International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Development of Learning Devices for Powers and Root Forms based on Problem Based Learning Models with a Scientific Approach in Class IX

Genri R. I. Damasar[1], Philoteus E. A. Tuerah[2], Santje M. Salajang[3]

[1, 2, 3]Master of Mathematics Education Study Program, Postgraduate Program, Manado State University

[1]genridamasarmath2013[at]gmail.com,
[2]pheatuerah[at]unima.ac.id,
[3]santjesalajang[at]unima.ac.id

Abstract: ***This article presents the application of one of the procedures for developing learning tools on the material of Powers and Root Forms and presents the results of developing tools that meet the criteria of being valid, practical and effective. The learning tool about powers and roots that was developed was based on the Problem Based Learning model using a scientific approach for class IX students and was carried out at SMP Negeri 2 Tahuna. The learning device development procedure used in this study was adapted from the development design model developed by Thiagarajan and Semmel (1974) which consisted of 4 stages, namely define, design, develop and desseminate which was adapted by eliminating the 4th stage. After passing the 3 (three) stages of development and 2 (two) rounds of validation and testing, the learning materials for Powers and Root Forms for Class IX students were obtained that met the valid, practical and effective criteria.***

Keywords: Problem Based Learning models, learning tools, development procedures, valid, practical and effective criteria

1. Preliminary

In learning mathematics, teachers and students are required to be active and must be supported by the availability of good teaching materials and media. In practice, teachers face formidable challenges to become facilitators as well as motivators for their students in solving problem solving problems (Sugiman, 2015). The teacher's obstacle in preparing lesson plans is to determine the teacher's learning strategy, which must adapt to the characteristics of different students and look for various learning methods so that students can better understand the material being taught (Fathurrahman, et al, 2020).According to the results of observations at SMP Negeri 2 Tahuna, information was obtained that some mathematics teachers had not been able to make learning tools using the PBL learning model independently, especially in making Student Worksheets (LKS). Some teachers at SMP Negeri 2 Tahuna only use learning tools such as lesson plans obtained from friends and the internet. The lesson plans used for Power and Root Forms only use a Scientific approach without being combined with any learning model. This shows the creativity and skills of the teachers in compiling and developing learning tools that are still problematic. The impact of the existence of this teacher is the process and learning outcomes of students' mathematics which are generally classified as low.

In fact, compiling learning tools is a professional task for teachers in the category of pedagogic competence. This article describes the process and results of developing mathematics learning tools that can be used as a reference for mathematics teachers in teaching power and root forms at the junior high school level. The problem that is answered is how teachers are able to plan learning activities that are oriented towards independence and student achievement.One learning approach that can facilitate this is learning with the Scientific Approach which consists of five steps including observing, asking, trying, reasoning, and communicating (Hosnan, 2014). The scientific approach is an approach designed in such a way that students actively construct concepts, laws or principles through the stages of observing (to identify or find problems), formulating problems, proposing or formulating hypotheses, collecting data with various techniques, analyzing data, drawing conclusions. and communicate the "found" concept, law or principle (Hosnan, 2014).Vhurumuku & Mokeleche (Dudu, 2014) stated that "*...conceptions of the nature of scientific inquiry are an individual's ideas, beliefs, understandings, and assumptions about the scientific process; what scientist do; and how scientific knowledge is developed and validated ....*" This statement means that learning with a scientific approach is a process of understanding and finding an idea scientifically, which is what scientists do in finding and developing a valid science. According to Hosnan (2014), the objectives of the scientific approach are, (1) to improve intellectual abilities, especially students' higher-order thinking skills, (2) to form students' ability to solve a problem systematically, (3) to create learning conditions where students feel that learning is a learning process. is a necessity, (4) obtaining high learning outcomes, (5) to train students in communicating their ideas. especially in writing scientific articles, (6) developing students' character.

