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Development of Problem-Based Learning Devices to Facilitate the Mathematical Problem-Solving Skills of Class IX SMP/MTs Student

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ABSTRACT

Aware of the importance of the role and function of mathematics, the quality of mathematics learning needs serious attention to achieve the goals set. Mathematical problem-solving skills are important abilities that students must possess to solve a problem. Currently, the Mathematical Problem Solving Ability (KPMM) of students in Indonesia is relatively low. The cause of the low KPMM students is that students only memorize the formulas the teacher gives without understanding the systematic concepts in implementing learning. Another thing is that students have not been able to do questions different from the teacher's example questions. KPMM can be developed by implementing learning, namely by allowing students to solve problems related to daily life. Problem-Based Learning (PBL) was chosen as a learning innovation to facilitate KPMM. In its implementation, PBL needs to be supported by good mathematics learning tools. Therefore, this study aims to develop mathematics learning tools in the form of Silbus, Learning Implementation Plan (RPP), and Student Activity Sheet (LAS) using the PBL model to facilitate KPMM for grade IX junior high school / MTs students who are valid and practical. The development model used is the 4-D model.

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INTRODUCTION

Mathematics is a science closely related to everyday life, so many problems in everyday life require mathematical skills. Solving mathematical problems is one of the important mathematical abilities that students have. This is in line with Branca's statement [1], namely: (1) mathematical solving ability is a general goal of teaching mathematics even as the heart of mathematics; (2) problem-solving is a basic ability in learning mathematics. This shows that through problem-solving, students are accustomed to and have more meaningful thinking abilities and can make strategies for solving further problems.

The low Mathematical Problem Solving Ability (KPMM) of students in Indonesia can be seen from the results of the PISA (Program for International Student Assessment), which decreased from 2015 to 2018. In 2015, Indonesia obtained an average score of 386 and experienced a decrease in score in 2018 by obtaining an average score of 379 from an international score of 489.

Other facts related to KPMM, namely from the results of a study [2] on 20 students of MTs Negeri 3 Kuantan Singingi on flat shape material where only two students could solve mathematical problems in the high category while four students were in a good category, four students with low category and ten students with very low category. The reason is that students are not accustomed to

working on problem-solving questions, and students only memorize formulas without understanding the concept of the material. Another study [3] initially tested students' mathematical problem-solving abilities on set material. The test was conducted on 40 students of SMP Negeri 9 Pekanbaru. From the pre-test given, it can be seen that students' mathematical problem-solving abilities are still relatively low. The low results of this test are caused by students who are not used to working on problem-solving questions, and the teaching and learning process does not link learning with everyday life. This observation is appropriate to the research, which states that the students who take integral calculus, it was found that the students are still experiencing an error in solving the problems given [4].

Associated with the low KPMM of students [5] suggests the cause is that students tend to only memorize the given formula without understanding it. In addition, [6] reveals that one of the causes of low mathematical problem-solving ability is that students have not been able to work on problems different from the sample questions given by the teacher, and some students cannot understand questions in the form of story problems properly. Students' problem-solving abilities can be developed through the learning process, by providing opportunities for students to solve problems related to everyday life [7].

The Problem-Based Learning (PBL) model is a learning model that emphasizes real problems in students' daily lives and can develop mathematical problem-solving abilities. PBL was chosen as an innovative learning model based on and driven by several opinions, namely: (1) the PBL model is one of the learning models that can be used to improve mathematical problem-solving skills and independent learning [8]; (2) students can facilitate the success of problem-solving, communication, group work, and also good interpersonal skills [9]; (3) the PBL model focuses students on being active, not just passively paying attention to the lessons from the teacher; and (4) students can express their thoughts, exchange opinions, and work together in groups [10].

Based on research by [11] and [12], students' attitudes toward the mathematics learning process with the PBL model had a good interpretation. The teaching and learning process with the PBL model enables students to develop knowledge and solve problems by having students discuss with their group mates.

