



## The Development Of Problem Based Learning Modeling By Using Environmental To Improve Mastery Learning At Junior High School

### Abstract

This study aims to: 1) Know the description of the needs analysis of the development of environment-based mathematics learning models in junior high schools / MTs so far; 2) Obtain comprehensive information in designing environment-based mathematics learning models to improve learning outcomes in junior high schools; 3) Produce products in the form of model books and environment-based mathematics learning tools that are valid to improve learning outcomes in junior high schools; 4) Produce products in the form of model books and environment-based mathematics learning tools that are practical to improve learning outcomes in junior high schools; 5) Produce products in the form of model books and environment-based mathematics learning tools that are effective for improving learning outcomes in junior high schools. The subjects of this research were students and teachers of MTs. Aisyiyah Sungguminasa. The research and development procedure used is the 4-D (Four-D) model, namely Define, Design, Develop and Disseminate. The data collection techniques used were observation, interview, test, questionnaire and documentation. The research instruments used learning implementation observation instruments, student learning outcomes assessment test instruments, and learning device validation sheets. The data analysis technique was carried out by (1) analyzing the level of validity, (2) analyzing the level of practicality, and (3) analyzing student and teacher response data. The results of this study indicate the need for the development of an environment-based mathematics learning model to improve learning outcomes at MTs. Aisyiyah Sungguminasa. The validation test results showed that the model book, learning tools and several research questionnaires were declared very valid based on expert assessments. Furthermore, the results of the practicality test also stated that this model proved to be very practical based on the results of observations of learning implementation and teacher and student response questionnaires.

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## 1. Introduction

Quality education is one of the main pillars in the development of superior human resources. In the context of education in Indonesia, especially at the junior high school level, the development of innovative learning models that are relevant to the surrounding environment is very important. This research aims to develop an environment-based learning model that can improve student learning outcomes in class VIII SMP/MTs Gowa Regency. This model is expected to not only improve students' understanding of the subject matter, but also foster awareness of the importance of environmental conservation among the younger generation.

One of the challenges faced in the learning process today is the lack of careful preparation from educators. Many teachers carry out the teaching and learning process without proper planning, such as not preparing the necessary learning tools, including teacher handbooks, lesson plans, and student activity sheets. This has the potential to result in ineffective learning and make students tend to be passive, so they only rely on the teacher as the only source of knowledge.

In an effort to overcome this problem, this research will identify the need to develop an environment-based learning model, design the model, and measure its validity, practicality, and effectiveness in improving student learning outcomes. It is hoped that the results of this study can make a significant contribution Quality education is one of the main pillars in the development of superior human resources. In the context of education in Indonesia, especially at the junior high school level, the development of innovative learning models that are relevant to the surrounding environment is very important. This research aims to develop an environment-based learning model that can improve student learning outcomes in class VIII SMP/MTs Gowa Regency. This model is expected to not only improve students' understanding of the subject matter but also foster awareness of the importance of environmental conservation among the younger generation.

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The application of environment-based learning models is expected to create a more active and interactive learning atmosphere. In this context, teachers are required to be more creative in designing learning activities that involve the surrounding environment as a learning resource. This is in line with the objectives of Curriculum 2013 which emphasizes the scientific approach and learning based on real experience. By involving students directly in activities related to the environment, it is hoped that they can better understand and appreciate the importance of preserving nature.

Thus, this research not only focuses on academic aspects, but also seeks to create environmental awareness among students, which is an important step in building a generation

that cares about environmental sustainability. Through this approach, students are expected to learn in a more active, creative and fun way, so that the learning outcomes achieved can be more optimal and meaningful.

## 2. Materials and Methods

This study used a research and development approach with a 4D model design proposed by Thiagarajan, Semmel, and Semmel (1974). The 4D model consists of four main stages, namely:

**2.1. Define:** At this stage, researchers conducted a needs analysis to identify problems faced by students and teachers in learning mathematics. Data were collected through interviews, needs analysis questionnaires, and observations. The steps taken include initial analysis, student analysis, concept analysis, task analysis, and specification of learning objectives.