According to Permendikbud Number 103 of 2014, the steps for learning with a scientific approach are as follows. (1). Observing: Activities in observing can be in the form of reading, listening, listening, seeing. Requires attention when observing an object/reading an article/listening to an explanation, notes are made about the observed, (2) Questioning: Asking is making and asking questions about information that is not understood from what is observed or questions to get additional information what observed (starting from factual questions to hypothetical questions), (3) Gathering information/ experiments: Collecting information can be done in the form of activities such as conducting experiments, reading sources other than textbooks, observing objects/events, interviews with resource persons, (4) Associating/processing information: Processing information that has been collected properly limited from the results of experimental activities as well as the results of observing and gathering information. Processing of information collected from those that add breadth and depth to processing information that is seeking solutions from various sources that have different opinions to conflicting ones, (5) Communicating: Communicating in the form of activities to convey the results of observations, conclusions based on the results of oral analysis , written, or other media.

Minister of Education and Culture Regulation No. 22 of 2006 states that one of the goals of mathematics is to understand mathematical concepts and be able to apply these concepts. One way that can be done to achieve this goal is to provide problems with interesting contexts, fun situations, and utilize brain abilities (Berson, et al, 1998). The appropriate learning model is Problem Based Learning (PBL), namely learning that uses problems as a focus for problem solving skills, materials and self-regulation (Eggen & Kauchak, 2012).PBL presents students with authentic and meaningful problem situations, which can serve as *stepping stones* for investigative and investigative activities. PBL is designed to help students develop critical thinking skills through investigation and collaboration by solving problems that are close to students' daily lives and activities carried out at the beginning of learning as well as problem solving skills or solving problems, and becoming independent learners (Tan, 2003), Arends, 2007, Boud, 2010, and Barrett, 2011)

PBL Learning Model with a Scientific Approach

Problem Based Learning (PBL) model is a learning model that uses problems as a first step to gain new knowledge, has the following syntax.

Table 1: Syntax of Problem Based Learning Model

Stage	Teacher Activities	Student Activities
Stage 1. student orientation to the problem	The teacher explains the learning objectives, explains the necessary needs and motivates students to be involved in the problem solving activities they choose	Students take an inventory and prepare the needs needed in the learning process. Students are in a predetermined group
Stage 2. Organizing students to learn	The teacher helps students define and organize learning tasks related to the problem	Students load the definition of the problem to be studied
Stage 3. Guiding individual and group investigations	The teacher encourages students to collect appropriate information, to get explanations and problem solving	Students conduct inquiries, investigations, and ask questions to get answers to the problems they face
Stage 4. Develop and present the work	The teacher helps students in planning and preparing reports and helps students for various assignments in their groups	Students compile reports in groups and present them in front of the class and discuss
Stage 5. Analyze and evaluate the problem solving process	Teachers help students to reflect or evaluate their investigations and the processes they use	Students take tests and submit assignments as material for evaluating the learning process

(Musdalifah, 2014)

In Permendikbud (2013), it is stated that the 2013 curriculum emphasizes the modern pedagogic dimension in learning, namely using a scientific approach. The scientific approach includes observing, asking, reasoning, trying, forming networks. Forming a network consists of three steps, namely: concluding, presenting, and communicating.

From the explanation above, it can be concluded that the scientific approach with the PBL model is a learning in which students work on scientifically authentic problems with the intention of actively compiling their own knowledge and giving meaning to the information and events experienced.

The steps for combining the PBL model with the Scientific approach are as follows: (1) The stages of student orientation on the problem include observing, asking and reasoning activities. At this stage students are given a problem and asked to observe it. After students observe the problem, it is hoped that it will raise a question for students and students can make sense of a concept from the problem given by the teacher. In addition, students are expected to be motivated by themselves and arouse curiosity. (2) Stages of organizing students to learn: At this stage, the teacher organizes students to learn by forming study groups. At this stage there is no scientific approach activity because the teacher only organizes students to learn. (3) At the stage of guiding individual and group investigations, there are trying and reasoning activities: At this stage, students conduct experiments or problem solving and reasoning on the experiments carried out. The teacher is tasked with guiding experiments or problem solving by correcting incorrect concepts.(4) At the stage of developing and presenting the results of the work there are activities to conclude: At this stage, students are required to make the work of the problem. In this study, students were asked to make a report from the results of trying it. Because implementation in networking mathematics lessons can be interpreted as concluding, in this study, it is in the form of reports and presentations in class about the results of learning in groups. (5) Stages of analyzing and evaluating the problem-solving process: At this stage, there is no scientific approach because the teacher evaluates the problem-solving process completed by students. Then, the teacher will conclude the learning material.