The advantages of the Problem-Based Learning (PBL) model [13] are: (1) students experience ease in understanding the content of the lesson by applying the PBL model; (2) students will feel increasingly challenged and will later provide their satisfaction for students who have used the PBL model in the learning process; (3) student activity in learning with the PBL model will increase; (4) students' sense of responsibility will increase, and students' new knowledge will develop related to learning carried out with the PBL model; (5) the learning process with the PBL model is considered more fun and popular with students; (6) students' critical thinking skills develop and students can adapt to new abilities obtained from the learning process; (7) later students will be able to apply the knowledge gained to everyday life; and (8) students' interest in learning will be more developed and increased through the learning process with the PBL model.

[14] The characteristics or characteristics of the Problem-Based Learning model include: (1) the application of contextual learning; (2) the problems presented in learning are required to be able to motivate student learning; (3) integrity learning, namely the learning process is motivated by unlimited problems; (4) in the learning process students are actively involved; (5) there is a cooperation between students; (6) students have various experiences, skills, and various concepts. [15] PBL consists of five phases: phase 1 of student orientation to problems, phase 2 of organizing students for learning, phase

3 of guiding individual or group experiences, phase 4 of developing and presenting work, and phase 5 of analyzing and evaluating the solution process problem.

One of the materials related to contextual problems in everyday life is similarity and congruence. The results of learning mathematics on similarity and congruence material at MTs N 5 Demak class IX are still low, of which 34 students, only six complete and the remaining 28 do not [16]. This is because, in the implementation of learning, the teacher tends to use the lecture method, in which students become less actively involved in learning. Students also believe that mathematics is difficult because it relates to abstract ideas, even though students' perceptions of the subject matter will contribute to academic achievement [17].

For PBL to be implemented properly, it needs to be supported by good mathematics learning tools. His research stated that Rokan Hulu Middle School teachers still had difficulty developing learning tools by the 2013 curriculum and did not understand selecting appropriate learning models [18]. There are deficiencies in the learning tools that the teacher uses, namely, (1) the discrepancy in learning time in lesson plans in the learning process; (2) the teacher only gives practice questions in the textbook and does not use LAS [19]. In terms of teaching materials, teaching materials used in schools are still mostly focused on conceptual understanding [20]. According to Nieveen and Van den Akker, learning tools developed need to consider criteria and quality [21]. This is because well-developed learning tools such as worksheets can also facilitate various abilities, one of which is the ability to solve problems [22]. Learning devices are said to be of high quality if they meet the criteria, namely validity, practicality, and effectiveness.

Based on the facts described, the researcher developed a learning tool, namely the syllabus, lesson plan, and LAS on Congeniality and Congruence material for class IX SMP/MTs, using the PBL model to facilitate students' mathematical problem-solving abilities. For the development of the device to be used well, the learning device must be valid and practical. Therefore, researchers conducted research with the title "Development of Problem-Based Learning Devices to Facilitate Mathematical Problem-Solving Ability of Class IX Students of SMP/MTs".

METHODS

The type of research being carried out in development research, with a 4-D development model: (1) the defining stage, which consists of five stages, namely initial and final analysis, student analysis, concept analysis, task analysis, and formulation of learning objectives; (2) the design stage which consists of 3 stages namely media selection, format selection, initial design; (3) the development stage, the activities carried out include product validation and group trials; (4) the stage of dissemination (disseminate).

The form of data in this study is qualitative and quantitative. Qualitative data were obtained from suggestions and comments in the form of input from supervisors, expert lecturers (validators), and students. In qualitative data the instruments used by researchers to retrieve this qualitative data were validation sheets and student response questionnaires. This validation sheet is used to assess the suitability of the developed device with the 2013 curriculum, while the student response questionnaire is used to assess the suitability of LAS with student abilities. Comments and suggestions obtained from supervising lecturers, expert lecturers, and students will be analyzed to serve as a reference in improving the learning tools developed.

Quantitative data was obtained from the average value on the validation sheet for learning tools that were expert lecturers (validators) and scores obtained from student response questionnaires using LAS. The instrument used by the researcher to retrieve this quantitative data was a validation sheet

in the form of scores given by three expert lecturers (validators) and student response questionnaires in the form of scores given by six students of class IX SMP/MTs.

