

Project-Based Learning E-Modules Improve Science Literacy Skills and Character on Minangkabau Cultural Themes

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ABSTRAK

Permasalahan saat ini yaitu kurangnya media pembelajaran yang dapat merangsang kemampuan literasi sains pada anak. Berdasarkan hal tersebut, maka tujuan penelitian ini yaitu untuk mengembangkan E-modul pembelajaran berbasis proyek. Subjek penelitian ini yaitu 1 ahli materi, 1 ahli media, dan 1 ahli bahasa. Subjek uji coba penelitian ini yaitu 4 orang guru (uji kepraktisan) dan 15 anak kelompok B Taman Kanak-Kanak. Metode yang digunakan untuk mengumpulkan data yaitu observasi, wawancara, kuesioner, dan dokumentasi. Instrumen yang digunakan dalam mengumpulkan data yaitu lembar kuesioner. Teknik yang digunakan untuk menganalisis data yaitu analisis deskriptif kualitatif dan analisis kuantitatif. Hasil penelitian yaitu Hasil penelitian di peroleh skor dari ahli materi (85%) dengan kategori valid, skor dari ahli media (67%) dengan kategori valid, skor dari ahli bahasa (96%) dengan kategori sangat valid. Hasil uji praktikalitas guru di peroleh skor (90%) dengan kategori sangat praktis, hasil penilaian kemampuan karakter anak (92%) dengan kategori sangat praktis, hasil penilaian kemampuan literasi sains (90%) dengan kategori sangat praktis. Disimpulkan bahwa e modul pembelajaran berbasis proyek dengan tema budaya Minangkabau dapat mengembangkan kemampuan literasi sains dan karakter peserta didik di taman kanak-kanak.

ABSTRACT

The current problem is the need for more learning media to stimulate children's scientific literacy. Based on this, this research aims to develop a project-based learning E-module. The subjects of this research were one material expert, one media expert, and one language expert. The test subjects for this research were four teachers (practicality test) and 15 kindergarten group B children. Observation, interviews, questionnaires, and documentation are used to collect data. The instrument used to collect data was a questionnaire sheet. The techniques used to analyze data are qualitative descriptive analysis and quantitative analysis. The results of the research are: The results of the research obtained scores from material experts (85%) in the valid category, scores from media experts (67%) in the valid category, and scores from language experts (96%) in the very valid category. The results of the teacher practicality test obtained a score of (90%) in the very practical category, the results of assessing children's character abilities (92%) in the very practical category, the results of evaluating scientific literacy abilities (90%) in the very practical category. It was concluded that project-based learning modules with Minangkabau cultural themes can develop students' scientific literacy skills and character in kindergarten.

1. INTRODUCTION

The development of science and technology brings changes in all areas of life, including early childhood education. With the development of technology and science, access to information in the outside world is getting easier (Lawrence & Tar, 2018; Magen-Nagar & Firstater, 2019; Park et al., 2020). The goal of 21st-century Education is to provide students with knowledge and Education so they have the necessary skills (Hirschman & Wood, 2018; Syartika & Delfi, 2022). Current Education ensures all students have 21st-century abilities, insights, and skills (Maritsa et al., 2021; Rizaldi et al., 2020). The learning that is implemented must be centered on the development of 21st-century skills. Likewise, early childhood education is an effort to provide stimulation that supports the growth and development of children (Antariani et al., 2021; Suryana, 2021). Early childhood learning must be designed to develop 21st-century skills that include creative thinking skills, critical thinking and problem-solving, communication, and

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collaboration (Irma et al., 2019; Nudiati, 2020; Wulandari & Ambara, 2021). One of the goals of 21st-century Education is to train life skills and develop literacy abilities.

