that the QR code-based pocket book is suitable for use in learning. The utilization of the developed product, namely the QR code-based pocket book, can be used as a variety of teaching materials, especially in KD 3.7 and 4.7 of grade VI elementary school science content. QR code-based pocket book can be used as an independent study guide with guidance from the teacher because it utilizes a smartphone. Suggestions for further development of pocket books based on QR code this material has advantages, namely practical size, light weight, easy to carry, attractive because it is colored and there are pictures, there are activities and practice

questions, and can be used as an independent study guide besides that it can be accessed via smartphone via QR code, for that it is recommended to teachers to be able to develop QR code-based pocket books as a choice of teaching materials on other materials or on other subject content.

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