

The Validity of the Learning Media Design Based on Creative Problem Solving (CPS) Model

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Abstract—This study aims to produce learning media in the form of RPP (Lesson Plan) and LKPD (Student worksheet) based on Creative Problem Solving (CPS) model. RPP is one of the learning media that must be prepared by a teacher before starting learning activities. While, LKPD is a learning media that can help students learn. This is a design research. Whereas, the model employed was *Plomp* model. Learning media were validated by 5 validators. Data from the validation sheet were analyzed using a quantitative analysis. From the analysis, it was found that the RPP developed based on CPS model was valid with average of 3.44, and the LKPD developed based on CPS model was valid with average of 3.39 in terms of presentation and feasibility of contents, 3 in terms of graphic, and 3.8 in terms of linguistics.

Keywords—learning media, CPS model, validity, design research

I. INTRODUCTION

RPP is one of the learning media that must be prepared by a teacher before starting learning activities. According to [1] RPP is prepared based on the basic competencies that have been established in the curriculum. LKPD is also a learning media that can help students learn. According to [2] LKPD are sheets containing tasks that must be done by students. Based on the results of interviews with a mathematics teacher at Babussalam Junior High School, she has used books and LKPD as learning resources, but the teacher uses LKPD only for a few materials. This condition does not seem enough to provide supports for students' to develop their mathematics skills, especially problem solving. Whereas, problem solving skill is an important activity in mathematics teaching [3]. Besides, [4] states that problem solving is an integral part of mathematics learning so that it cannot be separated from mathematics learning. Moreover, [5] shows that the achievement of Indonesian students on mathematics is much lower than other countries. For these reasons, researcher proposes learning media (LKPD and RPP) that are based on the Creative Problem Solving (CPS) model as a solution that can be used to overcome students' difficulty on problem solving. CPS model is a learning model that focuses on teaching and problem solving skills, which is followed by strengthening creativity. [6] also states in their study that teaching using CPS can help to improve students 'problem solving abilities and improve students' positive attitudes toward learning. Furthermore, other studies conducted by [7], [8], [9], [10] and [11] states that CPS not only deals 2nd Dr. Edwin Musdi, M.Pd Mathematic Education Department Universitas Negeri Padang Padang, Indonesia Win_musdi@yahoo.co.id

with students' problem solving skill but also deals with students motivation, interest, teamwork, creativity, optimism, and respect.

The steps of CPS model based on criteria of OFPISA Osborn-Parnes model are objective finding, fact finding, problem finding, idea finding, solution finding, acceptance finding [12]. In general, according to [13] CPS learning procedures are problem clarification, opinion disclosure, evaluation and selection, and implementation. This study follows the procedures of Pepkin.

Validity in development research is seen from two aspects, namely content validity and construct validity. "content validity is a need for intervention (the learning media made), and the design is based on existing scientific knowledge". While, construct validity (consistency) is "the design of the intervention (learning media) in accordance with the logic / the right reasons"

The validity aspects of teaching materials based on [14] Components for content feasibility that include conformity with core competency and basic competency, conformity with children's development, conformity with teaching material requirements, truth of the substance of learning materials; 2) Language components which include readability, clarity of information, conformity with the rules of Indonesian language, the use of effective and efficient language (clear and concise); 3) Components of presentation that include clarity of objectives (indicators) to be achieved, order of offerings, motivation, attractiveness; and 4) Graphical components which include the use of fonts; type and size, lay out or layout, illustration, image, photo, and display design.

The development of learning media in the form of Lesson Plans, aspects that will be validated are aspects of the lesson plan components. The first component is content validity (fulfilling the elements that must exist in a lesson plan such as school data, subjects, classes / semesters, subject matter, time allocation, learning objectives, competencies and indicators of achievement of competencies, learning materials, learning methods, media and learning tools and sources, steps in learning and assessment activities). The second component is construct validity which concerns to aspects of learning activities that are in accordance with the steps of the Creative Problem Solving model (clarification of the problem, disclosure of opinion, evaluation and selection and implementation), and aspects of language. Whereas for learning media in the form of students' worksheet, the aspects validated are aspects of the presentation of students' worksheet based on the steps of the Creative Problem Solving model, the appropriateness of the contents of the students' worksheet on material designed, graphics or appearance, and language.

II. METHOD

This research is a design research. The development model used in this study was adopted from the Plomp model. The Plomp model consists of three phases, namely the initial investigation phase (preliminary research), the development or prototype phase (development or prototyping phase), and the assessment phase (assessment phase) [15]. Learning media are validated by 5 validators. The experts who became validators came from 3 areas of expertise, namely mathematics education, educational technology and language. Research data were collected by using validation sheets. Data from the validation sheets will be analyzed using quantitative analysis. The validation results of the validators on all aspects assessed will be presented in form of tables. The analysis was carried out using a Likert Scale. Steps taken to determine the validity of the device based on data obtained from the validation sheet are:

- Validators gave a score for each scale on the validation sheet as follows: TABLE 1.
 Score 4 = strongly agree
 Score 3 = agree
 Score 2 = disagree
 Score 1 = strongly disagree
- 2) The value was determined by using the following formula:

$$R = \frac{\sum_{i=1, j=1}^{i=m, j=n} V_{ij}}{mn}$$

Annotation:

R = average of the scoring results from the experts V = Scoring results of the experts to-j toward the criteria to-i

n =the number of experts

m = the number of criteria

The criteria for obtaining the validity level of the media can be seen in Table 1.

