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DEVELOPMENT OF PROBLEM BASED INVESTIGATION MODEL LEARNING TOOLS BASED ON LOCAL WISDOM TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS

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ABSTRAK

Abstrak: Tujuan dari penelitian ini adalah mengembangkan perangkat pembelajaran model *Problem Based Investigation* berbasis kearifan lokal Sasak Lombok dan implementasinya dalam pembelajaran. Metode penelitian merupakan penelitian pengembangan yang menghasilkan produk perangkat pembelajaran. Tahapan penelitian dibagi menjadi 3 bagian, yaitu: mengembangkan produk awal, menvalidasi produk, dan uji produk. Produk awal yang dihasilkan berupa model pembelajaran dan perangkat pembelajaran *Problem Based Investigation* yang dilakukan melalui tahapan perancangan, pengembangan dan evaluasi. Validasi produk yang dilakukan oleh ahli pendidikan, kurikulum, media pembelajaran serta masukan dari teman sejawat dan guru. Uji produk secara terbatas dan lapangan di SD Muhammadiyah Mataram. Hasil penelitian bahwa pengembangan perangkat pembelajaran berbasis kearifan lokal berada pada kategori valid dan dapat meningkatkan kemampuan berpikir kritis pada materi bangun datar. Hasil validitas dari penilaian tiga validator dengan persentase sebesar 90% dengan kriteria sangat valid dan hasil ujicoba bahwa perangkat pembelajaran berbasis kearifan lokal berada pada kategori valid, praktis, dan efektif.

Abstract: *The purpose of this study is to develop a learning tool for the Problem Based Investigation model based on local wisdom of Sasak Lombok and its implementation in learning. The research method is a development research that produces learning device products. The research stages are divided into 3 parts, namely: developing the initial product, validating the product, and testing the product. The initial product produced is in the form of a learning model and a Problem Based Investigation learning tool which is carried out through the stages of design, development and evaluation. Product validation carried out by experts in education, curriculum, learning media and input from peers and teachers. Product tests are limited and field at SD Muhammadiyah Mataram. The results of the study show that the development of learning tools based on local wisdom is in the valid category and can improve critical thinking skills in flat building materials. The validity results of the assessment of three validators with a percentage of 90% with very valid criteria and the results of the trial that learning tools based on local wisdom are in the category of valid, practical, and effective.*

A. BACKGROUND

It is stated in the law that education is a conscious and planned effort to create an atmosphere of the learning process and the learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals and skills needed by themselves, the people of the nation and the State (Kholis, 1970). Therefore, efforts to improve the quality of education must continue to be developed and improved (Mahsup et al., 2020). Good education can give birth to a generation of quality human resources (Rahmatin et al., 2019)Namun demikian, Many factors are challenges to quality education. According to (Kabunggul et al., 2020) educational problems in Indonesia arise not only in the problem of the concept of education but also arise starting from the problem of curriculum, quality, competence, and even learning tools owned by teachers (Fitriani, 2018).

According to Permendikbud No. 21 of 2016, Graduate Competency Standards have been established based on 21st century competencies. To make it happen, a learning process involving 3 skills (21st Cenury Skills) is needed, namely (1) life and career skills, (2) learning and innovation skills, and (3)

information media and technology skills. These three skills require the learning process in the 21st century to be equipped with the ability to think critically and creatively in solving problems (Hastuti et al., 2016). Critical thinking emerges through student-centered learning models, one of which is the problem-based investigation learning model which can emphasize students to learn actively and give students the opportunity to think for themselves (Fatimah et al., 2021). Problem based investigation learning involves students actively in finding concepts, structures, and theorems (Trisnawati, 2020).

Problem based investigation learning requires students to be active and participate in the learning process by digging/searching for information/material that will be studied independently with available materials (Medyasari, 2017). With this process, students will learn actively, seek important information, and will naturally develop their critical thinking skills. The process of independently building knowledge trains students to dig up a fact, generalize and organize the ideas obtained. This will have a good impact on students' critical thinking skills. According to (Siregar, 2019), problem-based investigation learning not only helps students develop cooperation skills, critical thinking, and social attitudes, but also helps them to understand a concept. Students are asked to be active in solving each problem assigned by educators by forming groups and discussing together (Mendrofa, 2018).