Developed Learning Tools

Learning tools are a number of materials, tools, media, instructions and guidelines that will be used in the learning process (Suhadi, 2007). Learning tools needed in managing the teaching and learning process can be in the form of: syllabus, Learning Implementation Plan (RPP), Student Activity Sheets (LKS), Evaluation Instruments or Learning Outcomes Tests (THB), Learning Media, and Student Textbooks (Trianto, 2010) . In this study, learning tools were developed which included lesson plans, worksheets and THB which were described in detail as follows.

RPP is a planning program that can describe learning procedures and management to achieve basic competencies that are compiled as guidelines in learning (Depdiknas, 2008). The RPP component consists of subject identity, competency standards, basic competencies, competency achievement indicators, learning objectives, teaching materials, time allocation, learning methods, learning activities, assessment of learning outcomes, and learning resources (Permendiknas Number 41 of 2007).

LKS (Depdiknas, 2008) are sheets containing assignments that must be done by students. LKS contains learning objectives, instructions, steps to complete a task. A task that is ordered in the LKS needs to explain the basic competencies to be achieved. LKS (Trianto, 2010) contains a set of learning activities that must be carried out by students to maximize understanding in an effort to form basic abilities according to indicators of achievement of learning outcomes that must be taken.LKS contains a guide for the exercise of developing cognitive aspects as well as a guide for the development of all aspects of learning in the form of an experimental or demonstration guide. LKS aims (Depdiknas, 2008) (1) to help students find a concept, (2) to help students apply and integrate various concepts that have been found, (3) to function as a learning guide. The steps for preparing LKS (Depdiknas, 2008) include (1) curriculum analysis, (2) compiling a map of LKS needs, (3) determining LKS titles, (4) writing LKS. LKS components (1) formulate KD that must be mastered, (2) determine assessment tools, (3) preparation of material, (4) structure of LKS