The following formula is the data analysis technique for assessing the validation sheet researchers use.

$$\bar{M}_v = \frac{\sum_{i=1}^{n} \bar{V}_i}{n}$$

Information:

$\bar{M}_v$= average total validity

$\bar{V}_i$= average validator

n = the number of validators

The criteria for the device validity can be seen in Table 1 below.

Table 1. Learning Devices Validity Criteria

Interval	Category
$3{,}25 \leq \bar{M}_v \leq 4$	Very Valid
$2{,}50 \leq \bar{M}_v < 3{,}25$	Valid
$1{,}75 \leq \bar{M}_v < 2{,}50$	Valid Less
$1{,}00 \leq \bar{M}_v < 1{,}75$	Invalid

Learning devices can be considered valid if they get more than or equal to 2.50. The data analysis technique from the student response questionnaire used by researchers is the following formula.

$$\bar{T}_p = \frac{\sum_{i=1}^{n} \bar{P}_i}{n}$$

(adapted from [23])

$\bar{T}_p$= average total practicality

$\bar{P}_i$ = the average practical score of students to i

n= the number of respondents

The criteria for the practicality level of LAS are presented in Table 2 below

Table 2. Student Response Questionnaire Criteria

Interval	Category
$3{,}25 \leq \bar{T}_p \leq 4{,}00$	Very practical
$2{,}50 \leq \bar{T}_p < 3{,}25$	Practical
$1{,}75 \leq \bar{T}_p < 2{,}50$	Less Practical
$1{,}00 \leq \bar{T}_p < 1{,}75$	Impractical

LAS can be practical if it gets a value of more than or equal to 2.50.

RESULTS AND DISCUSSION

This research is on developing learning tools, namely syllabus, lesson plans, and LAS. This study aimed to determine the validity of the syllabus, lesson plans, and LAS, as well as the practicality of LAS based on Problem-Based Learning (PBL) on congruence and congruence material for class IX SMP/MTs. The researcher uses the 4-D design, which consists of 4 stages: definition, design, development, and dissemination.

1. Define

The define stage is carried out by analyzing the needs of a learning device development. This stage consists of five steps, namely 1) initial-end analysis, the researcher conducts literature studies and interviews with teachers at schools and obtains the results which serve as the basis for this research by developing learning tools in the form of syllabus, lesson plans, and LAS using the PBL model by the curriculum 2013 so that students can actively learn in honing students' mathematical problem-solving skills; 2) student analysis, the researcher conducted an analysis related to the characteristics of class IX junior high school students during the learning process. The results obtained are that the PBL model is a learning model that can help students construct their own knowledge 3) concept analysis, the researcher analyzes by examining the order in which the material is presented in mathematics student books for class IX SMP/MTs curriculum 2013 published by the 2018 revision of the Ministry of Education and Culture on material congruence and congruence referring to KD 3.6 and 4.6. The researcher divides the materials on congruence and congruence into four meetings: congruence of shapes, congruence of triangles, congruence of shapes, and congruence of triangles. ; 4) task analysis, the researcher determines Competency Achievement Indicators (GPA) on congruence and congruence material based on KD that has been determined according to the 2013 curriculum; 5) specification of learning objectives, this stage of specification of learning objectives is the stage where the researcher describes the learning objectives that are by KD and GPA from congruence and congruence material.

2. Design

The design stage aims to design learning tools: syllabus, lesson plans, and LAS. The activities carried out at this stage are 1) the selection of media, the media that researchers choose in this study are print media in the form of learning tools in book form; 2) the selection of formats and components contained in the syllabus and lesson plan format refer to Permendikbud Number 22 of 2016. The learning activities use the PBL model phases, and the LAS format contains the cover page of the LAS and the contents of the LAS, which are adapted to the PBL model; and 3) initial design, in this activity the researcher develops learning tools in the form of a syllabus, lesson plans, and LAS according to a predetermined format.

The following is an example of the product design the researchers developed in the form of a device cover display in Figure 1 and the table of contents in Figure 2 of the products the researchers developed.