Based on a preliminary study, the critical thinking skills of elementary school students in solving mathematical problems in the city of Mataram and West Lombok Regency are still relatively low. Based on the instruments distributed in 6 schools, as many as 65% of students are still at the lowest level. It is further strengthened from the results of observations in the field that the learning process at SD Muhammadiyah Mataram is still teacher-centered, students are still passive because they lack emphasis on critical thinking activities. In addition, learning focuses on textbooks, still emphasizing cognitive aspects and routine questions. To overcome the low critical thinking ability of elementary school students, especially in NTB, innovative mathematics learning needs to be developed based on the uniqueness and excellence of a region. Learning that implements local culture is able to lead students to love their region and nation

To overcome the low critical thinking ability of elementary school students in NTB, mathematics learning needs to be associated with local culture (Supiyati, 2019). Learning that implements local culture is able to lead students to love their region and nation. The 2013 curriculum also emphasizes the development of science, culture, technology, and the arts that can build students' curiosity and ability to utilize appropriately. Sasak cultural elements can be used as an interesting and fun source for elementary mathematics learning (Supiyati, 2019).

Local wisdom is a view of people's life in the form of activities in meeting the needs of daily life, which can be in the form of customs, norms, languages, beliefs, and habits that are still preserved today. So that local wisdom is considered as local ideas that are wise, full of wisdom, good values, which are embedded and followed by members of the community. In addition, local wisdom.

Problem based investigation learning tools based on local wisdom need to be designed to provide opportunities for elementary school students to build knowledge and develop their potential in accordance with the characteristics of their regions. Students can achieve their learning goals while still being guided by the cultural values of their region, so that they will become individuals with high character in the community. The purpose of this research is to develop a learning tool for the Problem Based Investigation model based on local wisdom of Sasak Lombok and its implementation in learning.

B. RESEARCH METHODS

This research is a research and development that produces learning device products. One of the models in R&D research is the Plomp model. The stages or phases of the Plomp model consist of preliminary research, prototyping phase, and assessment phase. The flow of each stage of Plomp development is described in Figure 1.

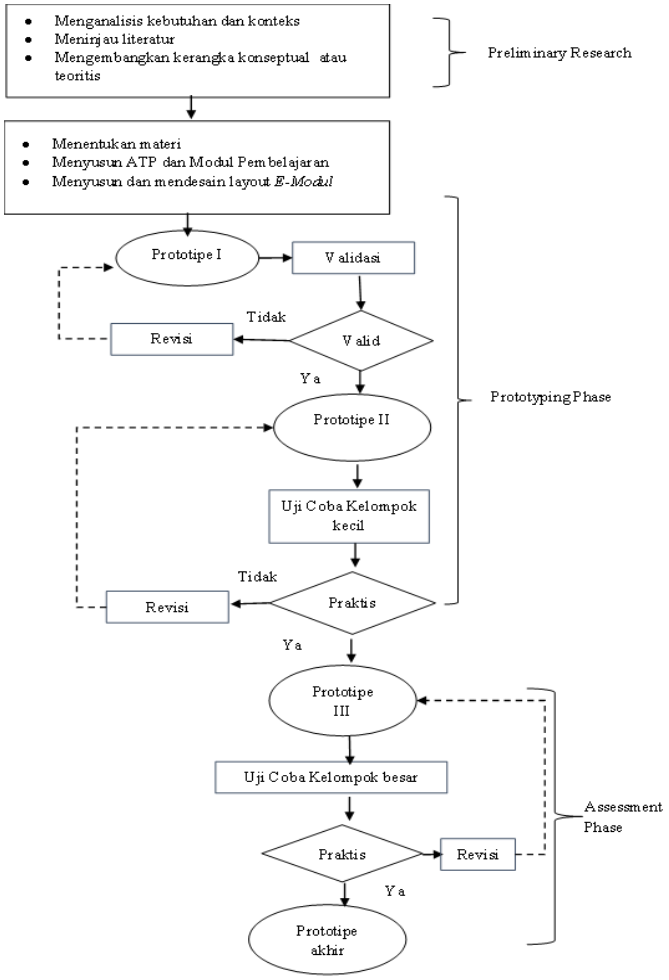

Figure 1. Plomp Development Model Scheme.