**2.2. Design:** Once the needs have been identified, the researcher designs a learning product that is in line with the results of the analysis. This stage involves selecting the right media and format to support the learning process.

**2.3. Develop:** At this stage, the designed product is tested to measure the validity, practicality, and effectiveness of the learning model. The trial was conducted by involving students as research subjects. Data is collected through observation sheets, teacher and student response questionnaires, and document analysis.

**2.4. Disseminate:** This final stage involves the publication and dissemination of research results to interested parties, including teachers and educational institutions, to improve the quality of environment-based mathematics learning.

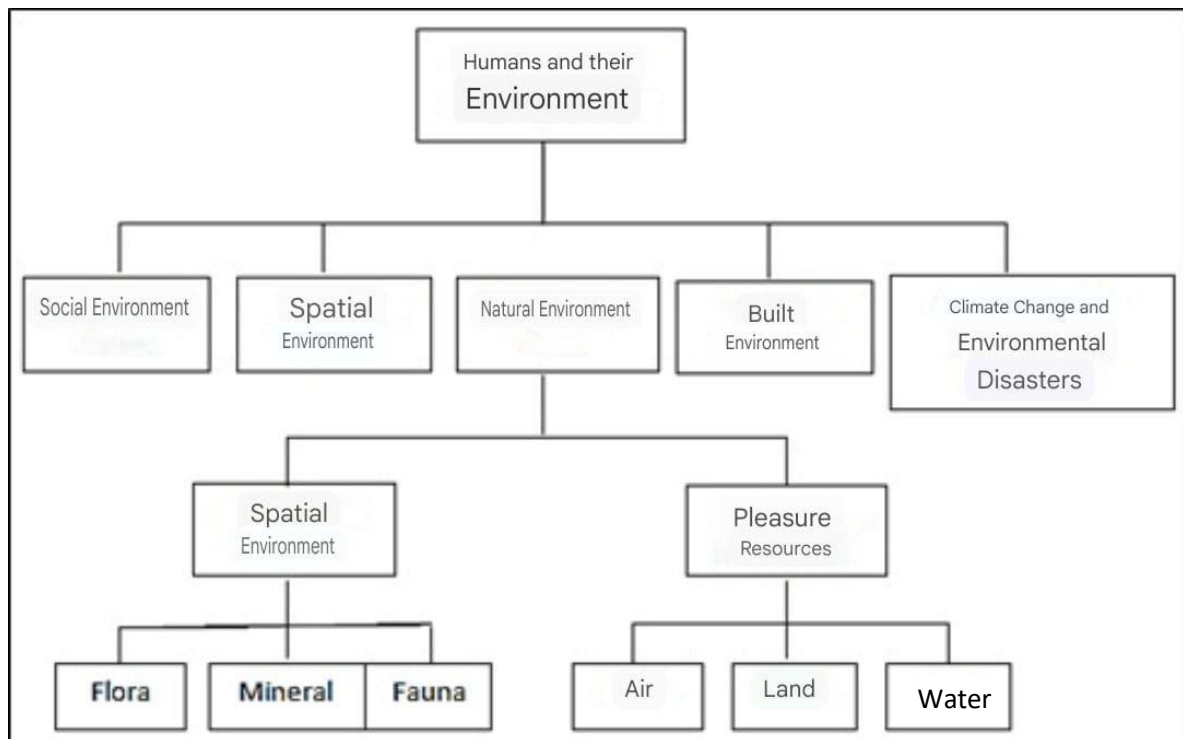
**2.5. Data Source:** Data sources in this study include documents related to learning, students, teachers, and experts/validators. The documents analyzed included curriculum, lesson plans, and textbooks. Students were involved in needs analysis and product effectiveness testing, while teachers provided input through questionnaires and observations.

**2.6. Data Analysis Technique:** Data analysis was conducted using qualitative and quantitative approaches. Qualitative data was obtained from interviews and observations, while quantitative data was obtained from questionnaires and pilot tests. The results of the analysis are used to evaluate and revise the developed learning products.

This research method is designed to provide a clear and systematic description of the research process conducted, as well as to ensure that the results of the research can be accounted for and useful for educational development.

