

Development of Student Worksheets (LKPD) Based on Problem Based Learning (PBL) in Mathematics Learning for Grade IV Students of Elementary School

Rastinah¹, Elya Rosalina², Sari Pertiwi³

¹ Universitas PGRI Silampari, Lubuklinggau, Indonesia; rastinaina284@gmail.com

² Universitas PGRI Silampari, Lubuklinggau, Indonesia; elyarosalina25@gmail.com

³ Universitas PGRI Silampari, Lubuklinggau, Indonesia; pertiwisari95unpari@gmail.com

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Abstract

In general, education can be interpreted as an activity to learn the knowledge, abilities, and habits of a group of people that are passed down from one generation to the next through teaching, practice, and research methods. This study aims to determine the validity, practicality, and effectiveness of the Development of Student Worksheets (LKPD) Based on Problem Based Learning (PBL) in Mathematics Learning for Fourth Grade Students of SD Negeri 2 Sukamana. Data collection techniques used were observation, interviews, and documentation. Data analysis techniques in the study were analyzed descriptively qualitatively. This study is a Research and Development (R&D) study using a 4-D development model, which consists of the stages of defining, designing, developing, and disseminating. The subjects of this study were 26 fourth grade students of SD Negeri 2 Sukamana. Data were collected using a validation questionnaire, a practicality questionnaire, and learning outcome tests in the form of pre-tests and post-tests. The results showed that the developed LKPD had a high level of validity, with a score of 0.92 from language experts, 0.86 from media experts, and 0.94 from material experts with an overall average of 0.90 which is included in the "very valid" category. Practicality by teachers showed a percentage of 96% and small group trials of 86.6%, with an overall average practicality of 91%. The pre-test results showed an average score of 40.42%, and the post-test increased to 94.46%. The N-Gain score obtained was 0.90%, which is in the "Very High" category. Based on this, it can be concluded that the development of student worksheets (LKPD) is very valid, practical, and effective for use in the learning process.

Keywords

LKPD, Mathematics, PBL-Based, SD N 2 Sukamana.



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INTRODUCTION

In general, education can be interpreted as an activity to learn the knowledge, abilities, and habits of a group of people that are passed down from one generation to the next through teaching, practice, and research methods. Rahman et al. (2022:2) explained that education is an activity that is planned with full awareness to create a learning environment and process

that allows students to activate their self-development. Learning and learning activities in elementary school are the basis of education before a person proceeds to a higher level of education. Nurmala et al. (2014:6) states that learning is A process of development and transformation in the individual that is reflected in new behaviors that arise as a result of experience and practice.

One of the learning in elementary school is mathematics. Learning mathematics at the elementary school level is often an obstacle in itself, both for teachers and students. Mathematics is a very important discipline in producing quality human resources. Badriyah, Sukanto, & Subekti (2020:11) explained that mathematics is a science that must be mastered by a person since elementary school. Kholil & Zulfiani (2020:152) adding that The Learning Process Mathematics in school aims for students to understand basic mathematical concepts, apply logic, solve mathematical problems, appreciate the usefulness of mathematics in daily life, and convey ideas using symbols, tables, and other means.

Based on the results of observations and interviews on September 15, 2025 with Mr. Muhammad Aras, S.Pd, as the homeroom teacher of grade IV (Four) and grade IV students at SD N 2 Sukamana, there was a problem. One of them is the Student Worksheet (LKPD) which only contains questions and students have a low interest in learning which is known through observation questionnaires and student needs questionnaires. The results of the needs analysis conducted at SD N 2 Sukamana show that teachers and students still use LKPD which only contains questions.

In an effort to overcome this problem, LKPD *berbasis Problem Based Learning* (PBL) is applied to the mathematics learning of elementary school students. Rusali (2023:15) stated that LKPD is a series of activities that must be carried out by students to improve their understanding in the process of developing basic skills in accordance with the indicators of learning outcomes that must be achieved. Rahayu & Budiyo (2018:257) added that LKPD functions as a learning resource consisting of task sheets, task implementation guides, and evaluations that need to be done by students. The LKPD used in this study is model-based Problem Based Learning (PBL). This is considered appropriate to be applied so that students can more easily understand mathematics learning.

Rosidah (2018:63-64) explains that problem-based learning or PBL is a A learning model that centers on authentic problems to develop students' thinking skills, so that they can construct their knowledge independently and find solutions to various problems faced. The use of the PBL model focuses on tasks related to problems, combined with an attractive design is expected to encourage student connectedness in learning. Broadly speaking, this research aims to create an attractive and model-based LKPD design Problem Based Learning (PBL) which relates a learning model that involves students in problem solving.

