



Development of Project Based Learning Based Ecosystem Module Using the Edcafe AI Platform in III Elementary School Students

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ABSTRACT

The development of information and communication technology encourages the world of education to present learning that is more invovocable, interactive, and student-centered. However, IPAS learning in elementary schools is still dominated by the use of printed teaching materials and lecture methods so that students are less active in the learning process. This study aims to determine the development procedure and validity level of *Project Based Learning Ecosystem Modules* using *the Edcafe AI Platform* in grade III elementary school students. This research uses *the Research and Development (R&D)* method with the ADDIE development model which includes *analyze, design, development, implementation, and evaluation*. The implementation stage was not carried out due to the limited research time. The data collection technique used observation, interviews, documentation, expert validation questionnaires, and teacher and student response questionnaires. The results of the study showed that the *Project Based Learning-based Ecosystem Module* using *the Edcafe AI Platform* obtained a validation percentage of 93% with a very feasible category. The results of the responses of teachers and students obtained an average percentage of 89% with a very feasible category. Thus, the *Project Based Learning* based Ecosystem Module using *the Edcafe AI Platform* is suitable to be used as a learning resource on the relationship between living things and their environment for grade III elementary school students.

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1. INTRODUCTION

Education is one of the important aspects in improving the quality of human resources who are able to face the times. Often with the development of information and communication technology, the world of education is required to be able to utilize technology as a means of supporting learning so that the learning process becomes more effective and meaningful for students. The use of technology in learning can increase interest in learning, facilitate the delivery of materials, and create a more interactive learning experience (Abduhrohman et al. 2025).

In the independent curriculum, Natural and Social Sciences (IPAS) learning aims to help students understand natural and social phenomena that occur in the surrounding environment. One of the materials studied at the elementary school level is the relationship between living things and their environment or ecosystem. This material requires a good conceptual understanding because it relates to the interaction between biotic and abiotic components in daily life (Muttaqin et al. 2025).

Based on the results of observations and interviews conducted at SDN 1 Kedawung, it was found that science learning is still dominated by the use of package books and lecture methods. Teacher-centered learning (*teacher centered learning*) causes students to be less actively involved in the learning process so that the understanding of the concepts obtained is not optimal (Rozali et al. 2022). The continuous use of lecture methods also has the potential to reduce students' interest and motivation to learn if it is not balanced with the use of interesting media or teaching materials (Abduhrohman et al. 2025).

These problems show the need for teaching material innovation that is able to increase student involvement in learning. One alternative that can be used is electronic modules (*E-Module*). E-modules are digital teaching materials that are systematically designed to allow students to learn independently, flexibly, and interactively (Utami and Atmojo 2021). The use of e-modules has been proven to improve students' understanding of concepts and learning outcomes compared to the use of conventional teaching materials (Imansari and Sunaryantiningsih 2017).

The development of e-modules will be more effective when combined with a learning model that places students as the center of learning. One of the appropriate models is *Project Based Learning* (PjBL). The selection of the PjBL model is based on the characteristics of IPAS learning which emphasizes understanding concepts through real experience, investigation, problem-solving, and the relevance of the material to daily life. The PjBL model provides opportunities for students to gain knowledge through direct experience, problem solving, and project completion so that they can increase creativity, critical thinking skills, and student learning outcomes (Almulla 2020; Fahrezi et al., 2020). In addition, the PjBL model is also able to improve students' communication and collaboration skills during the learning process (Khairani Astri et al. 2022).

The development of artificial intelligence technology (*Artificial Intelligence*) also provides new opportunities in the development of digital teaching materials. One of the platforms that can be used is *Edcafe AI. Platform*. It provides a variety of learning features such as material preparation, interactive quizzes, learning videos, and evaluations that can support project-based learning more effectively (Saleh dan Mohamed, t.t.). Utilization *platform Digital* in the preparation of teaching materials can improve the quality of

learning and provide a more engaging learning experience for students ([Alyusfitri et al. 2024](#)).

Previous research has shown that Project-Based Learning-based e-modules can increase the creativity, interest in learning, and critical thinking skills of elementary school students ([Kartika Fajar Pratiwi et al. 2023](#); [Irawan et al. 2024](#); [Agus Riyanto et al. 2026](#)). Previous research has generally examined the development of digital teaching modules or materials separately, the application of PjBL in learning, or the use of digital technology as a learning medium. Meanwhile, the integration of PjBL with *Platform Edcafe* AI in an ecosystem module that provides materials, project activities, and various interactive learning activities has not been studied specifically at the grade III level of elementary school. This condition shows that there is a research gap (*research gap*) as well as the need to present teaching materials that not only present the material digitally, but also facilitate active student involvement through project-based learning experiences and the use of AI technology. Therefore, this research was conducted to develop an Ecosystem Module based on *Project Based Learning* Using *Platform Edcafe* AI and knowing its level of feasibility as a digital teaching material for third grade elementary school students.

2. RESEARCH METHODS

This study uses the *Research and Development* (R&D). Research and development methods are methods used to produce a particular product as well as test the feasibility of the product before it is widely used ([Jul 2024](#)). The development model used is ADDIE which consists of five stages, namely *Analysis, Design, Development, Implementation, and Evaluation*.