TABLE 1. VALIDITY CRITERIA OF LEARNING MEDIA

Scoring average	Interpretation
R > 3.20	Strongly Valid
2.4-0 < R ≤ 3.20	Valid
$1.60 \le R \le 2.40$	Less Valid
$1 < R \leq 1.60$	Not Valid

Based on the validity criteria of the mathematics learning media on Table 1, it can be concluded that the learning media will be valid if the average obtained is > 2.40.

III. RESULT AND DISCUSSION

The process of designing learning media was started by making the prototype of students' worksheets and lesson plans. After Self-evaluation and the revisions were made, the prototype was believed to be good as expected. Then, the validity of the prototype 1 mathematics learning media was tested with the following stages:

- 1. Requesting the availability of lecturers / expert to become validators of mathematics learning media to be developed. The experts who became the validator of learning devices were five people consisting of three mathematical education experts, one linguist and one expert of educational technology. Three people in mathematics education experts were chosen to strengthen the validation results.
- 2. Requesting validator's consideration of the feasibility of the mathematics learning media that had been made. Suggestions and considerations requested are in accordance with the expertise of each validator.
- 3. Conducting an analysis of the validation results of the mathematics learning media from the validators. Validation results from the validator can be classified into three possibilities, namely:
 - a. If the validation results show valid and feasible without any revision, then the prototype 1 of the mathematics learning media is ready to be tested in the field.
 - b. If the validation results show valid and feasible to use with minor revisions, then a small revision is made of the prototype 1 of the mathematics learning device. The revised prototype 1 is called the prototype 2 and is ready to be tested in the field.
 - c. If the validation results show invalid and inappropriate, a major revision is made. The results of prototype 1 revision must be revalidated by the validator.

After the learning media were given to the validators, some suggestions from the validator were obtained. The suggestions and revisions done can be seen in Table 2 below.

TABLE 2. VALIDATOR SUGGESTIONS AND REVISIONS OF LESSON PLAN

Suggestions	Before Revision	After Revision
Learning objectives are arranged in ABCD	Learning objectives have not been compiled	Learning objectives have been prepared in ABCD
(audience, behavior, condition, degree)	in ABCD	
Add apperception	No apperception	Apperception has been added
Write down the motivational sentences given to	Not yet written the motivational sentences	Motivational sentences for students have been added
students.	given to students.	
Write the CPS model learning procedure	Not yet written the CPS model learning	The learning procedure with the CPS model has been
	procedure	written
At the core activity there is no sentence the	There is still a sentence the teacher explains	The teacher's sentence explains the learning material
teacher explains the learning material	the learning material	has been omitted
In the closing activity gave PR students	In the closing activity there was no written	In the closing activity it was written that the teacher
	that the teacher gave PR students	gave PR students
In the closing activity, replace the sentence	In the closing activity, it says "conveying the	The sentence "conveying the plan" has been changed
"convey the plan" by "learning the next	plan".	to "studying the next material".
material".		

TABLE 3. VALIDATOR AND REVISED LKDP SUGGESTIONS

Suggestions	Suggestions Before Revision After Revision	
Describe the steps of the CPS in LKPD	There is no description of the steps of CPS in	Overview of the steps of CPS in LKPD has been
	LKPD	added
Space needs to be fixed	There is an error in the space	The space has been fixed
Change the color of the students 'worksheets and	There is a color error for the writing of	The writing of student and based worksheets has been
based on the cover.	students' worksheets	replaced with color

After the revisions were made, the learning media were re-given to the validators to be scored. Then, the scores from the validators were analyzed to see whether the learning media were valid or not. Based on data analysis, analysis of RPP sheet validation results with Creative Problem Solving (CPS) model validated by four validators can be seen in Table 4.

TABLE 4. ANALYSIS OF LESSON PLAN SHEET VALIDATION RESULTS WITH CPS MODEL
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No	Aspects assessed	Average	Category
1	The RPP component is prepared in accordance with the requirements of a correct RPP.	3,75	Strongly valid
2	The order of the RPP components is correct.	3,25	Strongly valid
3	The RPP identity is written in full including school identity, subject identity, class, semester, subject matter, time allocation.	3,25	Strongly valid
4	Indicators of achievement of competencies are in accordance with core competencies and basic competencies.	3,75	Strongly valid
5	Learning objectives are formulated clearly and in accordance with indicators of achievement of competencies.	3,25	Strongly valid
6	Teaching material is in accordance with the learning objectives to be achieved.	3,5	Strongly valid
7	The quantity of subject matter is adjusted to the students' abilities and time allocation.	3	Valid
8	Models, approaches, learning methods chosen in accordance with the characteristics of the material and learning objectives.	3,75	Strongly valid
9	The activities of teachers and students in preliminary activities, core activities and closing activities are followed by time allocation to facilitate teachers in carrying out learning activities.	3,25	Strongly valid
10	Teacher activities are appropriate to encourage students to clarify problems	3,5	Strongly valid
11	Teacher activities are appropriate to encourage students to express opinions	3,25	Strongly valid
12	Teacher activities are appropriate to encourage students to evaluate and choose	3,25	Strongly valid
13	Teacher activities are right to encourage students to implement	3,75	Strongly valid
14	Learning steps facilitate the use of LKPD with the CPS model.	3,5	Strongly valid
15	Learning resources are used in accordance with the subject matter and support the implementation of learning with the CPS model	3	Valid
16	Assessment instruments are in accordance with indicators of achievement of competencies.	3,75	Strongly valid
17	The language used is easily understood by the teacher.	3,75	Strongly valid
18	The steps of learning in RPP are more oriented to students so as to facilitate students to improve problem-solving skills	3,5	Strongly valid
	Average	3,44	Strongly valid

