



Development of modules based on project-based learning material on block nets and cubes

Aliza Wulandari¹, Siti Quratul Ain², Fitriana Yolanda³

^{1,2,3}Universitas Islam Riau, Pekanbaru, Indonesia

alizawulandari4@gmail.com¹, quratulain@edu.uir.ac.id², fitrianyolanda@edu.uir.ac.id³

ABSTRACT

The project-based module learning model is one learning method that follows current technological developments. This model is an innovative and student-centered learning approach and aims to improve student learning outcomes. The project-based learning module developed aims to improve students' abilities in solving project problems so that students can complete the module containing this project. The research aims to create a project-based learning module for class IV block and cube network materials. This research is research and development using qualitative and quantitative approaches. The method used is Research and Development with a 4D model. The 4D model consists of four main steps. The first step is to define, which involves determining the product to be developed. The second step is design, which involves creating a predetermined product design. The third step is development. Material, design, and language experts are given questionnaires for module testing. Data was evaluated using a Likert scale. The validation results showed that material experts received 82.9 percent of presentations in the very appropriate category, design experts received 81.2 percent, and language experts received 83.1 percent of presentations in the very appropriate category.

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ABSTRAK

Salah satu metode pembelajaran yang mengikuti perkembangan teknologi saat ini adalah model pembelajaran modul berbasis proyek. Model ini adalah pendekatan pembelajaran yang inovatif dan berpusat pada peserta didik dan bertujuan untuk meningkatkan hasil belajar siswa. Tujuan penelitian adalah untuk membuat modul pembelajaran berbasis proyek untuk materi jaring balok dan kubus kelas IV. Modul project-based learning yang dikembangkan bertujuan untuk meningkatkan kemampuan peserta didik dalam pemecahan masalah proyek, sehingga modul berisi proyek ini dapat diselesaikan oleh peserta didik. Metode penelitian ini adalah penelitian dan pengembangan menggunakan pendekatan kualitatif dan kuantitatif. Metode yang digunakan ialah Research and Development dengan model 4D. Model 4D terdiri dari empat langkah utama, yaitu: define, yang melibatkan penentuan produk yang akan dikembangkan. Langkah kedua adalah design, yang melibatkan pembuatan desain produk yang telah ditentukan sebelumnya. Langkah ketiga adalah development, angket diberikan kepada ahli materi, ahli desain, dan ahli bahasa untuk pengujian modul. Data dievaluasi dengan skala likert. Hasil validasi menunjukkan bahwa ahli materi mendapatkan presentasi 82,9 persen kategori sangat layak, ahli desain mendapatkan presentasi 81,2 persen kategori sangat layak, dan ahli bahasa mendapatkan presentasi 83,1 persen kategori sangat layak.

Kata Kunci: media pembelajaran; modul; pembelajaran berbasis proyek

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INTRODUCTION

Learning for 21st-century elementary Schools requires students to engage in learning activities. The success of the teaching and learning process in the classroom largely depends on the teacher's ability to lead the class (Simanjuntak *et al.*, 2024). Teachers must have the ability to support the learning process by creating practical and creative teaching materials to achieve learning objectives. The role of teachers is crucial in achieving educational goals. Teachers must create a learning plan that includes learning activities and sequences for learning to run well. To create enjoyable learning, teachers can help and facilitate student learning by using teaching materials. Learning resources include all materials, media, equipment, and guides that teachers and students use when teaching and learning (Arini & Lovisia, 2019).

Using module materials is also a way to help students understand the learning content. Yaumi in "*Media dan Teknologi Pembelajaran*" explains that a module is a small learning unit that plays a role independently of other modules. Teaching can occur without the need for a teacher to be present. Used as a guide or instruction in carrying out a task or activity. Usually, modules are used in education or training to help participants learn and understand the material systematically. Modules can also contain theoretical explanations, examples, exercises, and evaluations to measure participant understanding. The module aims to convey information clearly and easily understood so that participants can apply the knowledge and skills needed in relevant situations. In the book "*Inovasi Pembelajaran*," Sani explains that the module will provide opportunities for students to work independently.

Teachers can develop students' creativity by creating modules. As a result, teachers should use their imagination to develop methods and modules that present interesting materials. With the modules that teachers have created, students can learn happily and enthusiastically. The role of media in learning is very significant in supporting the smooth running of the teaching and learning process. Thus, the role of media in learning is vital, and increasingly developing media becomes more enjoyable for students. Students must have high imagination in contributing their ideas during the learning process, creating a pleasant learning atmosphere, and enriching the learning environment with new ideas. For this reason, using project-based learning (PjBL) methods is essential in developing 21st century skills and meeting the learning requirements per Kurikulum Merdeka.