The research was carried out at SDN 1 Kedawung, Kismantoro District, Wonogiri Regency. The research subjects consisted of students and teachers in grade III of SDN 1 Kedawung.

In the analysis stage, the researcher conducts observations and interviews to identify the learning needs and problems faced by teachers and students. The design stage is carried out by compiling module designs, determining materials, learning objectives, project activities, and research instruments. Furthermore, in the development stage, the researcher compiles modules using *Platform Edcafe* AI by integrating ecosystem materials, learning videos, interactive quizzes, and PjBL-based projects. The evaluation stage is carried out through expert validation and product revision based on the suggestions provided by the validator ([Your Excellency, t.t.](#)).

The data collection techniques used include observation, interviews, documentation, validation questionnaires of material experts, media experts, linguists, and questionnaires of teacher and student responses. Data was analyzed using quantitative descriptive analysis techniques in the form of percentages to determine the feasibility level of the developed product ([Ramasari et al. 2024](#)).

3. RESULTS AND DISCUSSION

The results of the development of a *project-based learning* ecosystem module using the *Edcafe AI platform* for grade III elementary school students.

The development of the module is carried out based on the ADDIE model which includes the analysis, design, development, implementation, and evaluation stages. At the needs analysis stage, information was obtained that science learning in grade III still depends on package books and lecture methods. This condition causes students to be less active and experience difficulties in understanding the concept of the relationship between living things and their environment which is contextual. Based on these conditions, digital teaching materials are needed that are able to present the material in a more interesting, interactive, and active way in the learning process.

In the design stage, the researcher designed the structure and flow of the module by considering the characteristics of grade III elementary school students and the syntax of *Project Based Learning* (PjBL). The module is systematically arranged starting from the introduction to the learning evaluation. The introductory part consists of a cover page, instructions for using the module, foreword, and table of contents. The core part contains the material "The Relationship of Living Things with Their Environment" which includes the definition of living things and the environment, biotic and abiotic components, relationships between living things, symbiosis, competition, predation, simple food chains, and efforts to maintain environmental balance. The material is presented using simple and communicative language, equipped with illustrations or images that are relevant to the students' environment to help concretize the concepts learned.

The presentation of the material in the module is not only in the form of text, but combined with various digital media. Images are used to provide visual representations of concepts, while learning videos are used to provide examples of the phenomenon of the relationship between living beings and their environment in a more realistic way. After learning the material, students are directed to carry out interactive activities in the form of quizzes and exercises to find out their understanding of the material. The module is also equipped with project activities that are prepared based on the stages of PjBL, namely the presentation of basic questions or problems, project planning, preparation of activity schedules, project implementation and monitoring, presentation of project results, and reflection on the learning process and results. Through these activities, students not only gain theoretical knowledge, but also apply concepts through activities related to environmental conditions around them.

The module design is adjusted to the characteristics of the cognitive development of elementary school students who are at the concrete operational stage. Therefore, learning materials and activities are designed by prioritizing concrete examples, visualizations, observation activities, and problems that are close to students' daily lives (Bujuri, 2018; Fransiska et al., 2024). In addition, project activities are designed to be carried out simply and in accordance with the abilities of grade III students, both individually and in groups.

In the development stage, the design was realized using the *Edcafe AI Platform*. The use of this platform allows all module components to be integrated into one digital teaching material. The module structure is arranged sequentially so that students can

take part in learning starting from reading instructions, studying materials, observing visual and video media, working on interactive activities, carrying out projects, to doing evaluations and reflections. The interactive quiz feature is used to provide exercises and evaluations of students' understanding, while the multimedia feature is used to integrate images and videos into the material. Project activities are placed as concept application activities so that students can connect the knowledge gained with real problems in the surrounding environment.

With this design, the module not only functions as a source of materials, but also as digital teaching materials that integrate materials, multimedia, interactive activities, and project-based learning in one system. The integration is designed to create a more active, contextual, and meaningful learning experience for grade III students in learning the relationship between living things and their environment.

Product Validation Results

Product validation is carried out by material experts, media experts, and linguists. The validation results show that the developed modules obtain a very feasible category.

Table 1. Expert Validation Results

Validator	Percentage	Category
Material Expert	91%	Highly Worth It
Media Member	90%	Highly Worth It
Linguist	98%	Highly Worth It
Average	93%	Highly Worth It

The validation results showed that material experts obtained a percentage of 91%, media experts 90%, and linguists 98%, with an average of 93% and a very feasible category. The highest percentage was found in the language aspect (98%), which showed that the language in the module was clear, communicative, and in accordance with the characteristics of grade III students. The lowest percentage was found in the media aspect (90%), although it was still in the very feasible category. This shows that the display and presentation of the media has met the eligibility criteria, but there is still room for improvement. Overall, the validation results show that the module has met the feasibility aspects of content, media, and language so that it is very feasible to be used as a teaching material for IPAS grade III elementary school.

Results of Teacher and Student Responses

After revision based on validator input, the module was piloted on students and teachers of grade III of SDN 1 Kedawung.