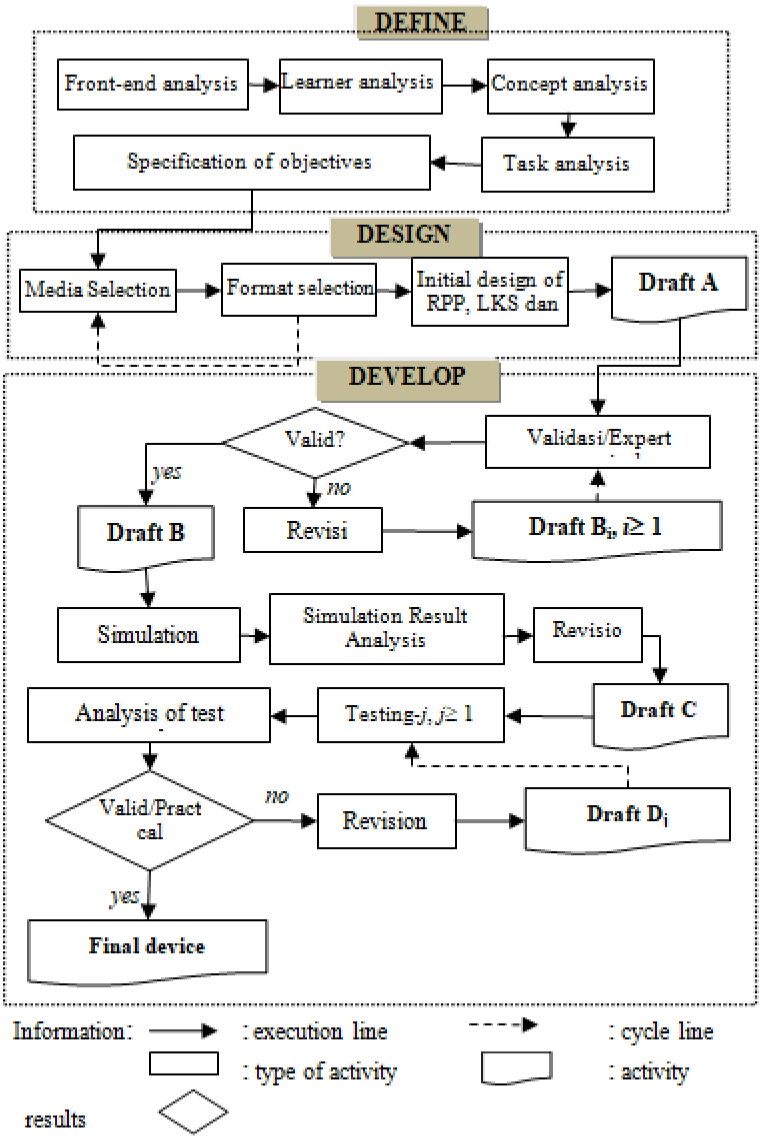

Figure 1: Description of the steps for Developing Learning Tools based on the 4-D model

THB (Trianto 2011) is a test item used to determine student learning outcomes after participating in teaching and learning activities. Learning outcomes tests are made referring to the basic competencies to be achieved, translated into indicators of achievement of learning outcomes and arranged based on a writing grid of questions complete with answer keys and observation sheets for psychomotor assessment of student performance. Learning outcomes test is a test used to measure students' abilities. The learning outcomes test developed was adjusted to the level of cognitive ability. For scoring test results, use an evaluation guide that contains keys and scoring guidelines for each item.

Topic of Powers and Root Forms for Junior High School

In the national curriculum for mathematics education contained in the official government document on Basic Competencies (Kemendikbud, 2013) it is stated that basic competence is number 3.1. understand the properties of exponents and the form of roots in a problem, and number 3.2 understands algebraic operations involving integers and roots.The two basic competency formulations are the basis for the presentation of the material for Ranks and Root Forms at the Junior High School Level as contained in the developed RPP. The topics discussed to make students have these basic competencies are (1) Powered Numbers, (2) Multiplication to Powers, (3) Division to Powers, (4) Zero Powers, Negative Powers, and Root Forms.The two basic competency formulations are the basis for the presentation of the material for Ranks and Root Forms at the Junior High School Level as contained in the Learning Implementation Plan that was developed. The topics discussed to make the students have these basic competencies are (1) Powered Numbers, (2) Multiplication of Powered Numbers, (3) Division of Powered Numbers, (4) Zero Power, Negative Powers, and Root Forms.

2. Research Procedure

This type of research is development research based on a 4-D model (Thiagarajan, 1974) which includes 4 stages, namely Define, Design, Develop, and Disseminate. This development model can be modified (Tisna, 2006) by simplifying the model, which is limited only to the development stage with the consideration of limited time and cost. Each D-stage consists of several cyclical activities that depend on the achievement of the decision criteria (Nieveen, 1999) at each stage, with the direction of development shown in Figure-1.

In the first assessment of the validity aspect, it turned out that the results were not valid and there were notes given by the validator. After revision and reassessment, valid results were obtained, as presented in the Table-1.Table-1 shows that the lesson plans were validated by two expert lecturers, and one practitioner of mathematics education, namely a mathematics teacher. If read vertically, Table-1 shows that validator-1 gives an average value of 3.75, validator-2 gives an average value of 3.75 and practitioners give an average value of 3.88. So the three validators provide validity values with valid categories.If read horizontally, Table-1 shows that on average each aspect of the assessment is categorized as valid and quite valid. Based on the assessment data above, the designed RPP is declared to meet the valid criteria after two assessments by validators and mathematics education practitioners.

The focus of the research is the development of mathematics learning products consisting of Learning Implementation Plans (RPP), Student Worksheets (LKS), and Learning Outcomes Tests (THB) to teach power and root forms to grade IX students of junior high school. The development is carried out based on the Problem Based Learning (PBL) model with a Scientific Approach. The measure of the achievement of research objectives is that each tool is valid, practical and effective (Nieveen, 1999). Validity data was obtained through the assessment of experts and practitioners of mathematics education. Practicality data and effectiveness data were obtained through observation of trial activities and distributing questionnaires to students of SMP Negeri 2 Tahuna.