The resulting learning tool products have criteria for validity, practicality, and effectiveness to improve critical thinking skills. This research was carried out at SD Muhammadiyah Mataram. Research data was collected through observations, interviews, questionnaires, and test results. This study juxtaposes Nieveen's (1999) theory about the criteria for quality products (valid, practical, and effective) and Borg and Gall's (1983) theory about development research modified by researchers. The validity of the products that have been made is assessed based on the validity of the content and the validity of the construction (Plomp & Nieveen, 2007). If the resulting product meets these requirements, it is considered valid. Product validators consist of 2 expert validators and 1 practitioner validator. The results of product validation are analyzed by:

$$V_a = \frac{TSe}{TSh} \times 100\ \%$$

Information:

Va = Expert validation

TSe = Total empirical score

TSh = Total highest score in the validation sheet

The validity criteria are as shown in the following Table 1:

Table 1. Validity Criteria

No	Validation Level	Validity Criteria
1	85,01% - 100,00%	Highly Valid
2	70,01% - 85,00%	Valid
3	50,01% - 70,00%	Quite Valid
4	01,00% - 50,00%	Invalid

(Akbar, 2017)

C. RESULTS AND DISCUSSION

The results of the data in this study are the validation assessment data for the development of learning tools after going through several stages of the Plomp development model starting from Preliminary Research, Prototyping Phase and Assessment Phase. The description in each stage is as follows:

1. Preliminary Research

The flow in Preliminary Research conducted by the researcher is to analyze the needs and context of learning, review the literature and then develop a conceptual or theoretical framework as an initial picture of the research. During this phase, researchers collect data related to fundamental problems that will be the basis for product development. The purpose of a needs analysis is to examine and identify the challenges faced by teachers and the needs of students in the learning process. To meet the learning needs of students and teachers' solutions in teaching Mathematics material, researchers conducted a literature review.

The results of interviews with teachers showed that Mathematics learning on flat buildings that had been carried out referred to school package books, students had never learned to use teaching materials based on local wisdom. in the form of modules. Students' interest in learning through the use of electronic media has a large percentage. because it is considered more practical. The existence of social issues in the surrounding environment can attract students' interest in connecting them with learning materials. This can

be seen from the questionnaire filled out by students with a high percentage. Based on the teacher's statement in the questionnaire, he has never measured the students' scientific argumentation and critical reasoning skills. The researcher develops a conceptual framework through the information collected after these stages. So they plan to develop additional teaching materials to support the student learning process.

2. Prototyping Phase

The Prototyping Phase aims to realize a valid learning product after going through several stages. The material used in this study is building space because of the limitations of abstract concept explanations in learning. Students' lack of mastery of concepts makes it difficult to understand the material. After determining the material to be used in product development, the researcher compiled the Learning Objectives Flow (ATP), Teaching Modules, Learning Implementation Plans (RPP) and Student Worksheets (LKS) which were aligned with the development of learning modules based on local wisdom.

Overview of ATP, Teaching Modules, Learning Implementation Plans and LKS which are focused on flat building materials based on local wisdom. By loading the types of flat buildings that exist around the community environment such as the shape of houses, windows and doors. Based on these conditions, it triggers students to argue. Argumentation skills are needed in making wise decisions based on the scientific knowledge gained by students.

Scientific arguments are closely related to the ability to reason critically. So that the preparation of this product is expected to encourage the development of students' scientific argumentation and critical reasoning skills. Students' knowledge of the issues discussed affects the way students think critically or argue in the context of the issue (Roviati & Widodo, 2019).

The next stage is to realize the data from the analysis and the conceptual framework into a teaching material in the form of learning modules, lesson plans and test instruments. The product design that has been prepared is called a prototype I. The resulting product outline is shown in Figure 2.

Gambar 2. Produk Modul Ajar

The next phase is to validate the results of the prototype I that has been designed. Validation data is obtained from validators through validation sheets. The validator consists of 1 expert lecturer and 1 grade 3 elementary school teacher as a practical validator. The results of product design validation from three validators. The results of the validation of learning modules, learning implementation plans and test instruments based on local wisdom with a total average assessment of two validators from five aspects of 90% are classified as very valid criteria. The assessment in each aspect by the validator indicates that it is very valid, as the graphics aspect is obtained by a percentage of 92%, the language aspect is 85%, the practicality aspect is 91%, the material aspect is 94% and the presentation aspect is 98%. The results of the product validity percentage show that modules, learning implementation plans and test instruments based on local wisdom can be used, but there are few revisions.

Some suggestions were given by validators for product improvement. Product revision has the goal of obtaining products that are proportional to the needs in the field. Revisions made include the cover, changing the position of the preface, adding borders between chapters, and changing unclear images.