Figure 1. Learning Device Cover Display

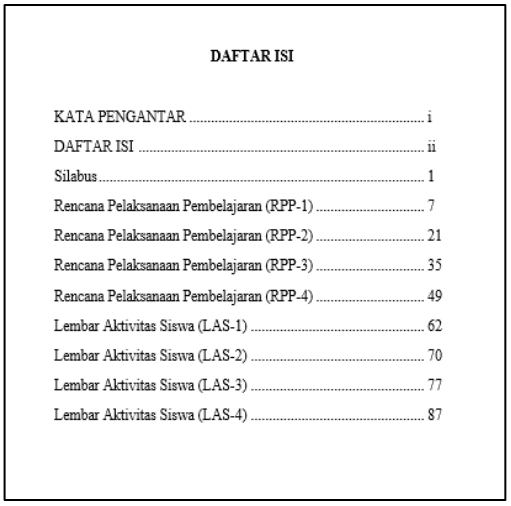

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Figure 2. Display of Learning Devices Table of Contents

3. Develop

In the development stage, the researchers carried out product validation, revision, and LAS trials. The learning tools, namely the syllabus, lesson plans, and LAS, which the supervising lecturers have approved, are continued to the validation stage by three validators consisting of three lecturers in Mathematics Education at the University of Riau. The syllabus validation results obtained can be seen in Table 3.

Table 3. Syllabus Validation Results

Assessment Component	Validator Average			Average Score	Criteria
	1	2	3		
Completeness of Syllabus Identity	4,00	4,00	4,00	4,00	Very Valid
Completeness of Syllabus Components	4,00	4,00	4,00	4,00	Very Valid
KD and IPK suitability and learning materials	3,00	3,67	3,67	3,44	Very Valid
Compatibility of Learning Steps with PBL Models and Scientific Approaches	3,33	3,33	4,00	3,56	Very Valid
Assessment of Learning Outcomes	3,25	3,25	4,00	3,50	Very Valid
Time Allocation	3,00	3,67	4,00	3,56	Very Valid
Learning Resources	4,00	4,00	3,00	3,67	Very Valid
Language	4,00	3,50	3,50	3,67	Very Valid
Average Score	3,67	3,73	3,82	3,74	Very Valid

The average validation score obtained based on table 3 is 3.74, with very valid criteria so that the trial can be continued with revisions according to the validator's suggestions. In several aspects, there are suggestions and comments from the validator for improvement or revision of the syllabus. The following are suggestions from the validator and revisions to the syllabus.

1. In the syllabus identity section, the validator suggests using the appropriate multiplication symbol in the "Time Allocation" section.
2. In the KD section and the writing learning material is not by Indonesian language rules, where the words are cut off
3. The validator suggests making one page for one material to make it clearer and tidier.

Furthermore, the RPP validation result data can be seen in Table 4.

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Table 4. RPP Validation Results

Assessment Component	Validator average to			Average Score	Criteria
	1	2	3		
RPP Identity	4,00	4,00	4,00	4,00	Very Valid
Completeness of RPP Components	4,00	4,00	4,00	4,00	Very Valid
Clarification of the IPK Formula	3,44	3,67	3,44	3,44	Very Valid
Clarity of the Formulation of Learning Objectives	3,42	3,33	3,25	3,31	Very Valid
Formulation of Learning Materials	3,60	3,67	3,33	3,57	Very Valid
Suitability of Media, Tools, Materials, and Learning Resources	3,06	3,00	2,95	3,02	Valid
Conformity of Learning Steps with the PBL Model	3,63	3,79	3,71	3,66	Very Valid
Assessment of Learning Outcomes	3,13	3,00	2,93	3,00	Valid
Language	3,67	3,56	3,44	3,61	Very Valid
Average Score	3,60	3,64	3,55	3,59	Very Valid

The average score obtained from the validator based on table 4 is 3.59, with very valid criteria so that a trial can be carried out with revisions according to the suggestions. The following are suggestions from the validator and revisions to the RPP.

1. The validator suggests correcting the identity of the lesson plan because there are errors in typing and errors in the semester.
2. The validator suggests that the learning objectives listed in the lesson plan complete the Degree formulation
3. In the facts section of the learning material, the validator suggests correcting it because the facts are unclear.
4. The validator suggests improving the procedure where the procedure made is not by the true meaning of the procedure.
5. The validator suggests that the skills assessment instrument section clearly shows KPMM with a clear score for each KPMM step.
6. In RPP 4, the validator suggests replacing the procedure. Because the procedure that the researcher used was not suitable for application to class IX students of SMP/MTs.