SDIT Fadhilah is one of the elementary schools in Pekanbaru that has implemented Kurikulum Merdeka since 2022. However, findings from an interview with a grade IV mathematics teacher at SDIT Al-Hidayah showed that: (1) teachers do not develop their teaching materials. The fact that teachers only use textbooks and LKS when teaching in class shows that their educational resources are lacking; (2) Teachers cannot use technology as a learning medium; (3) Students are not actively involved in asking questions about the subject matter; (4) The learning model used is still conventional and teacher-centered; (5) Students' learning outcomes in mathematics are still low, especially in understanding the concept of cuboid and cube nets.

Several important problems in mathematics teaching have been found based on the issues mentioned. One of them is that teachers have been unable to develop their teaching materials. Teachers' ability to use technology to create modules is also still lacking. In addition, some students do not understand Mathematics lessons by only relying on the teacher's guide books. By using modules, it is hoped that students can better understand the lesson material independently. This problem is in line with other studies on the development of learning modules, which state that there is a lack of student ability in mathematics learning and a lack of teacher creativity in implementing learning, for example, in the use of learning media that is fixated on textbooks only (Astriani & Akmalia, 2022). Another problem that is in line is also found in research, which states that not all Mathematics learning materials can be made into easy projects. Hence, the PjBL model is challenging to apply to some subjects to be taught (Afwa *et al.*, 2023). Therefore,

teachers must use PjBL-based mathematics teaching modules in the curriculum to improve students' mathematical connections.

This study differs from other studies in that it will develop a PjBL-based module media on cuboid and cube nets in class IV of SDIT Al-Hidayah Pekanbaru. So the purpose of this study is to develop a PjBL-based module for grade IV elementary school students that focuses on cuboid and cube material. The learning module developed aims to assist teachers in teaching in the classroom, outside the classroom, to improve student learning outcomes and student learning interests so that students can more easily understand the material explained in this module, and is expected to be a useful alternative for teachers.

LITERATURE REVIEW

Module

Modules are teaching materials that can support the students' learning process. According to Gunawan in "Modul Pelatihan Pengembangan Bahan Ajar/ Modul Pembelajaran," a module is structured educational material with activities to achieve specific learning objectives. The module also includes learning objectives, steps in the learning process, and assessments to evaluate learning achievement. Students can learn independently without much teacher assistance by using additional elements in the learning process (Ramadan & Ain, 2022).

Modules have advantages and disadvantages, the advantages of modules include: (1) Students focus on personal skills because they are generally able to work independently and responsibly; (2) Module competency standards help manage learning outcomes that students need to achieve; (3) The purpose of the tasks given to students is motivation and honing the growth of student abilities. In addition to having advantages, modules also have disadvantages, including: (1) The cost of developing materials is high and time-consuming; (2) The success or failure of a module depends on its preparation, so preparing an appropriate module requires special skills; and (3) Modules cannot be made from all learning materials (Puspitasari, 2019).

Rowntree explains that developing a module requires attention to various aspects, where nine must be considered (Wahyuningtyas & Trisnawati, 2021). First, the module needs to help students find effective methods for learning, such as repeating difficult sections. Second, it will explain the steps that need to be taken before starting to read the module. Third, it will show students' expectations after reading the module. Fourth, it will explain the methods that can be used to understand the module's content, including the estimated time needed to read it. Fifth, it will relate one material to another in the module. Sixth, it will support students who use the module to be willing to try each step to understand the material's content. It is recommended that students engage in various exercises and activities that will motivate them to interact with the subject matter being taught. Seventh, assessing students about their exercises and activities is a significant aspect. Eighth, this evaluation is intended to measure students' understanding of the module. Ninth, it will accompany students in summarizing and reflecting on the knowledge they have gained from the module. There are two types of modules, namely complete Self-Contained modules so that participants can master the knowledge needed without reading other sources, and the Non-Self-Contained Module is not complete, so participants must read other relevant sources to master the knowledge (Rokhayah, 2019).