METHODS

The development model used in this study is the research and development model or often known *as researd and development*. Development methods (R&D) there are several types

of development models, one of the development models used is the development of 4-D (*Four D*) models. This model consists of 4 stages, namely: *Define* (define), *Design* (design), *Develop* (development), and *Disseminate* (disseminate). The following is a chart of a 4D development model that has 4 stages of development, namely:

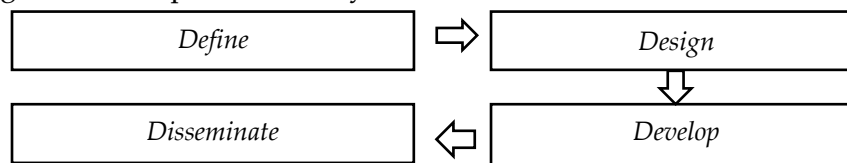


Figure 1. 4D Development Model

(Source: Slamet, 2022:18)

The definition stage is the first step to develop and determine the teaching materials that will be made by researchers. The design stage for the product to be developed by the researcher. The purpose of the design stage is to prepare the learning tools. At this stage of development, the main goal is to produce teaching materials in the form of LKPD that are valid, practical, and effective based on advice from experts. The deployment stage aims to produce a valid, practical, and effective product for many students and teachers in the learning process.

Calculate the number of scores obtained from the questionnaire using the Likert scale and determine the interpretation of the Likert scale.

To find out the value of expert validation using the following formula:

$$V = \frac{\sum s}{n(c-1)} \quad (\text{Sources: Retnawati, 2016:18})$$

Table 1 Interpretation of LKPD Validity

Correlation Coefficients	Validation Interpretation
$0.80 \leq V < 1.0$	Highly Valid
$0.60 \leq V < 0.80$	Valid
$0.40 \leq V < 0.60$	Quite Valid
$0 \leq V < 0.4$	Invalid

(Source: Lestari et al.2020:152)

The following is a formula for giving practical values for teachers and students to the Student Worksheet (LKPD) to find out the practicality value given.

$$\text{Practicality level} = \frac{\text{Jumlah Skor yang diperoleh}}{\text{Jumlah Total Skor}} \times 100\% \quad (\text{Source: Hidayat \& Irawan, 2017:132})$$

Table 2. Criteria of Practicality

Average score interval	Klasifikasi
81% - 100%	Very Practical
61% - 80%	Practical
41% - 60%	Quite Practical
21% - 40%	Less Practical
0% - 20%	Impractical

(Source: Hidayat & Irawan, 2017:33)

To calculate the value of the effectiveness of the LKPD obtained from the initial ability of the pre-test score and the final ability of the post-test using the formula:

$$N_{Gain} = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Maks - Skor\ Pretest} \quad (\text{Source: Volunteers, 2024:10})$$

Table 3. Categories of Acquisition N-Gain Score

N-Gain Value	Interpretasi
$0,70 \leq g \leq 1,00$	Very Height
$0,30 < g < 0,70$	Medium
$0,00 < g < 0,30$	Low
$g = 0,00$	There is no improvement
$-1,00 < g < 0,00$	There is a decline

(Source: Volunteer, 2024:11).

RESULTS AND DISCUSSION

Validity tests are used to measure the accuracy of instruments in research. The instrument is declared valid if r calculates $> r$ of the table at a significance level of 5% (r table $> 0,274$), so it is suitable to be used to measure the storytelling model assisted by flashcard media on the speaking skills of fourth grade students of SDN Beberan 2.

Table 4. Validity Test Results

Instruments	r count	R table	Remarks
Pretest Item 1	0,604	0,274	Valid
Pretest Item 2	0,631	0,274	Valid
Pretest Item 3	0,397	0,274	Valid
Pretest Item 4	0,553	0,274	Valid
Pretest Item 5	0,699	0,274	Valid
Posttest Item 1	0,744	0,274	Valid
Posttest Item 2	0,321	0,274	Valid
Posttest Item 3	0,549	0,274	Valid
Posttest Item 4	0,64	0,274	Valid

Posttest Item 5	0,548	0,274	Valid
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Source: SPSS 25, data processed (2026).

