




Improving Students' Creativity with Creative Problem-Based Learning Models

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ARTICLE INFO	ABSTRACT
<p>History Article: Received : 12 Mey 2025 Revised : 19 June 2025 Published: 29 July 2025</p> <hr/> <p>Keywords: Creative Problem Solving Problem-Based Learning Student Worksheets</p>	<p>This study aims to develop and implement Creative Problem Solving (CPS)-based Student Worksheets to improve students' creative thinking skills on fractions in fifth grade at SDN 1 Langkapura. In the context of the Independent Curriculum, teachers have the freedom to design innovative and contextual learning. However, the use of Student Worksheets or interactive media has not been widely implemented in several schools in Bandar Lampung. This study is based on the view that concrete and interactive learning media can improve student creativity more effectively than conventional methods. Data from the Ministry of Education and Culture's School Education Report Card shows a decline in literacy and numeracy skills of students at SDN 1 Langkapura in the last three years. The implementation of CPS is expected to address this problem by providing more meaningful and problem-solving-based learning. Analysis of previous research results shows that the CPS learning model can improve students' learning outcomes and creative thinking skills. This study uses an experimental approach by comparing learning outcomes between the experimental class using CPS-based Student Worksheets and the control class using conventional learning methods. The research method used is the ADDIE model development research. The research results are expected to contribute to improving the quality of learning in elementary schools and inspire the application of the CPS method in various educational contexts.</p>
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INTRODUCTION

The 21st century is synonymous with technological development (Eva *et al.* , 2020). One of the rapidly developing technologies is internet-based information and communication technology, which is a key component of the 4.0 industrial revolution (Prihatmojo and Badawi, 2020). Changes in the 4.0 era pose a challenge for education in Indonesia, which must adapt to meet these demands (Amaliyah, 2021; Onde et al., 2020) . Improving the quality of learning is essential to prepare students for the rapid advancement of science and technology (Fajri, 2017; Septikasari and Frasandy, 2018). 21st-century learning reflects an ideal learning process that prepares students to face the realities of the future filled with advances in science and technology (Fajri, 2017). Schools as catalysts of change are required to teach creative thinking skills , critical thinking and *problem solving* , communication , and collaboration *or* what is commonly called the 4Cs which are part of high-level skills as learning in the 21st century (Septikasari and Frasandy, 2018; Prihatmojo and Badawi, 2020). One of the abilities that need to be improved to support students' abilities in facing competition in the 4.0 era is the ability to think creatively.

Creative thinking is included in high- *order competencies* and can be considered a further development of basic competencies (Mursidik and Samsiyah, 2015). Educational goals can be achieved if teachers are able to teach creative thinking skills to students during the learning process (Ati and Setiawan, 2020;). The demand for *high-order competencies* in the form of creative thinking skills in education is realized through the Independent Curriculum policy (Handayani et al., 2023) . The Independent Curriculum gives teachers the freedom to design learning and teaching materials so that students can learn comfortably, focusing on developing student competencies and exploring creative potential, so teachers must have competencies in learning development, teaching modules, student worksheets and interactive learning media.

The learning process with teaching modules, student worksheets, and interactive media can help students improve their creativity, because the use of teaching modules, student worksheets, and interactive media provides meaningful learning and is based on contextual problem solving (Sari & Noer, 2017). The results of previous research explain that media based on *creative problem solving* can improve students' creative thinking patterns (Van Hooijdonk et al., 2023). Through the implementation of *Creative Problem Solving-based learning*, students are able to develop their creativity without limits as a learning achievement (Fitri et al., 2020). Learning Outcomes in Phase C require students to be able to identify, analyze, present, analyze, and construct the material obtained in the learning process. However, the learning outcomes of Phase C that should be achieved have not been fully mastered by students.

Data from the Ministry of Education and Culture's School Education Report for SDN 1 Langkapura shows that over the past three years, students' literacy and numeracy skills have declined. At the national level, the level reached 56.67% in 2022. However, in 2023, it decreased significantly to 29.42%, resulting in a lower-middle average of less than 40%. This indicates that students have not been able to solve numeracy problems effectively . Previous research has defined creative thinking as a fairly reflective and productive mindset that involves evidence as evaluation material (Andriani, 2021). According to Yuliana, creative thinking also involves analyzing a problem or idea in a clearer and more specific way, selecting, identifying, and testing something to form an argument or answer (Yuliana, 2023).

Based on the results of a literature study, *the Creative Problem Solving model* is not just an alternative method, but a relevant approach to adapting mathematics education to the demands of the times (Putri and Miharja, 2023) . Through the application of the *Creative Problem Solving (CPS)* learning model, student activity in learning increases and can improve student learning outcomes, especially students' mathematical creative thinking abilities (Prawiyogi et al., 2019) .