Fanani, in a thesis entitled "*Pengembangan E-Modul IPS dalam Upaya Meningkatkan Kemampuan Berpikir Kritis Peserta Didik Kelas V SD Gugus Dr. Sutomo Mandiraja Banjarnegara*," states that the contents of the module can be adjusted to suit the needs so that teachers have flexibility in designing it in line with the learning material, student characteristics, and learning environment (lihat: <https://repository.ump.ac.id/13140/>). Illustrations relevant to the learning material can be added and downloaded via Google or other reference sources to make the module content more straightforward. In

addition, the module arrangement process begins by determining the module title. The teacher then prepares books and references, analyzes basic competencies, studies the subject matter, determines competency achievement indicators, and defines the form and type of assessment. The next stage is to design the writing structure and the initial version of the module. After completing the module draft, the module validation and completion are carried out.

Project-Based Learning Model

Project-based learning (PjBL) is a resource needed for students to develop better thinking skills and provide access to students to improve their knowledge and skills. Students can improve their ability to make better decisions when choosing topics, observing, and completing specific projects (Amir & Solida, 2022). PjBL is an innovative learning strategy to improve education and learning (Muis & Dewi, 2021). However, it relates to the learners' competency and the curriculum's objectives. Based on both statements, PjBL is a learning model that learners need to improve their ability to make better decisions when choosing topics, observing, and completing projects.

Project learning models can improve problem solving skills and emotional intelligence (Ain *et al.*, 2021). Therefore, the PjBL model is a learning model that actively involves students in the learning process. This model is also known as student-centered learning (Anwar, 2022). The implementation stages are shown in Figure 1 (Ismanto *et al.*, 2022).



Figure 1. PjBL Steps
Source: Ismanto *et al* (2022)

The steps for implementing PjBL are explained in more detail as follows.

1. Identifying basic questions
Starting learning with key questions that help students complete activities, discuss themes related to real-world realities, and initiate comprehensive research.
2. Prepare a project plan
Planning includes understanding the rules of the game and selecting activities that will help answer important questions. This includes combining a variety of topics, tools, and materials that may be available to complete the project.
3. Make a schedule
Teachers and students work together to create a schedule of activities to complete the project. Activities include creating a project completion plan, determining a deadline for project completion, planning new methods for students, guiding students in creating methods, and asking them to explain their method choices.

4. Monitor students and project progress

The teacher supervises students' activities during the project's completion by accompanying them at each stage. Thus, the teacher takes a leadership role in student activities.

5. Testing Results

Assessments are beneficial because they allow teachers to measure and assess each student's progress and provide feedback on the students' level of understanding. They can also help teachers determine the next steps that students should take.

6. Assess the experience

Teachers and students reflect on the project's activities and results individually and in groups at the end of the learning process.

The PJBL approach aims to teach children to use and apply their knowledge in project learning activities and support them in expressing their creativity and imagination when making projects. By using the PjBL learning model, students have the opportunity to actively participate in solving problems. This can increase student creativity and spark discussions (Wu & Wu, 2020; Almulla, 2020).

In addition to having goals, PjBL-based learning also has advantages and disadvantages. The advantages of the PjBL model are (Dewi, 2022): (1) Students consider learning through projects more enjoyable than other curricula, and are motivated by persistent efforts to complete the project; (2) Develop problem-solving skills from sources that describe a project-based learning environment, allowing students to be active in solving complex problems; (3) Students can develop and practice communication skills, from the results of collaboration and group work in the projects they undertake; (4) By improving learning resource management skills, students are expected to be able to learn and practice managing projects and allocating time wisely to other resources such as equipment to complete tasks.

Behind the advantages, the PjBL model also has disadvantages. The disadvantages of PjBL according to Sunismi in the book "*Pembelajaran Berbasis Proyek*" namely: (1) It takes much time to solve problems and make products; (2) It requires enormous costs; (3) It requires competent teachers who are willing to try new things; (4) It requires adequate equipment, facilities, and tools in its implementation.

Mathematics Learning

Studying Mathematics will hone the ability to think analytically, innovatively, and honestly, and enable mathematical knowledge to solve challenges in everyday life and various other fields (Antari et al., 2022). Mathematics is part of the educational curriculum from Elementary School to College. Mathematics also plays a role in driving progress in the fields of science, engineering, business, and technology. In addition, Mathematics is a discipline that studies concepts through calculations, where understanding concepts requires thinking logically and rationally (Jeheman et al., 2019). Learning Mathematics aims to improve communication skills using numbers and symbols, and improve logical thinking skills that are useful in understanding and solving everyday problems. Mathematics education in schools aims to equip students with critical thinking skills that effectively solve mathematics-related problems (Marfu'ah et al., 2022).