Furthermore, the data from the LAS validation results can be seen in table 5.

Table 5. Questionnaire Results of Student Responses to LAS in Small Group Trials

Assessment Component	Average validator			Average score	Criteria
	1	2	3		
LAS Components	4,00	4,00	4,00	4,00	Very Valid
Appropriateness of Learning Materials	3,60	3,45	4,00	3,65	Very Valid
Quality of Learning Activities	3,00	3,38	3,83	3,40	Very Valid
Compatibility of KPMM Process with PBL Model	3,05	3,60	3,60	3,41	Very Valid
Compatibility with Didactic Requirements	3,00	3,30	3,35	3,21	Valid
Compliance with Construction Requirements	4,00	3,40	3,90	3,76	Very Valid
Compliance with Technical Requirements	3,19	3,30	3,25	3,24	Very Valid
Average score	3,40	3,49	3,70	3,52	Very Valid

The average validation score from the validator based on table 5 is 3.52, with very valid criteria so that a trial can be carried out with revisions according to the suggestions. The following are comments and suggestions from validators regarding the LAS that researchers developed.

1. On the LAS cover display, there are supporting images. The validator suggests adjusting the supporting images with the learning material. If not, more is not accompanied by supporting images
2. In the "Problem Orientation" phase, the researcher accompanied the KPMM step, namely "Understanding the Problem" the validator suggested that the KPMM step be placed in the "Organizing Student Learning" phase.
3. The validator suggests fixing the problem image on LAS-1 because there is an incorrect location of the number on the image contained in the problem.

Furthermore, the LAS that had been validated was carried out in a small group trial of 6 students with heterogeneous academic abilities. This trial was conducted to determine the ease of use of LAS. The data on the results of the student response questionnaire can be seen in Table 6 below.

Table 6. Questionnaire Results of Student Responses to LAS in Small Group Trials

Assessment Aspects	Average LAS to				Average score	Practical Category
	1	2	3	4		
LAS Display	3,45	3,52	3,48	3,48	3,48	Very Practical
Fill in the Material on LAS	3,50	3,50	3,50	3,47	3,50	Very Practical
Ease of Use LAS	3,67	3,67	3,61	3,56	3,57	Very Practical
Average Score	3,56	3,56	3,53	3,50	3,52	Very Practical

The average score obtained based on the results of the student response questionnaire in table 6 is 3.52 in the very practical category.

4. Disseminate

In the dissemination stage, researchers implement the revised product to the results seminar stage to determine the effectiveness of the product being developed and published in a journal.

This research is development research that aims to produce a product. The development research referred to here is to develop a syllabus, Learning Implementation Plan (RPP), and Student Activity Sheets (LAS) based on the Problem-Based Learning (PBL) model on congruence and congruence material. Class IX SMP / MTs. The model that is applied to the learning device that is applied is the PBL model, a scientific approach that contains problem-solving steps. This development research aims to produce a valid product that fulfills practical requirements. The researcher uses the development model by Thiagarajan [24], namely the 4-D development model, which consists of four stages: define, design, develop and disseminate.

At the define stage, the activities that the researcher carried out were to determine the initial problems encountered. Developing learning tools like syllabus, lesson plans, and LAS was necessary. In this study, researchers interviewed mathematics teachers at SMP Negeri 1 Sungai Apit and SMP Negeri 4 Sungai Apit. The results that the researchers got from this activity were that the teacher made the device only to fulfill the report requirements that had to be submitted to the school at the beginning of the semester, the teacher only occasionally used LAS because of time constraints in making LAS for each meeting, and based on the results of the syllabus analysis it was found that the syllabus made by the teacher does not contain all components according to Permendikbud No. 22 of 2016. The teacher's syllabus only contains school identity, classes, core competencies, basic competencies, and learning activities.