Based on the problems above, after the researcher conducted a literature study to obtain alternative solutions, it was found that; 1) Creative Problem Solving learning model shows significant

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effectiveness in improving students' critical and creative thinking skills, 2) This model helps them in developing analytical, evaluation, and complex problem-solving skills that are relevant to everyday life. In addition, this model also strengthens teamwork and communication between students, which are important competencies in Phase C Learning Outcomes, 3) Implementation of this model allows students to understand the subject matter better, but also be able to apply their knowledge in a broader context, thus preparing them for future challenges.

The results of the previous research analysis also showed a difference between the average learning outcomes of the experimental class and the average learning outcomes of the control class, which showed that the creative thinking abilities of students taught with the problem-solving model were better than the creative thinking abilities of students taught with the direct learning model (Suna et al., 2022) . So in this study, the researcher wants to provide a solution to the problems faced by implementing student worksheets based on *Creative Problem Solving* to improve students' creative thinking abilities, especially in fraction material in grade V of SDN 1 Langkapura.

METHOD

This research is the development of Student Worksheets based on *Creative Problem Solving* to optimize creative thinking skills. Development data was collected through observation, interviews, and tests. The research subjects consisted of 30 fifth-grade students of SDN 1 Langkapura. The resulting product in this study is a student worksheets based on Creative Problem Solving which aims to improve creative thinking skills. The creative thinking indicators used in this study refer to Guilford (fluency, flexibility, originality, and elaboration) (Susilawati et al., 2020). The development research design used is the ADDIE model.

1. *analysis* stage at this stage involves analyzing existing problems in the field and the needs of students and educators (Spatioti et al., 2022) . It is necessary to conduct theoretical studies or examine concepts related to the Student Worksheet, such as analyzing Learning Outcomes so that they can be broken down into appropriate Learning Objective Flows in the human digestive system material. Performance analysis, performance of the use of teaching materials such as Student Worksheets used in learning, and analysis of facts, concepts, principles and learning procedure materials as well as the relationship between the syntax of the PBL model and indicators of creative thinking are adjusted (Cahyadi, 2019) . The analysis stage is considered very important, because it serves as a reference point or foundation for determining the next steps (Apriliani & Radia, 2020).
2. *design* stage , this study uses Student Worksheets as teaching materials for the human digestive system to improve students' creative thinking skills. Furthermore, previous research consistently shows that learning using PBL-based Student Worksheets can effectively improve students' creative thinking skills. To prevent passive learning attitudes and attract students' interest, this study implements a problem-based learning model, so that in core activities students will have an important role in the continuity of the learning process (Najwa Nurfajriah et al., 2023) . The teaching materials designed are Student Worksheets, so activities include collecting the necessary materials such as human digestive system materials from various sources, relevant images and supporting images, relevant audio or video, and determining software for designing Student Worksheets (Tegeh & Kirna, 2013) .
3. *development* stage in developing a product naturally involves expert validation (*judgment expectation*) . The development of this student worksheets involved nine validators (three material expert validators, three media expert validators, and three language expert validators). The assessment results from the nine validators will be analyzed using Aiken (1985) as a validity test data analysis. The goal is to achieve an understanding between validators but from a more objective perspective (Yuh-Tyng Chen, 2012) . Therefore, the formula used is:

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$$V = \frac{\sum_{i=1}^n S_n}{n(c-1)}$$

The level of validity can be determined based on table 1, namely the range of the Aiken index scale, in measuring agreement between validators (Aiken, 1985) .

Table 1. Interpretation of Validity Index Values

Aiken Index Scale Range	Information
$V > 0.84$	Very Valid
$V > 0.68 - 0.84$	Valid
$V > 0.52 - 0.68$	Quite Valid
$V > 0.36 - 0.52$	Less Valid
$V \leq 0.36$	Invalid

- Implementation stage, to implement the results of this student worksheets will be tested on fifth grade students at MIN 2 West Lampung. Implementation is carried out on a control class of 15 students. The results will go through a practical test analysis of the prototype that students and educators have used. The results of this practicality test can demonstrate the practicality of using the PBL-based student worksheets model, using the mean formula. This assessment uses a *Likert scale calculation* , the results of the calculation can determine the feasibility category according to table 2 (Purwanto, 2013) .