METHODS

This research is a research and development using qualitative and quantitative approaches. The method used is Research and Development with the 4D model. According to Sugiyono in the book "*Metode Penelitian dan Pengembangan: Research and Development*", the 4D model consists of four main steps.

The first step is defining, which involves determining the product to be developed. The second step is designing, which involves creating a predetermined product design. The third step is developing, which involves implementing the design into a product that matches the specified content and testing the product repeatedly until it is valid and feasible. The last step is dissemination. However, this research is limited to the development stage.

The results of each stage are collected for analysis involving the dissemination of products to the public. Information is obtained from primary and supporting data sources. Primary data in this study were obtained from grade IV teachers, several grade IV students, and people who validated media, materials, and language. Secondary data in this study were obtained from existing sources, namely, indexers such as Google Scholar related to this study, books, journals, and theses. The subjects of this study were one grade IV teacher of SDIT Al-Hidayah Pekanbaru and six validators who were experts in their respective fields. There were six validators, with details of each expert having two validators. This research technique was carried out with a preliminary study, namely interviews, and continued with implementation using a questionnaire technique. The instruments used in this study were validation questionnaires (material, language, and design experts) and evidence in documents in the form of photos or images.

This module is measured by validity. There are three types of validation sheets, namely material validation, language validation, and design validation, which can be described as follows (Nafsiah *et al.*, 2019):

1. Material Validity

The validity of the material being tested must be relevant to the ability, lessons, knowledge, and experience. In the material's development, the contents of the book's text are not developed carelessly. Based on the concept of theory, the contents of the teaching materials must be the latest, following scientific developments and research results in science.

2. Language Validity

The use of language must be significant in choosing words, creating effective sentences, and arranging meaningful paragraphs. Even though the module's contents are accurate, packaged attractively, and formatted consistently, if students do not understand the language, the module will not interest them.

3. Design Validity

The design component contains information about how the layout and presentation of printed and non-printed teaching materials will look.

A validator expert assessed the validation questionnaire to determine the quality and suitability of the material with the learning strategy or concept. After filling out the validation questionnaire sheet, the validator expert was asked to determine only one answer that had been submitted. The instrument used in this study was a Likert scale with a data processing formula.

$$P = \frac{S}{N} \times 100\%$$

Information:

P = Score Percentage

S = Total score of data collector results

N = Maximum Score

Then, the average percentage results can be qualified into the eligibility category, as seen in the table below.

Table 1. Product Validity Criteria

No	Score	Information
1	80% - 100%	Very Feasible
2	60% - 79,9%	Feasible
3	40% - 59,9%	Feasible Enough
4	20% - 39,9%	Not Feasible Enough
5	0%	Not Feasible

Source: Arikunto in "Prosedur Penelitian Suatu Pendekatan Praktik"

In addition, each weight of the resulting reviews should be further reviewed, and a fairness score should be calculated using the following formula.

$$X = \frac{\sum x}{n}$$

Information:

X = Total scores

n = Assessors Quantity

$\sum x$ = Final score for each field

Next, there is a formula for the final result percentage, which can be calculated using the following formula.

$$Results = \frac{\text{total score obtained}}{\text{Maximum score}} \times 100\%$$

RESULTS AND DISCUSSION

This research and development resulted in a project-based learning module. It was conducted using a four-stage procedure: the define stage, the design stage, the develop stage, and the disseminate stage. However, the researcher limited this research to the development stage.

Define Phase

At this stage, the researcher determines the product to be developed. The purpose of analyzing media needs is to find out the media needs that are determined by the material and appearance of the development of learning media that will be developed. The analysis helps find out what media is suitable and feasible to use according to the problems in the field. The activities analyze media, teacher, student, and curriculum needs.

Teacher needs analysis aims to determine the problems teachers need to develop modules, both of which are from the module's contents, designed to be attractive, creative, and easy to understand and read by students. The analysis of student needs aims to understand the module developed according to students' characteristics, behavior, and environment, which will later be used as a guide in developing modules based on Project-Based Learning on the material of cuboid and cube nets. At the same time, the curriculum analysis carried out is discussed with teachers for the modules to be developed, and the curriculum is reviewed based on the books used by teachers to determine learning achievements and learning materials.

Designing Phase

At this stage, a module based on Project-Based Learning on the material of cuboid and cube nets is designed and created. Based on the data collected in the definition stage, the following process is the design of the module. The creation of the module begins with the collection and creation of the necessary images. Then, they are entered into the materials contained in the module. The module series can be seen in **Figure 2** below.



Figure 2. Cover, foreword, and table of contents of the module
Source: Research 2024

Next, **Figure 3** shows the contents of the developed module.