Based on criteria validity in Table 4, the overall lesson plans developed were very valid with an total average of 3.44. The highest average score on each point was 3.75 with strongly valid category and the lowest average score on each point was 3 with valid category. Thus, it can be concluded that RPP based on the Creative Problem Solving (CPS) model has been valid. Then, Analysis of Learning Media validation results in aspects of presentation and content appropriateness, appearance or graphics, and linguistics can be seen in Tables 5, 6, 7. In aspect of presentation and content appropriateness, there were three mathematics experts as the validators. Graphic aspect was validated by an



educational technology expert. Linguistic aspect was

validated by a linguist

TABLE 5. ANALYSIS OF LKPD VALIDATION RESULTS FOR PRESENTATION AND CONTENT APPROPRIATENESS

No	Assessed aspects	Average	Category
Present	ation		
1	LKPD presents material systematically.	3,67	Strongly valid
2	Questions in LKPD facilitate students to think and provide guidance.	3,33	Strongly valid
3	The problem given is a matter of everyday life so that students are interested in learning it.	3	Valid
4	LKPD guides students to construct their own knowledge.	3,33	Strongly valid
5	Teacher activities are appropriate to encourage students to clarify problems	3,67	Strongly valid
6	Teacher activities are appropriate to encourage students to express opinions	3	Valid
7	Teacher activities are appropriate to encourage students to evaluate and choose	3,67	Strongly valid
8	Teacher activities are right to encourage students to implement	3,33	Strongly valid
Content Appropriateness			
1	The material on LKPD refers to the 2013 curriculum.	3,67	Strongly valid
2	The problems and exercises presented in the LKPD are in accordance with KI and KD.	3	Valid
2	The problems and exercises provided are sufficient to achieve the indicators of achievement of	2.67	Strongly valid
3	competencies that have been established.	5,07	Strongry value
4	Problems and exercises that are given are logical and correct based on mathematics.	3,33	Strongly valid
	Average	3,39	a
			Strongly valid

TABLE 6. ANALYSIS OF LKPD VALIDATION RESULT FOR GRAPHICS ASPECT

No	Assessed Aspect	Score	Category
1	The cover design is made in such a way with attractive color combinations that represent the contents of the LKPD.	3	Valid
2	The type of letters used in LKPD is easy to read, and has a proportional size.	3	Valid
3	The layout of LKPD contents is appropriate and interesting.	3	Valid
4	The images presented in LKPD are clear, interesting, and in accordance with the problems presented.	3	Valid
5	The use of colors in LKPD is not striking.	3	Valid
6	The title and parts that require emphasis are bolded in attractive colors.	3	Valid
7	The overall LKPD display design is interesting.	3	Valid
	Average	3	Valid

TABLE 7. ANALYSIS OF LKPD VALIDATION RESULT FOR LINGUISTIC ASPECT

No	Assessed Aspect	Score	Category
1	This type of writing is easy to read and precise	4	Strongly valid
2	The sentence used has punctuation	3	Valid
3	Sentences used are in accordance with PUEBI	4	Strongly valid
4	The method of writing mathematical terms, symbols and equations is appropriate	4	Strongly valid
5	The language used is clear so it does not cause multiple interpretations	4	Strongly valid
	Average	3,8	Strongly valid

Based on Table 5, the overall developed learning media is categorized very valid for the aspect of presentation and feasibility of contents with an average of 3.39. The highest average score is 3.67 with category of strongly valid, while the lowest score is 3 with category valid.

Based on Table 6, the overall developed learning media is valid for graphic aspects with an average of 3. Each point in this aspect got score 3 from the validator. Based on Table 7, the overall developed learning media is strongly valid for linguistic aspects with an average of 3.8. The highest score is 4 with strongly valid category, while the lowest score is 3 with valid category.Thus, it can be concluded that the LKPD developed based on Creative Problem Solving (CPS) has been valid.

IV. CONCLUSION

Based on the results, it can be concluded that the learning media developed in the form of RPP and LKPD based on the Creative Problem Solving (CPS) model are valid. The validity of the learning media is obtained from the results of the validation sheet analysis. Those can later be used to teach mathematic and increase students' problem solving skill.

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