However, the current problem is that many students still need to improve their literacy skills. This is reinforced by previous research findings, which state that many students still have low science literacy skills (Afni et al., 2018; Lestari, 2020; Sukowati et al., 2017). Other research also states that low scientific literacy skills are caused by learning less enjoyable activities, making students feel bored while learning (Nofiana & Julianto, 2018; Zahro et al., 2019). Inappropriate learning models or learning media also cause boredom in students. Previous research findings also revealed that inappropriate learning models cause students to feel bored with learning (Diawati et al., 2018; Septiari et al., 2018). Other research also reveals that the lack of learning media causes students to have difficulty learning (Dewi et al., 2019; Rahmatika et al., 2021; Seika Ayuni et al., 2017). This problem was also found in kindergartens. Based on the observations and interviews with the teachers' Council at Bhakti Pediatrica kindergarten, it was found that teachers knew the project-based learning method but needed to understand the implementation of the Pancasila student profile project. In addition, teachers needed help to compile learning activities for the Pancasila student profile project or teaching modules for the Pancasila student profile project. Based on the results of observations on scientific literacy and character skills, data was obtained that children's scientific literacy and character skills had yet to develop optimally.

One of the efforts to overcome this is to develop learning media in electronic modules. Electronic modules (E-modules) are the development of printed modules in digital form that are largely adapted from printed modules (Murniyanto et al., 2022; H. Rahmatika et al., 2020; Ramadayanty et al., 2021). E-modules can also be equipped with interactive testing or evaluation facilities so students can interact more with their learning resources (Kimianti & Prasetyo, 2019b; Kumalasan & others, 2020). The advantage of e-modules compared to printed modules is that their interactive nature makes navigation easier, allows displaying/loading images, audio, video, and animations, and is equipped with formative tests/quizzes that allow immediate automatic feedback (Pramana et al., 2020; Sari et al., 2020; Sugihartini & Jayanta, 2017). Project-based e-modules can also be used to improve science literacy.

Project-based learning (PBL) is a learning method that integrates concepts, skills, and competencies in their direct context by forming teams to complete certain projects (Guo et al., 2020; A. Handayani & Sinaga, 2022; Zeptyani & Wiarta, 2020). Project-based learning requires children to be able to design, solve problems, make decisions, and give children the opportunity to produce new work so that learning becomes meaningful (Penuel et al., 2022; Ulya et al., 2020). Project-based learning is a learning method that uses projects or activities as media, and it has the following characteristics: First, it directs children to make decisions and create their framework. Second, there is a problem or question that must be solved. Third, children are guided in designing a process to achieve predetermined results (Culclasure et al., 2019; Safithri et al., 2021; Ulya et al., 2020). Fourth, each child is responsible for obtaining and managing the information collected to complete the child's project (Amelia & Aisya, 2021; Ningsih et al., 2022). Fifth, the children should be invited to do continuous evaluation. Sixth, children regularly reflect on what they do. Seventh, the expected result is that children produce a product, and its quality is evaluated. Eighth, the class must support change and not make children afraid to make mistakes.

Previous research findings also revealed that learning modules can make learning easier for students (Apriani et al., 2021; Sutama et al., 2021). Other research also reveals that E-modules can be accessed anywhere and anytime, so they can motivate students to learn (Istikomah et al., 2020; Rahmah et al., 2021; Sari et al., 2020). Other studies also reveal that project-based learning can improve student learning outcomes (Amelia & Aisya, 2021; Dewi et al., 2018). Project-based E-modules can facilitate improving students' abilities. The advantages of the E-module being developed are that it is adjusted to the students' characteristics, making it easier for students to learn. In addition, the E-module is also project-based, so it will increase children's learning independence because they will be assigned to create projects that help them think critically. Project-based learning modules to improve the science literacy and character skills of early childhood with the theme of Minangkabau culture in the form of electronic modules with the theme of Minangkabau culture with the sub-theme of getting to know the typical food of Payakumbuh so that students can love and know the typical food of Payakumbuh. Based on this, this study aims to develop project-based learning E-modules.