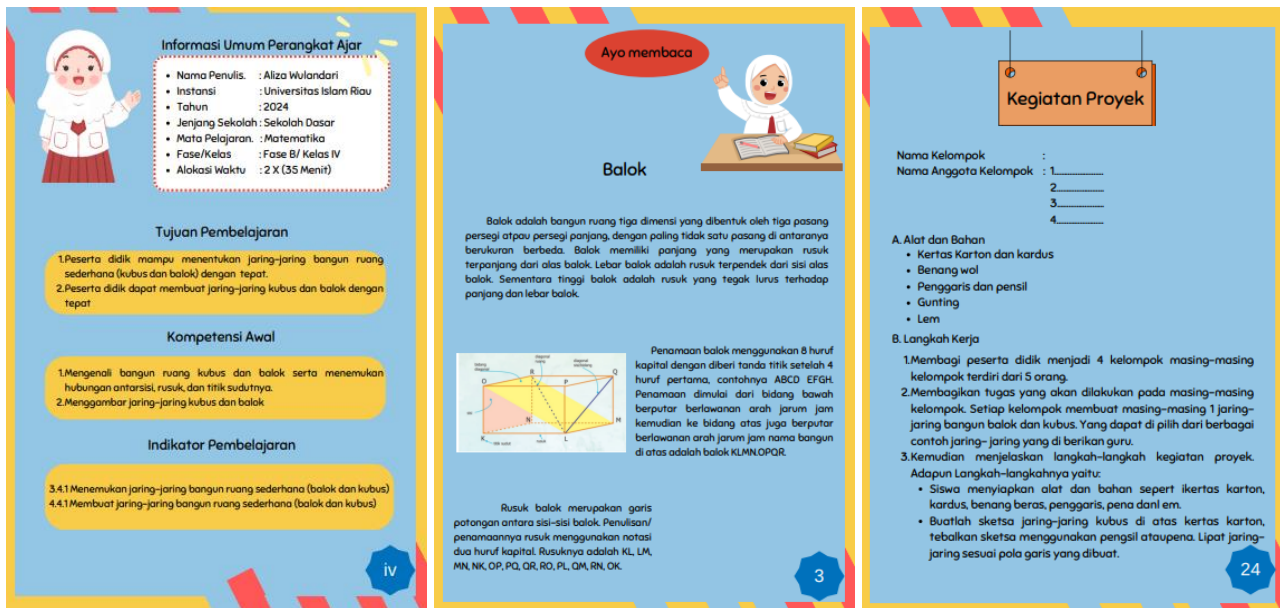


Figure 3. General information and module contents
Source: Research 2024

Figure 4 shows the evaluation section and bibliography of the developed module.