## 3. Results

When examining the objectives to be realized by environmental education stated earlier, then in substance, the scope of the subject matter of environmental education in schools must at least include the following:



**Figure 1.** Scope of Environmental Education Materials

### 3.1. Development of Learning Model

The characteristics of the PMBL model refer to the four characteristics of the learning model proposed by Arends (1997), namely: (1) logical theoretical rationale derived from its design, (2) rationale about the learning tasks to be achieved and how students learn to achieve the goals, (3) teacher teaching activities required for the learning model to be implemented actively, and (4) the learning environment required to achieve the goals.

While the components of the PMBL model refer to the components of the learning model proposed by Joyce, Weil, & Shower (1992), namely: (1) syntax, which is the sequence of activities called phases, (2) social system, which is the role of the teacher and students and the type of rules needed, (3) reaction principles, which give an idea to the teacher about how to view or respond to student questions, (4) support system, which is the condition required by the model, and (5) instructional impact and accompanying impact, which are the results that students will achieve after taking lessons.

The PMBL model development process refers to the general model of educational design proposed by Plomp (1997), which consists of five stages, namely: (1) initial investigation stage, (2) design stage, (3) realization/construction stage, (4) test, evaluation, and revision stage, and (5) implementation stage. Meanwhile, to assess the quality of the PMBL model using the criteria put forward by Nieveen (1999) by paying attention to aspects of validity, practicality, and effectiveness.

Furthermore, the development of the PMBL model was built concerning the learning theories proposed by: Piaget, Gagne, Bruner, and Ki Hajar Dewantara are described as follows:

Piaget argues that the cognitive development of each individual develops chronologically, namely: (1) sensory-motor stage, (2) pre-operational stage, (3) concrete operation stage, and (4) formal operation stage. This theory emphasizes that every lesson should pay attention to the stages of cognitive development of children. For example, at the formal operation stage, children

at this stage are already able to reason using abstract things. Reasoning that occurs in their cognitive structure has been able to use symbols, ideas, abstractions and generalizations.

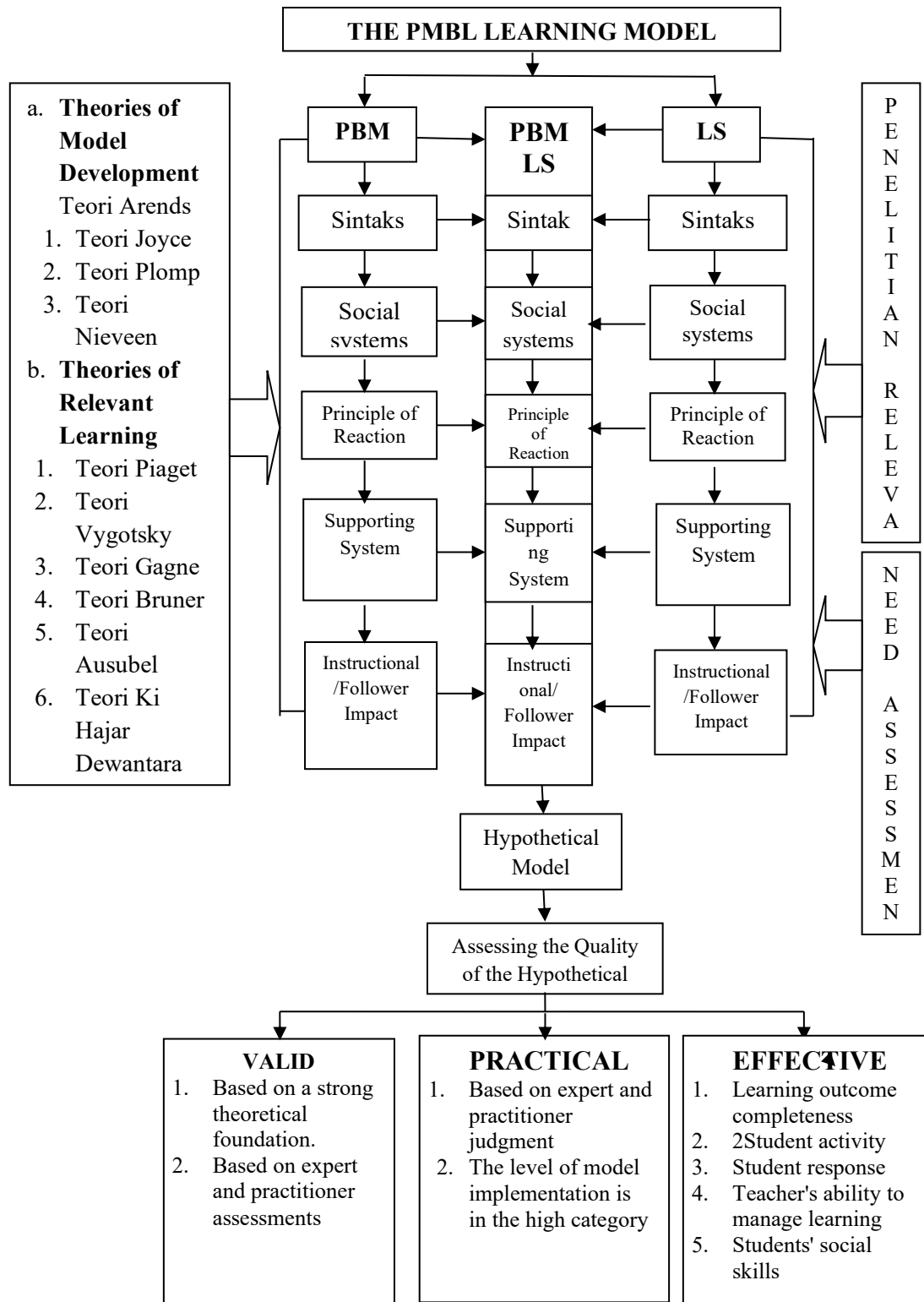
Piaget's learning theory provides the foundation for the PMBL model. In learning with the PMBL model, reasoning gets important attention, especially in phases 3 and 4 (action and demonstration). In this phase the teacher motivates students to gather the necessary information and carry out experiments and investigations to obtain explanations and problem-solving, students pay attention and follow the instructions given by the teacher and solve problems and find ways and answers to problems with individuals or groups contained in the LKS.