3. Results and Discussion

Through the define and design stages, the learning tools, namely RPP, LKS and THB, are called draft A. This draft A document is then assessed according to Nieveen's (1999) criteria which include aspects of Valid, Practical and Effective. This process is cyclical, meaning that if the assessment document does not meet the Nieveen criteria, it will be revised according to the correction and asked to be validated again, or do another trial for practical and effective aspects.

Table 1: Validity of the Learning Implementation Plan (RPP)

Assessment Aspect	Valida-tor-1	Valida-tor-2	Practitioner	Average	Category
Format	4	4	3	4.00	Valid
Destination	4	4	4	4.00	Valid
Subject matter	4	4	4	4.00	Valid
Evaluation	4	3	4	3.67	Valid
Learning Activities	3	3	4	3.33	Quite Valid
Language and writing	3	4	3	3.33	Quite Valid
Time Allocation	4	4	4	4.00	Valid
Benefits of use	4	4	4	4.00	Valid
Average	3,75	3,75	3,88		
Category	Valid	Valid	Valid		

Table 2: Validity of Student Worksheets (LKS)

Assessment Aspect	Valida-tor-1	Valida-tor-2	Praktisi	Rata-rata	Category
Format	4	4	3	3.67	Valid
Content	4	4	4	4.00	Valid
Evaluation	4	4	4	4.00	Valid
Illustrations, Tables, Diagrams, and Image Layouts	3	3	4	3.33	Quite Valid
Time Allocation	4	4	4	4.00	Valid
Benefits of use	3	4	4	3.67	Valid
Average	3,67	3,83	3,83		
Category	Valid	Valid	Valid		

Table-2 shows that the worksheets were validated by two expert lecturers, and one practitioner of mathematics education, namely a mathematics teacher. If read vertically, Table-2 shows that validator-1 gives an average value of

3.67, validator-2 gives an average value of 3.83 and practitioners give an average value of 3.83. So the three validators provide validity values with valid categories. If read horizontally, Table-2 shows that on average each aspect of the assessment is categorized as valid and quite valid. Based on the assessment data above, the design result LKS is declared to meet the valid criteria after two assessments by the validators and mathematics education practitioners.

Table 3: Validity of Learning Outcomes Test (THB)

Serial number	Aspek Penilaian	Validator-1	Validator-2	Praktisi	Rata-rata	Kategori
1	The items are appropriate and include the established basic competency indicators.	4	4	4	4.00	Valid
2	The characteristics of the items are clearly stated	4	4	4	4.00	Valid
3	The contents of the test material are in accordance with the measurement objectives.	4	4	4	4.00	Valid
4	The contents of the test material according to the type and level of the school	3	3	4	3.33	Cukup Valid
5	The formulation of each item uses words / statements / commands that demand answers from students	4	4	4	4.00	Valid
6	The formulation of the questions does not cause double interpretation	4	4	4	4.00	Valid
7	The formulation of each item uses simple, communicative, and easy-to-understand language	4	4	4	4.00	Valid
8	The formulation of each item uses good and correct Indonesian rules	4	4	4	4.00	Valid
9	The formulation of each item does not use the local language (cultural bias)	4	4	4	4.00	Valid
	Average	3.89	3.89	4.00		
	Category	Valid	Valid	Valid		

Table-3 shows that the THB tool was validated by two experts (lecturers), and one practitioner of mathematics education, namely a mathematics teacher. If read vertically, Table-3 shows that validator-1 gives an average value of 3.67, validator-2 gives an average value of 3.83 and practitioners give an average value of 3.83. So the three validators provide validity values with valid categories. If read horizontally, Table-3 shows that on average each aspect of the assessment is categorized as valid and quite valid. Based on the assessment data above, the design result THB is declared to meet the valid criteria after two assessments by validators and mathematics education practitioners.

As stated in the theory, what is meant by the practicality of the use of tools is the extent to which teachers are able to use learning tools for lesson plans, worksheets and THB which have been declared valid theoretically. In the first observation, the practical aspect turned out to be not practical and there were notes given by the observer. After the revision and the second trial were carried out, practical results were obtained, as presented in the following table.