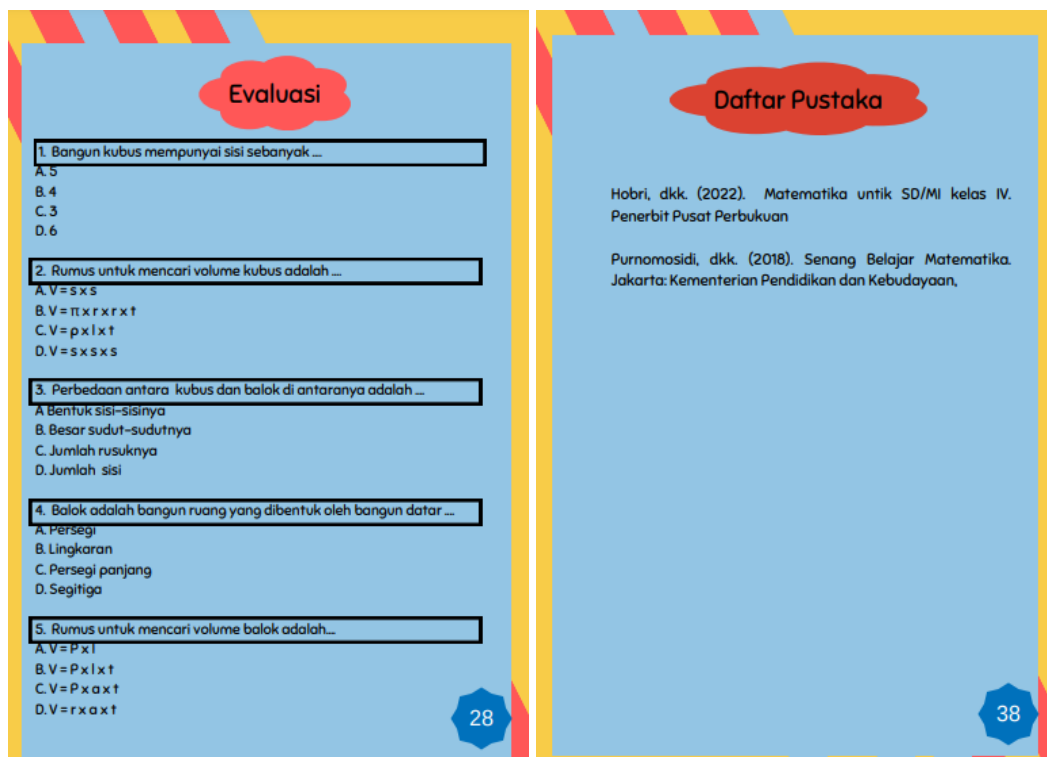


Figure 4. Evaluation and bibliography
Source: Research 2024

The process of creating a PjBL-based module on the material of cuboid and cube nets begins with: 1) conducting interviews regarding the analysis of the needs of teaching materials, students, learning

environments, and curriculum; 2) determining basic competencies in the sub-themes for this teaching material; 3) searching for relevant materials from books and the internet with proven sources; 4) creating image or illustration designs that will be included in the teaching materials. The images or illustrations used are not taken from the internet to reduce plagiarism; 5) creating module components, namely cover, foreword, table of contents, module contents, and questions for the subject matter.

Development Phase

This stage is carried out by making and producing the module according to the design made, and then conducting a validation test of the product that has been completed. Those who carry out the validation test are experts in their fields, usually called validators. This validator evaluates the developed module to determine its advantages and disadvantages. After the validator evaluates if there are any deficiencies, the researcher then revises, improves, and perfects the results of the validator's evaluation for the developed module. After obtaining valid results without revision, the module can be assessed by filling out the validation sheet according to the expert to determine whether the module is feasible.

1. Design Expert Validation

Two people experienced in assessing designs conducted the design validation. Table 2 shows the very feasible category for the project-based learning module design.

Table 2. Design Validation Results

No	Assessment Aspects	First Expert First Validation	First Validation, Second Expert	First Second Expert Validation	Validasi Kedua Ahli Kedua
1	Modul Size	75%	75%	75%	100%
2	Cover	81,25%	78,125%	87,5%	87,5%
3	Module Contents Design	75%	75%	75%	90,90%
	Average	77,08%	76,04%	79,16%	92,80%
	Total Average	81,27% (Very Feasible)			

Source: Research 2024

2. Validation of Material Experts

Two experts validated the material in the assessment. Table 3 shows the very feasible category of the project-based learning module material.

Table 3. Material Validation Results

No	Assessment Aspects	First Expert First Validation	First Validation, Second Expert	First Second Expert Validation	Second Expert Validation
1	Suitability of materials	87,5%	75%	93,7%	75%
2	Material presented	85%	75%	100%	100%
3	Easy to understand material	75%	75%	75%	75%

No	Assessment Aspects	First Expert First Validation	First Validation, Second Expert	First Second Expert Validation	Second Expert Validation
4	Evaluation or practice questions	85%	75%	85%	80%
	Average	83,1%	75%	88,4%	85,4%
	Average Total	82,95% (Very Feasible)			

Source: Research 2024

3. Language Expert Validation

Two experienced linguists conducted language validation. Table 4 shows that the language in the project-based learning module has a very feasible category.

Table 4. Language Validation Results

No	Assessment Aspects	First Expert First Validation	First Validation, Second Expert	First Second Expert Validation	Second Expert Validation
1	Language requirements	75%	71%	90%	100%
2	Language proficiency	75%	59%	100%	95%
	Average	75%	65%	95%	97,5%
	Total Average	83,125% (Very Feasible)			

Sumber: Penelitian 2024

The design expert considers the design assessment aspects in the PjBL-based module. The design expert consists of two experts: a Lecturer in Communication Science at the Islamic University of Riau (UIR) and a teacher from SD IT Al-Hidayah Pekanbaru. The design expert who acts as a validator assesses the design aspects on the validation sheet provided as a questionnaire. Two media trials were carried out during this validation process. In the initial validation stage, the result was 76.56 with a qualified status. The design expert gives suggestions and input related to the product. After that, improvements are made to the product based on suggestions and input from the initial validation. Furthermore, a second verification trial was carried out, which achieved a success rate of 85.98% and was categorized as feasible. In this case, it can be seen that the PjBL module concept can be applied, especially with a design appropriate for the education level.