Based on the SPSS validity test, all pretest and posttest instrument items of speaking skills have a r count of $> r$ table (0.274), so that it is declared valid. The pretest Pearson Correlation value was in the range of 0.397–0.699 and the posttest was 0.321–0.744, so that all instruments are suitable for use in the storytelling model research assisted by flashcard media in fourth grade students of SDN Beberan 2.

Reliability Test

The reliability test is used to determine the consistency of the instrument in measuring research variables. The instrument is declared reliable if Cronbach's Alpha value > 0.60 . In this study, a reliability test was carried out to assess the consistency of the storytelling model instrument assisted by flashcard media on the speaking skills of grade IV students of SDN Beberan 2.

Table 5. Validity Test Results

Activities	Nilai Cronbach's Alpha	Kriteria Cronbach's Alpha	Remarks
Pretest	0,688	0,6	Reliabel
posttest	0,634	0,6	Reliabel

Source: SPSS 25, data processed (2026).

Based on the SPSS reliability test, the value of Cronbach's Alpha pretest was 0.688 and the posttest was 0.634 (> 0.60), so that all instruments were declared reliable and had good consistency to measure students' speaking skills in the storytelling model research assisted by flashcard media in grade IV of SDN Beberan 2.

Descriptive Statistics

Descriptive statistics were used to describe the initial condition of students' speaking skills before the application of the storytelling model assisted by flashcard media through pretest results in grade IV students of SDN Beberan 2. This analysis includes mean, minimum, maximum, median, mode, and standard deviation to see the characteristics of the student's initial ability before the learning treatment.

Table 6. Results of the Pretest Descriptive Statistical Test

Instruments	Shoes 1	Shoes 2	Shoes 3	Shoes 4
Smoothness	7	20	9	0
Pronunciation Clarity	13	14	7	2
Intonation & Expression	15	16	5	0
Story Content	14	17	5	0
Confidence	16	14	6	0
Number of Students		36		
Minimum Score		25		
Average Score		45,972222		
Maximum value		65		

Total	1655
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Source: SPSS 25, data processed (2026).

Based on the results of the descriptive statistical test in Table 3, the speaking skills of grade IV students of SDN Beberan 2 at the time of *the pretest* showed a minimum score of 25, a maximum score of 65, and a mean score of 45.97 with a total score of 1655. These results illustrate that students' initial speaking skills are still in the low category and need to be improved through the application of *a storytelling* model assisted by *flashcard media*.

Descriptive statistics were used to describe the final condition of students' speaking skills after the application of *the storytelling* model assisted by *flashcard media* through *posttest results* in grade IV students of SDN Beberan 2. This analysis includes *mean*, minimum value, maximum, median, mode, and standard deviation to see the final ability of students after the learning process.

Table 7. Results of the Pretest Descriptive Statistical Test

Instruments	Shoes 1	Shoes 2	Shoes 3	Shoes 4
Smoothness	0	0	19	17
Pronunciation Clarity	0	0	25	11
Intonation & Expression	0	0	25	11
Story Content	0	0	25	11
Confidence	0	0	24	12
Number of Students		36		
Minimum Score		75		
Average Score		83,611111		
Maximum value		100		
Total		3010		

Source: SPSS 25, data processed (2026).

Based on the results of the descriptive statistical test in Table 4, the speaking skills of grade IV students of SDN Beberan 2 in the posttest activity showed a minimum score of 75, a maximum score of 100, and a mean score of 83.61 with a total score of 3010. These results show that after the implementation of the storytelling model assisted by flashcard media, students' speaking skills have improved and are in the good to very good category.

Prerequisite Test (Normality Test)

The normality test is used to determine the distribution of data in the study. In this study, the Kolmogorov-Smirnov method was used, with the criteria of normal distribution data if the significance value > 0.05 (Ghozali, 2022).

Table 8. Results of the Kolmogorov Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardize d Residual
N		36
Normal Parametersa	Mean	.0000000

	Std. Deviation	1.18323048
Most Extreme	Absolute	.094
Differences	Positive	.094
	Negative	-.092
Test Statistic		.094
Asymp. Sig. (2-tailed)		.200c, d
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Source: SPSS 25.

Based on the SPSS Table, the significance value (Asymp. Sig. 2-tailed) was $0.200 > 0.05$, so that the research data of the storytelling model assisted by flashcard media on the speaking skills of grade IV students of SDN Beberan 2 was normally distributed and suitable for parametric analysis.