Table 2. Feasibility Categories Based on Practicality Assessment

Eligibility Scale	Category
80%, $x \leq 100\%$	Very good
60%, $x \leq 80\%$	Good
40%, $x \leq 60\%$	Enough
20%, $x \leq 40\%$	Not enough
0%, $x \leq 20\%$	Very less

- The evaluation stage, as a follow-up to the implementation activities, is to see the success of the development of the PBL-based student worksheets model in improving students' creative thinking skills (Astuti et al., 2018) . Not only the advantages will be used as evaluation results, but any shortcomings will improve this student worksheets product. Analysis of product effectiveness test data requires providing pre-test and post-test questions to students (Samboteng et al., 2023) . The results will be used as a reference in determining the improvement or progress experienced by students in their creative thinking skills when using the student worksheets, so the formula used is:

$$g = \frac{Skor\ Posttest - Skor\ Pretest}{100 - Skor\ Pretest}$$

The value obtained will be adjusted to the N-gain category, the criteria for which are explained in Table 3 (Ningsih et al., 2022) .

Table 3. N-gain criteria

Gain Increase Criteria	Normalized Score
g-Height	$g \geq 0.7$
g-Medium	$0.7 > g \geq 0.3$

RESULTS AND DISCUSSION

Analyze

In the analysis stage, the researcher conducted a needs analysis to identify problems and determine appropriate solutions. The needs analysis conducted on March 7, 2024, found that the creative thinking skills of fifth-grade students at SDN 1 Langkapura were classified as low. This finding was based on the results of a pretest given to 30 students, with 4 students falling into the moderate category and 26 students falling into the low category. The results of the categorization of student pretest scores can be seen in Table 4.

Table 4. Pretest Result Data

No	Category	Number of Students
1	Very high	0
2	Tall	0
3	Currently	4
4	Low	26
Total		30



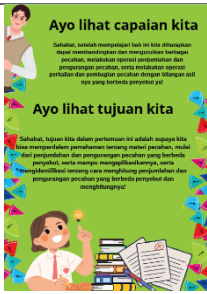
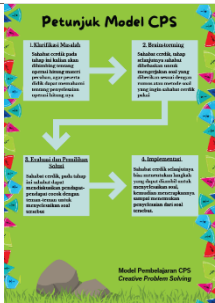

The results of observations conducted during the implementation of learning in the classroom found that teachers in implementing learning only used textbooks as teaching materials and used the lecture method as a learning method. In learning activities, there were 12 students who seemed unenthusiastic in participating in learning, this was based on the 12 students who seemed engrossed in their own activities or disturbed their other friends. 6 students looked less enthusiastic because they looked bored and put their heads on the table or looked out through the window.



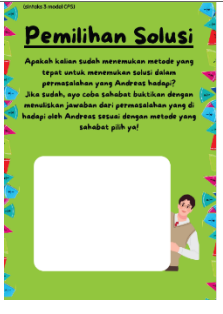

Observations of school facilities and infrastructure revealed that the only materials available in the library were textbooks, varying from two different publishers but using the same presentation techniques. Based on this preliminary analysis, the researchers decided to create a Creative Problem Solving-based Student Worksheet for fractions.

Design

The second stage in the ADDIE research design is design. At this stage, the researcher formulates the outline of the student worksheet design. Based on the needs analysis, the learning model used to solve the problem is the Creative Problem Solving (CPS) model. The student worksheet is structured based on the syntax of the CPS model.

Table 5. Storyboard of Discovery Learning -Based Science Student Worksheet

No	Sub Section	Appearance	Information
1	Cover		The cover is a picture of the opening of the student worksheets with illustrations regarding the material, in this cover section it contains the basis of the Creative Problem Solving (CPS) learning model, the title of the material intended for grade V elementary school students,
			The second page contains the identity of group members, class, day/date of the learning implementation.
2	Learning Outcomes and Learning Objectives		Learning outcomes are learning competencies that students must achieve at each stage of development and are abilities acquired through internalizing knowledge, attitudes, skills, competencies, and accumulated work experience. Learning objectives are statements that explain what will be achieved.
3	Instructions for implementing the CPS model		The CPS model instructions are instructions for implementing learning based on the creative problem solving model.
	Instructions for Using student worksheets		Study instructions are instructions for using student worksheets

4	<i>Creative Problem Solving Syntax</i> Problem Clarification		At the problem clarification stage, students are given a question to identify and analyze.
5	<i>Creative Problem Solving Syntax</i> Brainstorming		At the brainstorming stage, students are asked to discuss in each group to choose the right method to solve the problem.
6	<i>Creative Problem Solving Syntax</i> Solution Selection		At the solution selection stage, students determine the appropriate method to solve the problem.
7	<i>Creative Problem Solving Syntax</i> Implementation		At this stage, students implement the methods that have been discussed previously.

