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THE VALIDITY OF GENERAL BIOLOGY LEARNING EQUIPMENT BASED ON CASE METHOD AND PROJECT BASED LEARNING

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ABSTRACT

This research is a type of development research. The development method applied follows the define, design, and development Model. The aim of this study is to produce a valid general biology learning equipment based on case method and project based learning. In this research, the completed general biology learning equipment design was validated by content experts and language experts. Based on the validation results from content experts, the tool achieved a validation percentage of 86.65%, categorized as highly valid. The language experts validated the equipment with a percentage of 81.25%, also categorized as highly valid. Therefore, it can be concluded that the developed general biology learning eqipment is suitable for testing by instructors of general biology courses.

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INTRODUCTION

The 21st century currently demands lecture learning that leads to the active participation of not only lecturers but also students. In accordance with the demands in higher education, it must meet the main performance. Ministry of Education and Culture said that the Main Performance Indicators (KPIs) in Higher Education that must be met are 8 indicators. One of the indicators that is closely related to the learning process is the seventh indicator, which is an indicator that realizes a collaborative and participatory classroom (Pendidikan & Kebudayaan, 2021). The guidance from IKU 7 stimulates lecturers to involve students in the teaching and learning process, by using a case method (Prastowo, 2023).

Along with the development of the implementation of the Independent Campus Learning (MBKM) curriculum, campus policies are increasingly developing by implementing Outcome-Based Education Independent Learning Independent Campus (OBE-MBKM) based learning (Annisa et al., 2023). The case method concept is one of the developments of Outcome-Based Education (OBE). In the concept of learning in higher education, the basis of thinking learning outcomes refers to program learning outcomes (CPP) rather than to curriculum education learning outcomes (Harahap et al., 2022).

Success in achieving learning objectives is one of them by using the right method in lectures. The case study method has an effect on student learning outcomes both in cognitive and affective aspects. In lectures, it is hoped that students will not only memorize the material but also know the relationship between the material taught and real-world situations. For prospective educators, case studies can broaden their learning horizons and give them a concept of how learning should be done. This case study method encourages problem determination, investigation and persuasion that must be carried out by students. Therefore, one of the important elements of the case study method is to include a collaborative discussion of the issues at hand. That way, students can identify what they need to know with the aim of understanding the case and establishing a problem to investigate (Rizka & Permatasari, 2023).

Project-based learning (PjBL) allows students to focus on achieving the project while achieving the learning objectives or concepts to be achieved. PjBL is able to increase students' creativity in carrying out projects and improve students' ability to utilize technology as a medium to communicate their work, media to create products. PjBL increases student creativity. PjBL is also effective in improving expected learning outcomes (Dewi, 2021)

The PjBL-CM learning model is one of the learning models that uses real problems/cases as a form of description of the real world experienced by students. The PjBL-CM learning model requires the active participation of students to integrate many sources of information in the learning context and be able to solve cases based on previous experience and knowledge and facilitated by lecturers and then students are trained to cooperate or collaborate with their peers to discuss solving problems/cases (Akhyaruddin, 2022). To enhance students' abilities, it is not sufficient to merely lecture or explain; efforts are needed to train and practice the skills they possess. One of these efforts includes encouraging students to analyze and seek solutions to problems around them through the case study method. Therefore, in case method learning, students are expected to collaborate in solving assigned projects given by the lecturer (Pernantah et al., 2022).

Biology is a part of Natural Sciences (IPA) that studies living organisms and their environment, exploring the reciprocal relationships between living organisms and their surroundings. In the biology learning process, there are four main elements that students should possess: Curiosity, interest in natural phenomena, Scientific methods to solve problems, Products consisting of facts, principles, theories, and laws, and Implications, applications of scientific methods, and scientific concepts in daily life (Sari, 2017).

The General Biology course in the Department of Biology FMIPA Unimed is one of the compulsory courses and still uses the KKNI curriculum, but in the future it will use an OBE-based curriculum so that it is necessary to update the learning

equipment for the General Biology course. Problem-solving skills are skills that need to be developed in biology learning and biology learning can equip students with positive values (Utami & Dewi, 2017). In the General Biology course at the Biology Education Study Program of UNIMED, it consists of three credits (SKS), divided into two credits for theory and one credit for practical sessions. The General Biology lectures in the Biology Education program at UNIMED have not yet implemented case method and project-based learning. It is Necessary to Develop General Biology Course Learning Equipment Based on Case Method and Project-Based Learning in Accordance with OBE Curriculum.

Based on the background outlined above, the research title could be " The Validity of General Biology Learning Equipment based on Case Method and Project Based Learning".

METHOD

This research includes developmental research. this research product is a case method and team project-based course learning tool in general biology courses that is valid. This development research refers to the 4-D model (four-D model) which consists of four stages, namely the define stage, the design stage, the develop stage, and the dissemination stage (Indrianti et al., 2024). In this research, the focus is on the development stage, following validation of the instructional materials. The definition stage in this study begins with recognizing the General Biology material, student exercises and assignments, learning strategies and models based on case methods and project-based learning, as well as the evaluation of the learning outcomes to be used. The second stage is design. The researcher designed the development of learning equipment for general biology courses consisting of Semester Learning Plans (RPS), Student Task Designs (LKM), and learning outcome assessment sheets. In the third stage, namely development. The compiled device is validated by four validators. The validation process involves two content experts and two language experts. This study uses a data collection technique using a validation method through the provision of validation sheets to expert validators to determine the validity of the learning equipment developed. The data analysis technique in this study was carried out by calculating and analyzing the average results of the validation score of the learning tool from expert validators.