The validator's suggestion to change the cover aims to make the display more attractive and contain an overview of the content of the module. Vidianti & Qonita (2022) revealed that the cover is the front view of the module which contains the inscription, the title of the module, and an image representing the content of the module. According to Winatha et al., (2018) attractively designed modules are able to trigger students' interest and involvement in learning.

Revision of the preface with the purpose of the preface in the module contains the purpose and gratitude in connection with the completion of the module (Syahputri & Dafit, 2021). Validators suggest

that the preface display be made to be a single column so that it looks neater. The neat arrangement of modules can create aesthetics so that they are comfortable to read and do not look boring (Septiara & Saino, 2022).

Revision of the content of the teaching material of the Module. On the material page, the image module functions as a support for learning materials that are able to help students understand the context. In figure a) before the revision, the description in the image is not clear and detailed so that the validator considers that there needs to be a revision. Pramesti et al., (2021) presented the presentation of images well so that they were more attractive and could stimulate learning motivation.

Meanwhile, the revision of the learning tool is to be adjusted to the format of the Independent Learning curriculum that has been implemented at SD Muhammadiyah Mataram. In the preparation of LKS to adjust to teaching materials and present contextual problems in daily life.

Based on the results of the validator assessment, the teaching materials of the learning modules, the Learning Implementation Plan (RPP) and LKS in the category are very valid with a percentage of 90%. Some suggestions from validators to improve the product are carried out so that the product can meet the needs in the field. Therefore, the products that have been produced are in the form of modules, lesson plans and LKS based on local wisdom.

3. Asesment Phase

The purpose of this stage is to produce a final tool, namely a learning tool that has been revised based on the input of experts (validators). The three validators gave an assessment with a score of 3 or 4 on each RPP, meaning that the components in the RPP received a good and very good assessment. The three validators concluded that the RPP can be used with a slight revision because there are several sentences that must be corrected according to the thinking level of grade III elementary school children. In the LKS assessment, the three validators also gave an assessment of 3 and 4 on each LKS. So that the components in the LKS get a good or very good quality assessment. In revising the validation tools and instruments, the researcher refers to the results of the discussion by following the suggestions and instructions from the validator.

The readability test of Draft II was carried out on 6 grade III students of SD Muhammadiyah Mataram. The results of the readability test analysis showed that the LKS as a learning tool could be read clearly, could be understood by students, and the appearance of the LKS was attractive. Thus, the LKS developed does not need to be revised and can be used in the trial class. Based on the above analysis, Draft II is a learning tool that has been improved based on input and suggestions from validators and has been tested for readability and validity and reliability of learning outcome test questions.

From the results of the trial of the learning tool, data from the observation of the implementation of learning activities, data from the observation of student activities, pretest and posttest data, data on students' metacognition ability and student response data were obtained. The data obtained during the trial was analyzed, then the results were used as consideration to revise draft II into a valid, practical, and effective learning tool.

Every aspect of the implementation of learning activities by teachers at each meeting, is included in the category of good or good. Some of the activities carried out by teachers are (1) conveying learning objectives; (2) training students in metacognition skills in terms of planning, monitoring, and evaluation through contextual problems; Teaching and learning activities are centered on student activities. This shows that learning can be used well by teachers so that the device does not need to be revised.

Based on the criteria of student activities, every aspect of the learning implementation plan is carried out and is within the ideal time determination interval. Overall student activities show active students and activities oriented to practice critical thinking skills. In line with Fariana's (2017) research, the increase in student activity is due to the improvement of classroom management carried out by teachers because it will be directly related to the learning process.

To solve contextual problems, students plan by discussing, control problem-solving steps (monitoring) by checking the suitability of the prerequisite concepts used, and then evaluate the overall problem-solving process. The emergence of metacognition activities in solving problems is in accordance with the opinion of Anggo (2011a) that the activities of the student metacognition process in

planning, monitoring, and evaluation arise when solving contextual problems.

D. CONCLUSIONS AND SUGGESTIONS

Based on the results of data analysis and discussion, the development of learning tools based on local wisdom is in the valid category and can improve critical thinking skills in flat building materials. The validity of the learning tools based on local wisdom was reviewed from the assessment of three validators with a percentage of 90% with very valid criteria, but there were few revisions. Based on the results of the trial, the learning tools based on local wisdom are in the valid, practical, and effective categories.

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