Development

In the development stage, the CPS-based Student Worksheet design outlined in *the Storyboard* is created in the form of a Student Worksheet. Next, the student worksheets is developed based on the previously created design to obtain the initial student worksheets product to be developed. This stage has the following steps. First, collecting sources or references, where researchers collect sources for material based on the learning outcomes of the Independent Curriculum according to the material to be developed. Second, writing the student worksheets, at this stage the researcher begins writing the student worksheets according to the student worksheets outline planned in the design stage. The development and layout of the student worksheets were carried out using the *Canva for Education application*. Third, the preparation of instruments consisting of a material expert questionnaire, a media expert questionnaire, and a language expert questionnaire. The material expert, media expert,

and language expert questionnaires were used for the purpose of validating the student worksheets before the student worksheets was tested on students.

Product validation is conducted after the developed product is completed. Product validation itself is conducted with the aim of ensuring that the developed product receives assessment and input from experts. Input from material experts, media experts, and language experts is used as a reference for improving the CPS-based student worksheets. Input from material experts relates to the sequence of concepts to be more aligned with the curriculum and indicators, including solution strategies, and the need to provide freedom to students at the beginning of discussions regarding problems in the student worksheets. The student worksheets that has been created is validated by experts and teachers. The elaboration carried out at the development stage is as follows:

The Creative Problem Solving (CPS)-based student worksheets has undergone three stages of validation by a team of experts. The validations included material validation, presentation validation, and validation of the CPS along with indicators of creative thinking skills. Aiken's V validity was used to calculate the expert validation analysis, and then the results were interpreted.

In the material expert validation, there are four indicators: curriculum, content, presentation, and implementation. The results of the material expert validation are shown in the following table:

Table 6. Material validation results

Rated aspect	<i>Aiken's</i> Number	<i>Aiken's</i> coefficient criteria
Curriculum	0.9375	Very Valid
Contents	0.8333	Very Valid
Presentation	0.9107	Very Valid
Implementation	0.9583	Very Valid
Average	0.9100	Very Valid

Source: (Research, 2024)

Based on table 3, it was found that the results of the validation test by the material expert team obtained an average value of 0.9100 which is included in the category > 0.84 and is considered very valid. Therefore, it can be concluded that the CPS-based student worksheets for grade V Elementary School with fraction material is declared very valid in terms of material. The curriculum aspect received a score of 0.9375 and is included in the very valid category, the content feasibility aspect received a score of 0.833 and is included in the valid category, the presentation aspect entered the very valid category with a score of 0.9107 and the implementation aspect received a score of 0.9583 with a very valid category. These findings show that the CPS-based student worksheets was developed in accordance with the content of the material and meets all CPS syntax and includes indicators of creative thinking skills. Table 7 shows the results of the media component validation.

Table 7. Media validation results

Rated aspect	<i>Aiken's</i> Number	<i>Aiken's</i> coefficient criteria
Device	0.8438	Very Valid
Visual	0.9444	Very Valid
Communication		
Media	0.9375	Very Valid
Characteristics		
Average	0.9086	Very Valid

Source: (Research, 2024)

Table 4 shows the results of the media expert validation, which obtained an average score of 0.9086 with high criteria and can be considered very valid. In the media expert validation, there are three focus aspects: devices, visual communication, and media characteristics. In the device aspect, the average score was 0.8438 and is categorized as very valid. The average score for the visual communication aspect was 0.9444 with a very valid category, while the media characteristics aspect received an average score of 0.9375 and is categorized as very valid. Furthermore, the results of the language validation analysis can be seen in Table 8.

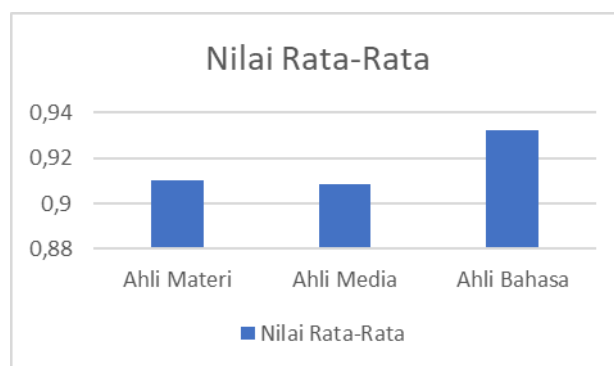
Table 8. Language validation results

Rated aspect	<i>Aiken's</i> Number	<i>Aiken's</i> coefficient criteria
Straightforwardness	0.9167	Very Valid
Linguistics	0.9375	Very Valid
Conformity to student development	0.9375	Very Valid
Use of Terms and Symbols	0.9375	Very Valid
Average	0.9323	Very Valid

Source: (Research, 2024)

Table 8 explains that the language validation results obtained an average value of 0.9323 and are very valid. The average value was obtained from the straightforwardness aspect which obtained an average value of 0.9167 with a very valid category, the linguistic aspect obtained an average value of 0.9375 with a very valid category, the aspect of suitability with student development obtained an average value of 0.9375 with a very valid category, and the aspect of the use of terms and symbols obtained an average value of 0.9375 with a very valid category. Overall, the results of the expert validity test can be seen in diagram 1.