Uji Hypothesis

The paired sample t-test was used to compare the pretest and posttest scores on the same sample to determine the influence of the storytelling model assisted by flashcard media on the speaking skills of grade IV students of SDN Beberan 2. The result is declared significant if the value of Sig. (2-tailed) < 0.05 .

Table 9. Paired Sample T-Test Results

Paired Samples Test

Paired Differences		95% Confidence Interval of the Difference					Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error	Lower	Upper	
Pair 1	pretest - posttest	-7.52778	1.91961	.31994	-8.17728	-6.87827	.000

Source: SPSS 25.

Based on the results of the Paired Sample T-Test on the SPSS output, an average value (Mean Difference) of -7.52778 was obtained with a calculated t-value of -23.529. The test results showed a significance value of less than 0.05 (Sig. < 0.05), so it can be concluded that there is a significant difference between the pretest and posttest values. Thus, the application of the storytelling learning model assisted by flashcard media has an effect on improving the speaking skills of grade IV students of SDN Beberan 2.

The N-Gain Score test is used to determine the level of improvement in student learning outcomes before (pretest) and after (posttest) treatment. In this study, the N-Gain Score test

was used to measure the effectiveness of the application of the storytelling learning model assisted by flashcard media on the speaking skills of grade IV students of SDN Beberan 2. The basis for decision-making is based on the N-Gain value, where the value of > 0.7 is in the high category, the value is $0.3-0.7$ in the medium category, and the value < 0.3 is in the low category.

Table 10. N-Gain Score Test Results

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NGain	36	.03	.12	.0826	.01976
Valid N (listwise)	36				

Source: SPSS 25.

Based on the results of the N-Gain Score test, an average score of 0.0826 was obtained which showed an improvement in students' speaking skills after the application of the storytelling learning model assisted by flashcard media. These results show that the learning model applied has changed the speaking ability of grade IV students of SDN Beberan 2.

Discussion

Application of Storytelling Learning Model Assisted by Flashcard Media at SDN Beberan 2 Grade IV

The implementation of the storytelling model assisted by flashcard media was carried out in stages to improve the speaking skills of grade IV students of SDN Beberan 2. Teachers start learning with perception, motivation, delivery of learning objectives, and introduction to flashcard media that will be used in storytelling activities.

Students are divided into small groups to observe flashcards, discuss the content of the images, and put together a chain storyline. Each group then conveys the story in front of the class in turn, while the teacher acts as a facilitator and observes aspects of fluency, clarity, intonation, story content, and student confidence.

The teacher provides evaluation, feedback, and appreciation for the student's performance. Reflection is carried out together to review the learning experience that has been implemented. The application of this model creates a more active, fun learning atmosphere and increases students' courage in speaking in front of the class.

The Effectiveness of the Flashcard Media-Assisted Storytelling Learning Model

Effectiveness of learning models storytelling media-assisted flashcard in developing the speaking skills of grade IV students of SDN Beberan 2 is known through the results of Pretest and posttest. Before the treatment, students' speaking skills were still low, characterized by a lack of confidence, difficulty telling stories in sequence, and unclear intonation.

After the application of the storytelling model assisted by flashcard media, there was an improvement in speaking skills. Students are more likely to understand the storyline through the help of pictures, be more active in storytelling activities, and be more courageous in

speaking in front of the class. The results of the Kolmogorov-Smirnov test showed a significance value of $0.200 > 0.05$ so that the data was normally distributed and worthy of parametric analysis.

The results of the paired sample t-test showed a significance of $0.000 < 0.05$ which indicates a significant difference between the pretest and posttest. In addition, the N-Gain result of 0.0826 indicates an increase in the low category. Nevertheless, this model still has a positive impact on increasing the courage, activeness, and speaking ability of fourth grade students of SDN Beberan 2.

CONCLUSION

Based on the results of data analysis and discussion, the application of the storytelling learning model assisted by flashcard media has a positive influence on the speaking skills of grade IV students of SDN Beberan 2. The increase can be seen from the average pretest score of 45.97 to 83.61 in the posttest. The results of the hypothesis test showed a significance of $0.000 < 0.05$ which indicated a significant difference before and after treatment. The learning model is effective in increasing students' courage, activeness, and speaking ability.

The initial condition of students' speaking skills is still low. Students experience difficulties in fluency, pronunciation clarity, intonation, story content, and confidence. The application of the storytelling model assisted by flashcard media increased students' activities in speaking. Students are more enthusiastic, more daring to perform in front of the class, and show improvement in every aspect of their speaking skills.

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