The development of learning tools considers students' characteristics, namely as a reference in designing learning tools that researchers will develop. The intellectual abilities of each individual are different. This is what researchers consider to develop mathematics learning tools using appropriate learning models so that students can use them with different abilities and understandings. The Problem-Based Learning (PBL) model is a learning model that can help students construct their knowledge and develop independence and abilities of the students themselves. Then the researcher conducted a concept analysis to detail and compiled relevant concepts related to the material being developed, formulate Competency Achievement Indicators (GPA), determine the tasks students carry out, and formulate learning objectives.

At the design stage, the activities carried out by the researcher were to choose the media to be used in this study in the form of printed media (printout) in the form of syllabus, lesson plans, and LAS. The researcher also designed the learning device's initial design (syllabus, lesson plan, and LAS) based on the previously selected format. The syllabus preparation format is guided by Permendikbud No. 22 of 2016 concerning process standards, RPP, and LAS formats adapted to the PBL phase and scientific approach and contain steps for solving mathematical problems and LAS fulfilling didactic, construction, and technical requirements. The researcher designed a learning device consisting of four meetings with the scope of the material being: (1) flat shape congruence; (2) triangular congruence; (3) congruence of plane shapes; and (4) triangle congruence.

The development stage of the activities carried out is validation. In this study, the validation was carried out by three validators, namely three mathematics education lecturers at the University of Riau. Researchers revised the device according to suggestions and input from the three validators. The average validation score given by the validator for the syllabus meets all aspects of the assessment according to Permendikbud No. 22 of 2016. This can be seen from the score obtained from the validation analysis results of the three validators on the syllabus achieving an average score of 3.74 with very valid criteria. Based on the results of the syllabus validation, it can be concluded that the syllabus meets valid aspects and is feasible to be tested with several improvements according to the validator's suggestions. The average syllabus validation score of the three validators for each aspect, namely in the aspect of the completeness of the syllabus components, the score obtained is 4.00. This indicates that the identity and components of the syllabus are complete and by Permendikbud No. 22 of 2016. The aspect of conformity of KD with IPK and learning materials obtained a score of 3.44, meaning that active verbs in the IPK contain active verbs that can be measured and are appropriate to the learning material. The aspect of suitability of the learning steps with the PBL model and the scientific approach obtained a score of 3.56, meaning that the learning steps are by the PBL model and the scientific approach. The aspect of learning outcomes assessment obtained a score of 3.50, which means that the assessment is by the GPA. The aspect of the time allocation score obtained is 3.56, meaning that the time allocation written on the syllabus is by the learning material and learning activities. Aspects of learning resources obtained a score of 3.67 means that the learning resources used are by the learning material. The language aspect obtained a score of 3.67, meaning that the language used in the syllabus is clear and does not contain double meanings.

RPP validation is carried out in the same way as the syllabus. The average score that the validator gives is based on the 2013 curriculum and is adapted to the PBL model, a scientific approach, and contains steps for solving mathematical problems that must meet the minimum valid category. The results of the validation analysis of the three validators for lesson plans achieved an average score of 3.59 with very valid criteria. The results show that lesson plans are worth testing during learning

by revising them in advance according to the suggestions given by the validator. Regarding the completeness of the RPP components, an average score of 4.00 is obtained with a very valid category. The completeness of the RPP components obtained a score of 3.98. The clarity aspect of the GPA formulation obtained a score of 3.47, indicating that the use of active verbs in the GPA already contains active verbs that are precise and measurable by the learning material. The clarity aspect of the formulation of learning objectives obtained a score of 3.31, meaning that the learning objectives were formulated by the GPA and learning materials and used ABCD (Audience, Behavior, Condition, and Degree). Still, the validator suggested clarifying the Degree in the formulation of learning objectives. The aspect of learning material formulation obtained a score of 3.62, meaning that the learning material is by KD and contains facts, concepts, principles, and procedures as recommended in Permendikbud No. 22 of 2016. The suitability aspect of media, tools, materials, and learning resources obtained a score of 3.07. The suitability aspect of the PBL model-based learning component obtained a score of 3.62, indicating that the learning carried out already consists of preliminary, core, and closing activities and is by the scientific approach and the PBL model. The evaluation aspect of learning outcomes obtained 3.03, indicating that the assessment instrument technique is by the GPA. The language aspect obtained a score of 3.61, indicating the language used in the lesson plan is easy to understand and does not have multiple meanings.