Next is the assessment of material experts on the PjBL-based module. These material experts consist of two experts: a Lecturer in Mathematics Education at UIR and a teacher at SD IT Al-Hidayah Pekanbaru. The material experts who serve as validators assess various aspects of the material by filling out a questionnaire on the validation sheet that has been provided. In this validation process, two material tests were conducted. In the initial validation stage, it was found that 79% were in the feasible category. Experts in the field of design provided suggestions and views on the product. After that, improvements were made to the product based on suggestions and input that had been previously validated. Furthermore, a second validation was carried out with a success rate of 86.9%, and it met the very feasible criteria. The use of PjBL-based modules is highly recommended in learning activities.

Validation from linguists focuses on considering aspects of language use assessment in PjBL-based modules. These linguists consist of 2 experts: a Lecturer of Elementary School Teacher Education UIR

and a teacher at SD IT Al-Hidayah Pekanbaru. The linguists who act as validators provide an assessment of the language aspects on the validation form available in the form of a questionnaire. In this validation process, media testing experiments were carried out twice. In the initial check, 70% of the types were feasible. A linguist provides recommendations and opinions about the product. Then, improve the product based on suggestions and initial validation. Then, a second validation was carried out, which was successful with a high percentage of 96.25% and considered very feasible. This can be tested by determining whether modules based on project-based learning can be applied in the learning process.

Figure 5 presents the results of research on all aspects of the PjBL-based module by design experts, material experts, and language experts in the first and second validations in the form of a diagram.

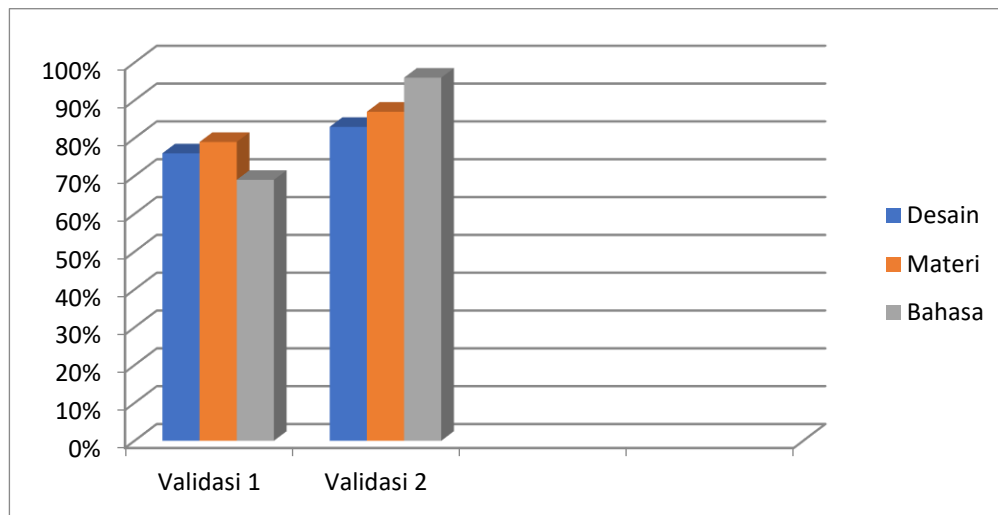


Figure 5. Overall Research Results: Aspects
Source: Research 2024

Discussion

Elementary school students have several principal characteristics that can be divided into several areas, such as thinking and language skills, physical growth, and personality development. So, in carrying out the learning process, educators need to focus on delivering lesson materials and developing student character as the primary goal. In their development, elementary school grade IV students can argue using correct grammar, think progressively, and listen critically (Pebriyanti & Badilla, 2023). In addition, elementary school students are still classified as children who can work together with others, adapt to the environment, enjoy playing in groups, understand and follow the rules that apply in the social environment and from parents, and can distinguish one thing from another.

The PjBL model provides opportunities for students to work with other individuals or in groups to complete projects or assignments related to the subject matter (Yuniarti, 2021). This model also improves their competence in solving problems, working together, and creating. PjBL has a significant impact on the development of students (Syawalina *et al.*, 2024). This learning model is not only limited to activities in the classroom, but also involves activities outside the classroom, such as conducting interviews and visiting the field. By having clear and relevant educational goals, students can also increase their intrinsic motivation. In the project-based learning model context, the teacher's task changes.