2. METHOD

The type of research used in this study is development research using the ADDIE development model. The stages of this model are analysis, design, development, implementation, and evaluation (branch, 2009). At the analysis stage, curriculum and needs analysis are carried out. At the design stage, Project-based Learning E-Modules are designed to improve scientific literacy skills and characters in the

Minangkabau Culture theme. At the development stage, Project-based Learning E-Modules are developed to improve scientific literacy skills and characters in the Minangkabau Culture theme. At the implementation stage, project-based learning modules are applied to improve scientific literacy skills and character in the Minangkabau culture theme. Project-based Learning E-Modules are implemented at the evaluation stage to improve scientific literacy skills and characters in the Minangkabau Culture theme.

The subjects of this study were one material expert, one media expert, and one language expert. The subjects of this study were four teachers (practicality test) and 15 children in group B of Labuh Baru Kindergarten. Observation, interviews, questionnaires, and documentation were used to collect data. Observations and interviews were conducted to determine the problems in the field. Questionnaires were used to collect data through assessment results from experts, teachers, and children. The documentation method was used to collect data in the form of a curriculum in the form of P5 Element Dimensions, Teaching Modules, videos of the implementation of research activities, and photos of activities. The instrument used in collecting data was a questionnaire sheet. The research instrument grid is presented in [Table 1](#), [Table 2](#), and [Table 3](#).

Table 1. Grid of Learning Material Expert Instruments

No.	Indicator	Description
1	Suitability of Materials Accuracy	Suitability of material with the character dimensions of the independent curriculum Suitability of material with the achievement of scientific literacy skills Meets standards The material's content is based on the needs of the e-module material. Meets the standards of the independent curriculum The content of the material is based on the theme. The material and images are by the material. Learning activities are based on the characteristics of the child.
2	Update of Materials	The material is presented in an actual manner according to the child's development. The presentation of the material is easy for children to understand The presentation of the material encourages the child's scientific literacy and character skills.
3	Presentation Techniques	The presentation of the E-module is equipped with images Consistency of presentation in learning activities Keruntutuan panyajian
4	Completeness of Presentation	Introductory section Content section Closing section

Table 2. Expert Instrument Grid for Learning Media

No.	Indicator	Description
A	Cover	Cover illustration of e-module drawing the content/teaching material and expressing the character of the object
1		Do not use too many letter combinations
2		The color of the module title contrasts with the background
3		The proportion of the size of the title and subtitle letters and text is more dominant and professional compared to the size of the module and the author's name.
B	Content Design	
4		Using a variety of letters that are not excessive
5		The suitability of the image to the message
6		The spacing between rows of the arrangement with the normal text message
7		Normal letter spacing
8		The attractiveness of the appearance of the project-based learning e-module.

Table 3. Language Expert Instrument Grid

No.	Indicator	Description
1	Straightforward	Sentence structure accuracy
2		E-modules use simple sentences that are easy for teachers and children to understand
3		Use of appropriate language
4	Communicative	Language accuracy is appropriate
5		Sentence writing is clear
6		Use of appropriate sentence spelling
7		Sentences are arranged correctly
8		The word selection structure is clear and appropriate
9	Dialogic and Interactive	Sentence length is appropriate to the child's level of understanding
10		The language used can stimulate child development
11		The language used arouses a sense of joy when learning using e-modules
12	Language Rules	Sentence structure is appropriate to the child's level of understanding
13		The storyline of the e-module is easy for children to understand
14	Terms/Symbols	The use of terms must be consistent according to early childhood in the e-module
15		The use of symbols must be consistent in the e-module section

The techniques used to analyze the data are qualitative descriptive analysis and quantitative analysis. Qualitative descriptive analysis is used to analyze data in the form of input and suggestions provided by experts, teachers, and children on project-based learning E-modules. Quantitative analysis is used to analyze data in scores given by experts, teachers, and children on project-based learning E-modules and to analyze the effectiveness of project-based learning E-module products on science literacy and character skills in early childhood.