The average LAS score obtained from three validators is 3.52, with very valid criteria. Based on the validation results, it was concluded that LAS is feasible to be tested in the learning process by making revisions to improvements first. The LAS component aspect obtained a score of 4.00, meaning that the LAS components contained in the LAS are complete. The suitability aspect of the learning material obtained a score of 3.62, meaning that the learning material is by KD and GPA. Aspects of the quality of learning activities obtained a score of 3.40 means that learning in LAS helps students to achieve learning goals. The process suitability aspect of students' mathematical problem-solving abilities with the PBL model obtained a score of 3.37, meaning that the steps in the LAS already contain the PBL model and mathematical problem-solving abilities. The aspects of suitability with the didactic, construction, and technical requirements obtained scores were 3.32, 3.76, and 3.25, respectively.

They were overall based on the results of validation by the validator on learning tools (syllabus, lesson plans, and LAS) mathematics on congruence and congruence material based on the PBL model to facilitate the mathematical problem-solving abilities of class IX students of SMP/MT's that have met the valid category. The validator stated that the learning tools (syllabus, lesson plans, and LAS) were worth testing with revisions according to the suggestions.

Valid learning devices must also meet other criteria. This is in line with the opinion [25] that learning devices can be of high quality if they meet three criteria: valid, practical, and effective. In this research, only the validity aspect by the validator and practicality would be assessed through small group trials. The subjects for the small group trial consisted of 6 students of grade IX at SMP/MT's with heterogeneous abilities. Large group trials were not carried out in this study, considering the learning process in schools was still limited. The average score obtained in the student response questionnaire was 3.33, with very practical criteria, and met the requirements for trial activities by the lesson plans. Several suggestions and comments on the student response questionnaire stated that the LAS that the researchers developed helped them learn congruence and congruence material and was easy to understand. The LAS display aspect obtained a score of 3.35 in the very practical category,

the content aspect of the LAS obtained a score of 3.26 in the very practical category, and the ease of use aspect of the LAS obtained a score of 3.45 in the very practical category.

Based on the description of the results of the validation of the syllabus, lesson plans, and LAS, as well as the results of the questionnaire on student responses to the implementation of LAS mathematics on congruence and congruence material, it can be concluded that the syllabus, lesson plans and LAS that the researchers developed met the criteria of being very valid and very practical for use in learning.[21] Learning devices that meet valid and practical criteria can be used in learning. Next is the Dissemination stage, namely the use of learning tools packaged and developed on a wider scale in schools.

The product that researchers have developed has advantages and disadvantages. The advantages of this product include that it can be used as an alternative learning device that teachers use in the implementation of learning, and this learning device is a learning device that has been tested valid and practical. In addition, the drawback is that researchers only developed this product on congruence and congruence materials. In developing the device, the researcher only tested the level of validity and practicality of the device, not to test effectiveness of the device.

CONCLUSIONS AND SUGGESTIONS

The results of this research are in the form of a product, namely learning tools consisting of the syllabus, lesson plans, and LAS on materials on congruence and congruence for class IX SMP/MTs based on PBL to facilitate KPMM. The model chosen by researchers in this development research is the 4D model, which consists of define, design, develop, and disseminate stages. This learning device was validated by three validators and has been tested valid and continued to the trial stage to determine the learning device's practicality. The trial was carried out on 6 class IX students of SMP Al-Fityah Pekanbaru so that it was obtained that the learning tools developed by the researchers were tested valid and practical.

Some recommendations that researchers can give related to this research to develop learning tools are as follows.

1. The product of this research can be used as an alternative learning device (syllabus, lesson plan, and LAS) that teachers can use in implementing learning because this tool has been tested valid and practical.
2. In this study, the researchers limited the mathematics learning tools developed, namely the syllabus, lesson plans, and LAS based on the Problem-Based Learning model on congruence and congruence material to facilitate students' mathematical problem-solving abilities. Researchers recommend being able to develop tools for learning mathematics at other materials and levels.
3. In this study, researchers only measured the validity and practicality aspects of the device. The researcher suggests that further researchers be able to measure the effectiveness of the developed learning tools to determine the product's quality on students' problem-solving abilities.

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