Table 4: Observation Results of Practical Use of Learning Devices by Teachers in Trial II.

Serial number	Aspect Observation	Observer-1	Observer-2	Rata-rata
1	Preliminary	3.5	3.75	3.63
2	Core activities	3.7	3.8	3.75
3	Closing Activities	3.5	4	3.75
4	Time Management	4	4	4.00
5	Class situation	4	3.5	3.75
	Average	3.74	3.81	

Table-4 shows the results of two observers regarding the implementation of learning by teachers which includes 5 aspects of observation. Each of the 5 aspects of observation has a sub-aspect of observation, so that the results shown in the cell above are the average values of all sub-aspects in each aspect. by two expert (lecturers), and one practitioner of mathematics education, namely a mathematics teacher. If read vertically, Table-4 shows that observer-1 gives an average score of 3.74, and observer-2 gives an average score of 3.81.So the two observers gave the value of practicality with the category carried out. If read horizontally, Table-4 shows that every aspect of the average assessment by two observers is categorized as implemented. Based on the results of the observations above, the revised learning device in the first trial was declared to meet the practical criteria.

Assessment of the effectiveness of the use of learning tools developed is carried out using 3 (three) indicators, namely: (1) Student Learning Outcomes, (2) Student Activities and (3) Student Responses. Data on student learning outcomes was captured using THB and the score was calculated and then the value was determined in a scale range of 0 – 100. Student activity data was collected using student activity observation sheets and there were 6 object observations. Student activities are categorized as active if the first 4 objects of observation reach the ideal time.Data on student responses to learning with the tools developed were captured using a questionnaire instrument that was given to each student to be filled in according to their respective opinions on each aspect included in the questionnaire items. The response of each student is declared positive if at least 80% of students give a positive opinion on the learning they are participating in.

In the first trial, the indicator of student learning outcomes has not reached the specified completeness criteria, namely at least 80% of students have achieved the complete criteria. The criteria for completion are set at a minimum of 65 in a scale range of 0-100. The indicator of student activity has also not reached the specified criteria. Of the 6 (six) students who are the subject of observation, in general, they have not reached the ideal time benchmark for each category of observed activity. Indicators of student response to learning show that almost 80% of students give a positive opinion on the implementation of the developed learning. However, this result is not enough to state that the student's response is already in the positive category.

In the second trial, 100% of the students, as many as 15 people, had reached the criteria for completion. Indicators of student activity also reached the set criteria. Of the 6 students who became the subject of observation there were 5 students doing activities that were classified as active categories. Indicators of student response in the second trial showed that more than 80% of students gave a positive opinion. Thus in the second trial all effectiveness criteria have been achieved and the process of developing learning devices based on the Problem Based Learning model with a scientific approach is declared complete.

4. Conclusions and Suggestions

Based on the results of research and discussion, the following conclusions are obtained. The problem-based learning model of mathematics with a scientific approach to teach power and root forms has been developed using a modified 4-D development model so that it is divided into 3 stages, namely: defining, designing, and developing to produce valid learning tools. The resulting learning tools include RPP, LKS, and THB which are valid, practical and effective. The requirements for validity, practicality and effectiveness were achieved after 2 (two) validation processes, and the trial was also carried out twice.

Based on the conclusions put forward, there are several suggestions that need to be considered for improving the quality of school mathematics learning, especially the matter of Powers and Root Forms. Mathematics learning in junior high school using a problem based learning model and the scientific approach applied to learning activities in this research provides several important things to note. For this reason, the researcher suggests the following things.The resulting learning tools still need to be tested in other schools with various conditions so that in learning a higher quality device is obtained (as a deployment stage in the 4-D development model). Learning tools for power and root forms based on the Problem Based Learning model with a scientific approach should be developed on other mathematical topics, because based on student responses, the results show that students are interested in participating in learning using the developed tools.

5. Acknowledgement

We would like to express our gratitude to the Manado State University in this case the Postgraduate Program which has provided the opportunity for researchers as students to explore the theory and practice of developing mathematics learning tools after taking courses in the Master of Mathematics Education program.