Furthermore, Gagne argues that in learning there are two objects that students can obtain, namely direct objects and indirect objects. Indirect objects include the ability to investigate and solve problems, learn independently, have a positive attitude towards learning, and know how to learn. While direct objects are facts, skills, concepts, and rules. In addition, Gagne also categorizes learning into eight types of learning, namely: cue learning, stimulus-response, series of movements, verbal series, distinguishing, concept formation, rule formation, and problem-solving. The eight types of learning are ordered according to their level of difficulty from cue learning to problem-solving learning.

Meanwhile, according to Jerome Bruner in his theory that learning will be more successful if the teaching process is directed to the concepts and structures made in the subject matter being taught, in addition to the related relationships between concepts and structures. Bruner strongly recommends the activeness of children in the learning process in full, as well as strongly emphasizing that children are allowed to manipulate objects through props. Therefore, Bruner states that the teaching and learning process goes through three stages, namely: the enactive, iconic, and symbolic stages.

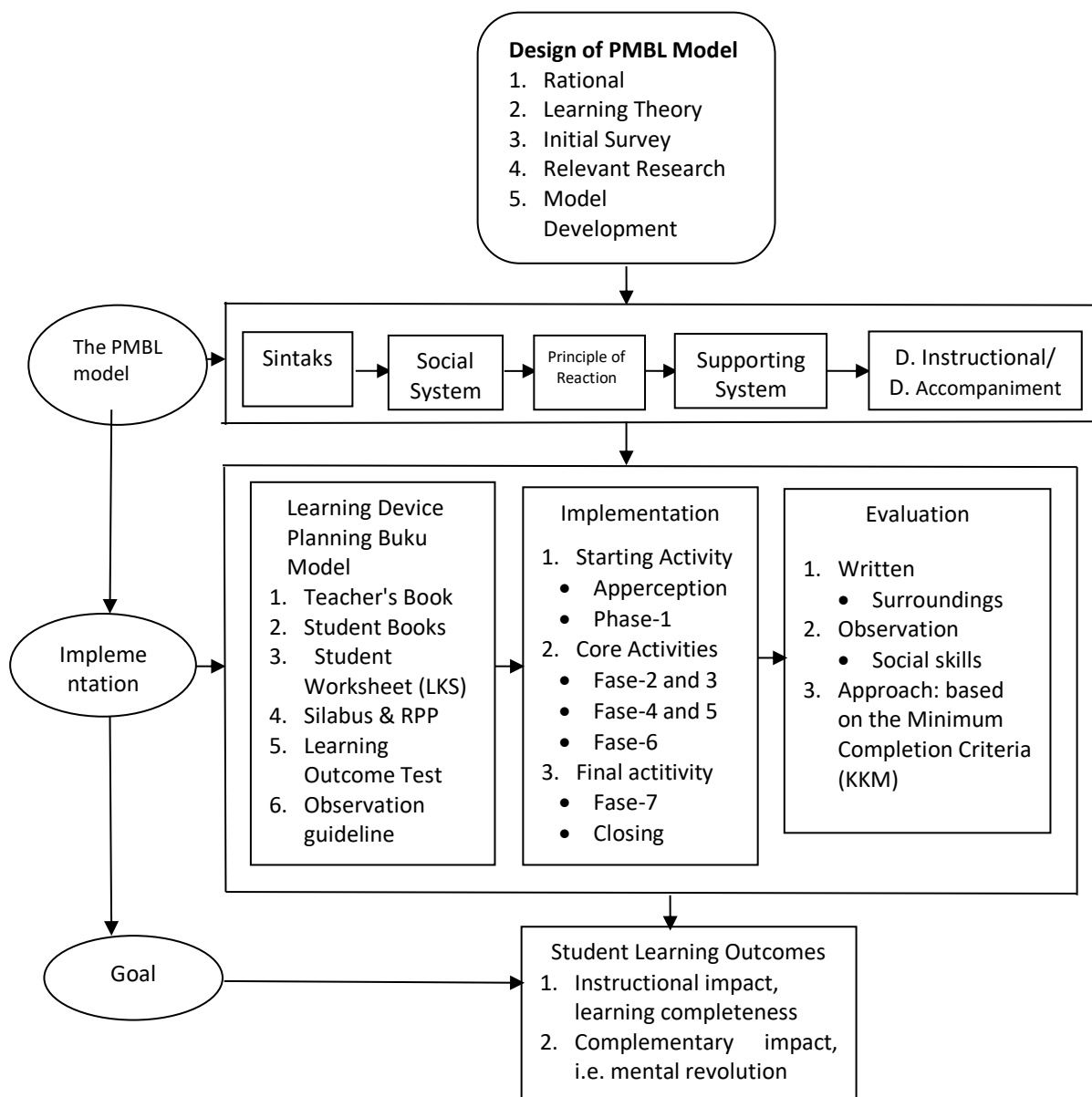
Meanwhile, according to Ki Hadjar Dewantara, in the learning process an educator should be able to act as follows: (1) "ing ngarsa sung tulada" which means: in front, someone must be able to give an example or example. Therefore, in addition to mastering knowledge, educators must also have a personality that can be emulated and exemplified, (2) "ing madya mangun karsa" which means: in the middle or between someone can create initiatives and ideas. In the learning process at school, this means that a teacher must be able to create initiatives and ideas for their students when they are in the learning process. So the teacher does not need to teach much but rather needs to initiate various stars of achievement that each student needs to achieve, and (3) "tut wuri handayani" which means: from behind an educator must be able to provide encouragement and direction.