Diagram 1 Holistic Value of Expert Validity Test



Based on the average value obtained from the validation of media, material and language experts, it can be concluded that the validity of the CPS-based student worksheets is very valid for use in learning.

Implementation

In the implementation stage, the researcher tested the student worksheets on a fifth-grade class of SDN 1 Langkapura with 30 students. The implementation of learning using the CPS-based student worksheets was carried out in four meetings with a duration of 2 x 35 minutes. Learning using the DOI article: <https://doi.org/10.23960/joae.v3i2.1245>.

CPS-based student worksheets was carried out on May 7 and 8 and May 15 and 16, 2020. The following are photos of the learning implementation.



Figure 2. Implementation of learning in class



Figure 3. Implementation of Learning in Class

After the learning process, the researcher administered a posttest to the students to measure the creative thinking skills of fifth-grade students at SDN 1 Langkapura. The following is a comparison of the pretest and posttest scores.

Table 9. Pretest and Posttest Results

Criteria	Pretest	Post Test
Very high	0	5
Tall	0	21
Currently	6	4
Low	24	0

The table above shows that only 6 students scored in the medium pretest, while 24 students scored in the low pretest. After the CPS-based worksheets were implemented and the posttest was conducted, significant improvements were observed. Five students scored in the very high pretest, 21 in the high pretest, and five in the medium pretest. Zero students scored in the low pretest.

There was also an increase in the average student scores. The pretest average was only 51.47, but the posttest average score increased significantly to 84.50.

A t-test was conducted to determine the extent of the difference between the pretest scores of students who had not been given treatment in the form of using CPS-based student worksheets and the posttest scores of students who had been given treatment in the form of using CPS-based student worksheets. The results of the t-test can be seen in the following table.

Table 10 t-Test Results

		Paired Differences							
		Mean	Standard Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre_Test	-	-						
	Post_Test	33.033	4.24657	.77531	-34.61903	31.447	42,6	29	.000
		33				64	06		

Based on the data in the table above, it is known that the sig. (2-tailed) value is $0.000 < 0.05$, so H_0 is rejected and H_a is accepted. So it can be concluded that there is an average difference between the pretest and posttest scores of students, which means that there is an effect of using CPS-based student worksheets in improving the creative thinking skills of fifth-grade students of SDN 1 Langkapura in 2023. The table above also shows the mean paired differences value of -33.033. This value shows the difference in the average pretest and posttest scores of students.

To determine the effectiveness of using CPS-based student worksheets, NGain measurements were conducted. The NGain data are presented in the following table.

Table 11. Results of Effectiveness Test

	N	Minimum	Maximum	Mean	Standard Deviation
Gain	30	.49	.87	.6908	.10265
Valid N (listwise)	30				

From the data above, the NGain value is 0.6908 and is included in the moderate category, so it can be concluded that the use of CPS-based student worksheets is quite effective in improving the creative thinking skills of fifth-grade students of SDN 1 Langkapura. This CPS-based student worksheets contains all indicators of creative thinking skills such as fluency, flexibility, originality, elaboration. All indicators of creative thinking skills are linked to the CPS syntax so that the purpose of making the Science student worksheets is achieved.

Evaluation

Data obtained during the development phase showed that the CPS-based Student Worksheet demonstrated very high validity, allowing it to be implemented in learning activities. During the implementation phase, learning activities were carried out using the CPS-based student worksheets. There was an increase in the overall average score. This increase in the average score was due to the use of the CPS-based student worksheets.

CONCLUSION

The results of this study indicate that the use of CPS-based Student Worksheets has a positive effect on improving creative thinking skills. Students become more active in learning, fulfilling all indicators of creative thinking skills such as fluency, flexibility, originality, and elaboration. In addition, during the learning process, students also learn to work together in groups and communicate. The application of the CPS model also motivates students to be more active in learning and helps them develop social skills and thinking skills. Thus, it can be concluded that the use of CPS-based Student Worksheets has the potential to improve the quality of learning and students' creative thinking skills.

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