Table 2. Results of Teacher and Student Responses

Validator	Percentage	Category
Individual Test	87%	Highly Worth It
Small Group Test	89%	Highly Worth It
Large Group Tests	90%	Highly Worth It
Teacher's Response	93%	Highly Worth It
Average	89%	Highly Worth It

After revision based on validator input, the product was then tested for readability and limited user response to students and teachers in grade III of SDN 1 Kedawung. This test aims to determine user responses to the module, including aspects of ease of use, attractiveness of appearance, clarity of material, readability, and usefulness of the module in supporting learning. The test is carried out through individual tests, small group tests, large group tests, and filling out teacher response questionnaires.

The measurement results showed that the individual test obtained a percentage of 87%, the small group test 89%, the large group test 90%, and the teacher's response 93%. The overall average was 89% with the category of very feasible. The results showed that the module could be understood and used well by students and obtained positive responses from teachers. The highest percentage was found in the teacher's response of 93%, while the lowest percentage was found in the individual test of 87%. However, all results were in the very feasible category. This test was conducted to determine the feasibility and initial acceptance of the product, not to measure the effectiveness of the module on student learning outcomes. Therefore, the research did not reach the stage of widespread learning implementation.

Discussion

The results showed that the *Project Based Learning Ecosystem Module* using the *Edcafe AI Platform* obtained a very high level of eligibility, with an average validation result of 93%. The results showed that the module had met the feasibility aspects of content, media, and language so that it was suitable for use as digital teaching materials for grade III elementary school students. This feasibility was supported by the systematic presentation of materials and the use of images, videos, interactive quizzes, and project activities in the module.

The use of the *Project Based Learning* (PjBL) model is in line with the theory of constructivism, which views that knowledge is built through students' experience and active involvement in learning (Dewi and Fauziati, 2021; Masgumelar and Mustafa, t.t.). Through projects carried out individually, students have the opportunity to observe, seek information, apply concepts, and produce a work based on the material that has been learned. Thus, students not only receive information from the teacher, but build their understanding through direct experience. These activities can also support the development of creativity, critical thinking skills, and student learning independence.

The application of PjBL in the module is also in accordance with Piaget's theory of cognitive development. Grade III elementary school students are at a concrete operational stage so that it is easier to understand concepts through objects, experiences, and activities that can be observed directly. The material on the relationship of living beings to the environment presented through pictures, videos, concrete examples, and simple projects helps students connect concepts with the conditions they encounter in daily life (Bujuri, 2018). Thus, individual project activities can be a means for students to apply knowledge concretely according to their stages of cognitive development.

In addition, the application of learning through individual projects can still be attributed to Vygotsky's theory of social development, especially through the concept of *scaffolding*. In the process of working on the project, students receive direction and help from the teacher when facing difficulties, then gradually complete the task independently. The guidance helps students achieve higher abilities than can be achieved without help. Thus, learning not only encourages student independence, but also provides support according to the development needs of each student.

The use of *the Edcafe AI Platform* also supports the learning process by integrating materials, images, videos, and interactive quizzes in one digital teaching material. The presentation provides a variety of learning experiences and helps students understand the material through visualizations and interactive activities. These findings are in line with Alyusfitri et al. (2024), who show that the use of interactive e-modules can provide a positive response to learning. The results of this study also support the research of Kartika Fajar Pratiwi et al. (2023), Irawan et al. (2024), and Agus Riyanto et al. (2026), regarding the use of PjBL-based e-modules in supporting the creativity, learning interests, and critical thinking skills of elementary school students.

Thus, the high level of feasibility of the module shows that there is a compatibility between product design, material characteristics, learning theory, and student development stage. The integration of PjBL with *the Edcafe AI Platform* allows students to learn through concrete experiences and project activities independently with the support of interactive digital media, so that learning material on the relationship between living things and the environment becomes more active, contextual, and meaningful.

4. CONCLUSION

The Project Based Learning-based Ecosystem Module using *the Edcafe AI Platform* was successfully developed through the ADDIE model at the analysis, design, development, and evaluation stages. The resulting product is in the form of an interactive digital module that contains ecosystem materials, learning videos, interactive quizzes, evaluations, and Project Based Learning-based project activities.

The validation results of material experts, media experts, and linguists obtained an average percentage of 93% with the very feasible category. Meanwhile, the results of the responses of teachers and students obtained an average percentage of 89% with the very feasible category. Thus, the *Project-Based Learning-based Ecosystem Module* using *the Edcafe AI Platform* is suitable for use as teaching material on the relationship between living things and their environment for grade III elementary school students.

The results of this study have implications for the availability of alternative digital teaching materials that can help teachers present IPAS learning in a more interactive, contextual, and activity-oriented manner. The integration of PjBL in the module provides a space for students to learn through experiences and projects independently, while the use of *the Edcafe AI Platform* supports the presentation of materials through various digital media. This module can be an alternative for teachers in utilizing technology to support IPAS learning in elementary schools. However, this research is still limited to product development and feasibility testing, so further research needs to test the effectiveness of the module on student learning outcomes and skills through broader learning implementation.

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