### 3.2. The PMBL Learning Model



**Figure 2. Framework**

Based on the theoretical study of learning model development and observations in the field, a hypothetical model can be proposed in the form of a problem-based learning model using the surrounding environment (PMBL Model). The hypothetical model framework and its components can be explained as follows:



**Figure 3.** Hypothetical PMBL Model Framework

1. Introduction and rationale for the PMBL model, namely the rationale for the importance of the PMBL model in learning in junior high schools / MTs. The relevant supporting theories of the PMBL model, namely: (a) constructivist theory in learning, (b) cognitive learning theory, (c) socio-cultural learning theory, (c) Gagne learning theory, (d) Bruner learning theory, (e) Ausubel learning theory, (f) Ki Hajar Dewantara learning theory, (g) relevant research, (h) model development theory, and (i) relevant research.
2. The components of the PMBL model consist of (a) syntax, (b) social system, (c) reaction principle, (d) support system, and (e) instructional/coaching impact.
3. Implementation of the PMBL model, which consists of (a) PMBL model learning device planning stage, (b) PMBL model learning implementation stage, and (c) evaluation and follow-up stage.
4. PMBL model learning tools, which consist of (a) teacher's book, (b) student's book, (c) syllabus, (d) lesson plans, (e) worksheets, (f) learning outcomes evaluation tools, and (f) observation guidelines.

#### 5. Goal or purpose

The application of the PMBL model aims to create effective learning so that instructional objectives in the form of learning completeness about caring for living things from meeting 1 to meeting 6 are optimally realized. In addition to the instructional objectives being realized optimally, also from the application of the PMBL model is expected to provide an accompanying impact, namely the realization of independence in learning. To realize this goal, the PMBL model is equipped with a model book and learning tools.

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#### 7. Learning approach/method

The learning approach used is the problem-solving approach. The steps in problem-solving, namely: (a) understanding the problem, (b) planning the problem, (c) implementing the problem, and (d) testing. Furthermore, the teacher used the lecture method to convey some information, for example: group division, explanation of procedures for discussion, and classical guidance. Meanwhile, the students' problem-solving process is carried out using the discussion method and giving assignments, both as structured and unstructured assignments.

#### 8. Learning resources and tools

Learning resources and tools are supporters in the implementation of the PMBL model. Therefore, in this learning activity, several learning resources and tools are used by students, namely: (a) student books, (b) student worksheets, and (c) other references relevant to the material studied. Learning tools as aids are used are the blackboard, LCD, and several pictures that tell the problems of everyday life. Meanwhile, teachers use model books, teachers' books, syllabi and lesson plans as well as observation guidelines that are used to facilitate students in achieving learning objectives.

#### 9. Learning evaluation

Learning evaluation is divided into two, namely: (a) evaluation to determine students' knowledge ability (cognitive), and (b) evaluation to determine the value of students' attitudes (affective) and skills (psychomotor). To assess cognitive acquisition is done using written tests and assignments, namely: (a) formative tests (block exams) and (b) daily tests. Meanwhile, to assess affective and psychomotor skills, an observation guideline was used, which contained statements about students' attitudes, namely: (a) the complexity of the material, (b) the complexity of learning management, (c) the complexity of the explanation of the material/teaching material, (d) the complexity of the method, (e) the carrying capacity of learning tools and media, and (f) the intake of students (basic achievements of students). Meanwhile, to determine the level of competency achievement of students, namely based on the Minimum Completeness Criteria (KKM) that has been determined in the education unit. Meanwhile, for attitudes referring to the Education Assessment Standards (Permendiknas Number 66 of 2013), the assessment of attitude competencies can be carried out by teachers, through (1) observation, (2) self-assessment, (3) assessment among students, and (4) journals. The instruments used for observation, self-assessment, and assessment among learners are checklists or rating scales accompanied by rubrics, while in journals in the form of

educators' notes.

## 5. Conclusions

The developed environment-based learning model is proven to be valid, practical, and effective in improving students' mastery of the material in class VIII SMP/MTs Gowa Regency. However, to ensure successful implementation in various educational contexts, it is important to consider some challenges that may arise. For example, differences in the resources available in each school, the level of teacher training in applying this model, as well as varied student engagement. Therefore, it is recommended that schools conduct ongoing training for teachers to improve their understanding and skills in using this model. In addition, it is important to actively involve students in the learning process in a way that is relevant to their environment, so that they can directly benefit from the learning that is done. These recommendations are expected to provide clearer guidance for educators and researchers in implementing the environment-based learning model, as well as encourage further research to explore the effectiveness of this model in different contexts. Thus, this research not only contributes to the development of learning theory but also provides practical solutions that can be implemented in the field.

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