According to Kusumawati and Maruti in "*Strategi Belajar Mengajar di Sekolah Dasar*," the teacher's role is limited to teaching and includes tasks as a facilitator and guide. The teacher provides guidance, supports students during learning, and provides constructive feedback. Students are more actively involved in this

learning process and are more committed to the projects they complete. Thus, PjBL provides a more interesting and meaningful learning experience for students. This model functions not only as a conveyor of conceptual understanding to students but also as a supporter in developing skills and attitudes related to everyday life (Wulandari *et al.*, 2019). Mathematics learning using the PjBL model has an impact on (Nurul & Wardani, 2019): 1) Communication skills, critical thinking, creativity and collaboration of students are developed through the projects being worked on; 2) Increasing the ability to direct groups, so that they can organize the division of tasks so that the project can be completed successfully; 3) Cultivating a competitive spirit among students.

Modules that can attract students' interest are one way to support PjBL. Modules are an important part of learning because they help students gain basic knowledge about the subject studied (Suastika & Rahmawati, 2019). The goal is to facilitate learning to achieve the goals of skills and attitudes. The module is designed so students can learn independently, and teachers can help and guide students during the learning process. In addition, the module is intended to increase student motivation and improve the learning process. The module can be an alternative learning medium for students (Rusmanto & Rukun, 2020; Imania *et al.*, 2022).

Project-based modules are a type of learning that focuses on building students' skills and knowledge through real projects. It is expected to be well implemented in elementary schools because interesting, innovative, and creative modules allow students to participate more actively and be motivated in the teaching and learning. By using modules to present materials in a creative, engaging, and innovatively, teachers can gain convenience in their role as facilitators, and students will benefit because they can learn independently wherever they want (Dewanty & Farisya, 2023). Thus, students will be motivated to learn. Modules are tools that help teachers deliver lessons to students (Saputri & Ramadan, 2022). This module's teaching method can increase students' interest in the lesson because it uses interesting pictures or illustrations. Using illustrations in the learning process can potentially increase students' understanding and interest (Buckley & Nerantzi, 2020). As a result, students responded positively to the use of modules in learning. This module can provide a visual depiction of the material explained. By modifying the addition of a project-based learning model to the module, it is hoped that it can overcome students' sustainability in the learning process (Erdi & Padwa, 2021). Thus, PjBL is an effective option in increasing the use of modules as a learning tool in elementary schools.

The development of the module in this study is expected to help increase student interest and produce scores that are not as low as before. The results of the design validation test that have been presented are with an average score of 82.4%, which is a very feasible category. The validation results were obtained from the assessment results given by validator experts in their respective fields. This shows that the developed module design is suitable for use in the teaching and learning process in the classroom. The steps for making this research module are curriculum analysis, choosing a title, and writing the module. First, this analysis is carried out on the independent learning curriculum so that it can be adjusted to the curriculum studied by teachers and students. Second, the placement of the module title, where the module title refers to the learning outcomes.

Researchers added a project-based learning model that can produce a product made by students, where the module title highlights the material on cuboids and cube nets. Moreover, writing the module is the last step. This module consists of several components. The components of this research module are the cover, foreword, table of contents, module contents, study instructions, learning materials, activity sheets, student worksheets in the form of informative tests, and answer keys. The independent learning curriculum teacher's guidebook is a source of learning achievement for this module, and the material on cuboid and cube nets is the subject of the investigation. Then the material section contains pictures or illustrations that can attract students so they do not get bored, and a project-based learning model can produce products. It has three sub-materials, so the material is developed and studied more widely. Each sub-material is

equipped with exercises or worksheets for students so that they can determine whether students understand the material discussed in this module.

CONCLUSION

The PjBL module is a teaching material developed in this study. Identifying materials that are relevant to learning outcomes and objectives that need to be achieved is part of making this module. You should also think about how to make project-based learning modules more interesting. Studies show that modules are practical learning tools that can be used as learning tools and will be more interesting with innovations. PjBL provides learners with space and opportunities to process and manage learning in the classroom by involving project work or many people. Based on the analysis of research data and discussion, it can be concluded that the learning module for cuboid and cube net material, based on the project, uses three stages: defining (Define), planning (Design), and developing (Develop). Based on the validation results of design, material, and language experts, this module gets an average of 82.4% and is in the very feasible category. Future research is expected to be able to develop project-based modules as a reference for creating other project-based modules or further refining existing project-based modules.

AUTHOR'S NOTE

The author declares that there is no conflict of interest regarding the publication of this article and confirms that the data and content of the article are free from plagiarism.

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