References

[1] *Arends, Richard I. (2007).* Learning to Teach Seventh Edition. *New York: The. McGraw Hill Companies*

[2] *Barrett, Terry. 2011.* New Approaches to Problem Based Learning. *Dublin: University College Dublin*

[3] *Berson, J et.al. 1998.* Powerful partnership: A Shared Responsibility for Learning. *Report American Association for Higher Education. Diakses pada tanggal 10 Oktober 2019 dari http://www.aahe.org/assessment/joint.htm*

[4] *Boud, David. (2010).* Problem-based Learning in Education for the Professions. *Higher Education Research and Development Society of Australia*

[5] Eggen&Kauchak. 2012. *Strategi dan Model Pembelajaran : Strategi dan Model Pembelajaran: Mengajarkan Konten dan Keterampilan Berpikir*. Jakarta : Indeks

[6] Depdiknas. 2008. *Panduan Pengembangan Materi Pembelajaran dan Standar Sarana dan Prasarana*. Jakarta: BP. Mitra Usaha Indonesia.

[7] *Dudu, Washington T. 2014.* Exploring South Africa High School Teacher's Conceptions of The Nature of Scientific Inquiry: A Case Study. *South Africa Journal of Education. 2014 34 (1).*

[8] Fathurrahman, Muhammad. Budiarti, Marlinda Eka, dkk (2020). *Analisis Rencana Pelaksanaan Pembelajaran Matematika Kurikulum 2013 Di Mts Sains Algebra Kota Sorong*. EMTEKA: Jurnal Pendidikan Matematika. Volume 1, No. 2, 2020. 183-192

[9] Hosnan, M. 2014. *Pendekatan Saintifik dan Kontextual dalam Pembelajaran Abad 21*. Jakarta: Ghalia Indonesia.

[10] Kemendikbud. 2013. *Matematika*. Jakarta: Kementrian Pendidikan dan Kebudayaan.

[11] Musdalifah. 2014. *Model Pembelajaran Berbasis Masalah.* (Makalah Online) Tersedia: https://www.slideshare.net/musdalifahyusuf1/makalah-modelpembelajaran-berbasis-masalah-problem-based-learning. Diakses pada tanggal 13 Oktober 2019.

[12] *Nieveen, N. 1999.* Prototyping to Reach Product Quality, In Alker, Jan Vander, Design Approaches and Tools in Education and Training.*Dodrect : Kluwer Academic Publisher.*

[13] Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 103 Tahun 2014 tentang *Pembelajaran pada Pendidikan Dasar dan Pendidikan Menengah*.

[14] Permendikbud. 2013. *Permendikbud Nomor 68 Tahun 2013 tentang KD danStruktur Kurikulum SMP/MI*.Jakarta: Menteri Pendidikan dan Kebudayaan Republik Indonesia.

[15] Peraturan Menteri Pendidikan Nasional Nomor 41 Tahun 2007 tentang *Standar Proses Pembelajaran*.

[16] Sugiman, 2015. *Peran Guru Matematika dalam Mewujudkan Siswa yang Konstruktif melalui Pemecahan Masalah.*Yogyakarta : Lumbung Pustaka UNY (Repositori UNY)

[17] Suhadi. 2007. *Petunjuk Perangkat Pembelajaran.* Surakarta: Universitas Muhammadiyah.

[18] *Tan, Oon-Seng. 2003.* Problem Based Learning Innovation: Using Problem to. Power Learning in 21st Century. *Singapore: Thompson Learning*

[19] *Thiagarajan,S.,Semmel, D.S.,& Semmel, M.I. 1974.* Instructional development for training teacher of

exceptional children. *Bloomington Indiana: Indiana University*.

[20] Trianto. 2010. *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: Kencana.

[21] -----------, 2011, *Model Pembelajaran Terpadu Konsep, Strategi Dan Implementasinya Dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)*, Jakarta: Bumi Aksara.

[22] Trisna, Benny Nawa. 2006. *Pembelajaran Matematika Realistik di Kelas VIII SMP Negeri 1 Sukamara (Topik Persamaan Garis Lurus)*. Tesis.Surabaya : Program Pascasasrjana.