To calculate the percentage of validity results, the following formula is used:

$$P\ \% = \frac{Total\ score\ of\ data\ collection\ results}{Total\ Score}\ x\ 100\%$$

(Septyaningrum & Lestari, 2023)

Furthermore, to interpret the validity percentage, criteria can be used as presented in Table 1. Learning equipment are said to be good if they have at least valid validation results (percentage > 61%).

Table 1. Validation criteria

No.	Percentage	Validation criteria
1.	81 ≤ P < 100	Very valid
2.	61 ≤ P < 80	Valid
3.	41 ≤ P < 60	Less valid
4.	21 ≤ P < 40	Valid enough
5.	0 ≤ P < 20	Not valid

(Latif et al., 2022)

RESULT AND DISCUSSION

The development of General Biology Learning Equipment Based on Case-Based Method and Project-Based Learning was conducted at the Faculty of Mathematics and Natural Sciences, Department of Biology, Universitas Negeri Medan, following the Syntax of Research And Development (R&D) Method. Based on the Research and Development results that have been carried out, the researchers presented several findings as follows:

The researcher developed/produced a product in the form of the Development of General Biology Learning Equipment Based on Case-Based Method and Project-Based Learning by choosing the Research And Development (R&D) type of research. The development method followed the 4D Development Model, namely Define, Design,

Development, and Dissemination. In this study, the development process progressed up to the development stage.

a. Define

In the Define stage, curriculum analysis is conducted. The curriculum used for developing General Biology learning equipment is the OBE Curriculum. The General Biology course consists of three credits, with a distribution of two credits for theory and one credit for practical work. Therefore, in developing General Biology learning equipment based on case method and project, practical activities are equated with mini-research tasks.

b. Design

In the Design stage, General Biology learning equipment that will be developed are planned. The General Biology learning equipment to be developed include Course Contracts, Semester Teaching Plans (RPP), Student Worksheets (mini-research LKM and project LKM), and task assessment rubrics. The developed learning equipment are tailored to the current OBE Curriculum, which incorporates case method and projects, thus facilitating their use in the learning process.

c. Development Stage

During the development stage, an evaluation is conducted on the completed general biology learning equipment that have been designed. A good learning tool must meet validity criteria set by expert validators (Nial et al., 2021). The developed learning equipment should meet validity requirements, which are achieved by calculating the percentage of achieved scores compared to the ideal score (maximum score) for each aspect assessed, calculating the average percentage of validator score achievements, and then interpreting the data using percentage interpretation based on feasibility achievement criteria. Evaluation by validators is done through discussions about the developed learning equipment. This aims to obtain input from the validators (Latjompoh, 2018).

The validation results by content experts can be seen in the following Table 2.

Tabel 2. The validation results by content experts

Validator	Percentage	Result
Prof. Dr. Masdiana Sinambela, M.Si	93,3%	Very Valid
Widia Ningsih, M.Pd	80%	Valid

The development of General Biology Learning Equipment Based on Case Based Method and Project Based Learning has currently received validation results both in terms of content and language. The developed learning equipment have been validated by Content Expert Prof. Dr. Masdiana Sinambela, M.Si, achieving a validation percentage of 93.3%, deemed suitable for field testing with some revisions. Additionally, Ms. Widia Ningsih, M.Pd, provided a validation percentage of 80%, concluding it suitable for field testing with revisions including adding assessment criteria F1, F2, F3, and F4 (according to the latest rules), detailing the contract between lecturer and students, adding lecture rules, and specifying the objectives, theory, equipment, and materials in the Student Worksheet. From the validation results of both content experts, the overall validation percentage obtained is 86.65%. This indicates that the General Biology Learning Equipment Based on Case Based Method and Project Based Learning are considered valid for use in the General Biology learning process.

The validation results by language experts can be seen in the following Table 3.

Tabel 3. The validation results by language experts

Validator	Percentage	Result
Halim Simatupang, M.Pd	92,5%	Very Valid
Ahmad Safwan S. Pulungan, M.Si	70%	Valid

The validation by language experts, Mr. Halim Simatupang, M.Pd, concluded that the tool is suitable for field testing without revisions, achieving a percentage of 92.5%. Mr. Ahmad Safwan S. Pulungan, M.Si., achieved a percentage of 70%. Therefore, the overall validity from the language experts is 81.25%. This means that the General Biology Learning Equipment Based on Case Based Method and Project Based Learning have

been deemed linguistically valid by the validators for use in the General Biology learning process. Based on the validation results from both content and language experts, the development of General Biology Learning Equipment Based on Case Based Method and Project Based Learning is deemed suitable for use by students and lecturers in teaching General Biology courses.

CONCLUSION

The General Biology learning equipment developed in this study include the syllabus contract, Semester Teaching Plan (RPS), Student Worksheet (LKM), and Rubric for assessing mini-research tasks and projects. These learning equipment are based on case method and project based learning. The research has progressed to the development stage, and the learning equipment have been validated by subject matter experts and language experts. The validation results indicate that the General Biology learning equipment are valid and can be used in teaching activities.

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