3. RESULT AND DISCUSSION

Result

The results of each stage of ADDIE development carried out in developing E-module project-based learning with the theme of Minangkabau culture are as follows. First the analysis stage. At the analysis stage, needs analysis and curriculum analysis are carried out. Needs analysis is carried out to determine the level of need for the project-based learning module to be developed. To determine the level of need for the development of e-module project-based learning, a focus group discussion (FGD) was held with the Bhakti Pediatrica Kindergarten Teachers' Council. Based on the results of the FGD, it was concluded that the Bhakti Pediatrica Kindergarten Teachers' Council already had knowledge of project-based learning and had carried out project-based learning activities, but the project activities carried out were by the learning theme and were carried out for one day. However, the teacher has yet to understand the application of project-based learning in the Pancasila student-based project activities. The next analysis is curriculum analysis, which researchers conduct to determine the stages of implementing the independent curriculum's project-based learning (P5). The curriculum analysis involves studying the implementation guidelines for the Pancasila student profile project in the foundation phase, analysis of the achievement of scientific literacy skills and character dimensions in the foundation phase, and project theme analysis (P5). Four themes per the independent curriculum guidelines are: 1. I love Indonesia, and 2. I love the earth 3. We are all brothers and sisters 4. Imagination and creativity, analysis of children's ability assessments after project implementation, analysis of project implementation reporting for students and schools.

Second is the design stage. At this stage, the project-based learning E-Module on the theme of Minangkabau culture is designed. At this design stage, the e-module also contains 21st-century Education, 21st-century learning methods, the independent curriculum, and the implementation of the P5 project with the theme I love Indonesia, sub-theme of getting to know Payakumbuh's specialties as a reference for teachers in implementing project learning. The designed learning e-module contains the main material: 1.) The importance of early childhood education 2.) Development of 21st century skills for early childhood. 3.) 21st-century learning methods 4.) Pancasila student profile strengthening project 5.) Getting to know Minangkabau culture about Payakumbuh's specialties. 6.) Stages of implementing the P5 project on the theme of Minangkabau culture. 7.) Stages of reporting the Pancasila student profile project. At the design stage, the researcher designed the e-module using the Canva application.

Third, development. After the project-based learning e-module is designed using the Canva application, the next step is to develop it. Part E of the developed module consists of a cover, foreword, table of contents, instructions for use, bibliography description, and appendices. The results of the development of the project-based learning e-module are presented in Figure 1.

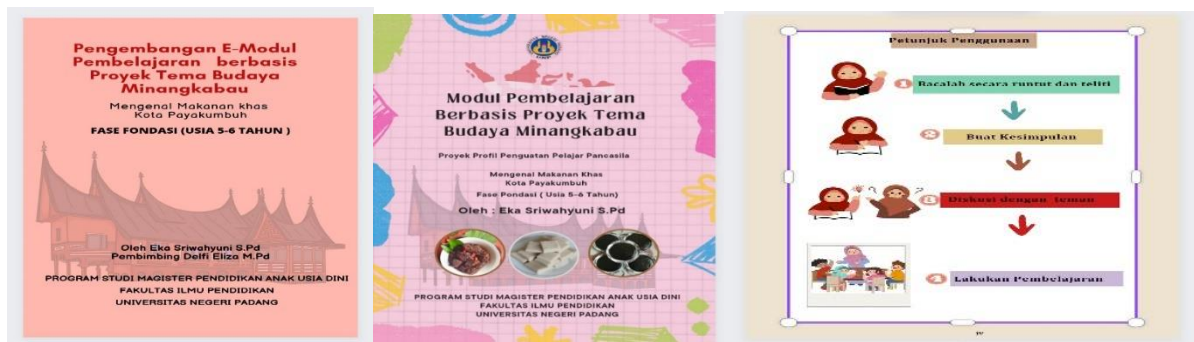


Figure 1. Results of Project-Based Learning E-Module Development

The developed Project-Based Learning E-Module was then tested for validity by three experts. The assessment test results of the learning material expert obtained a percentage value of 85%, thus obtaining a valid qualification. The assessment test results of the learning media expert obtained a percentage value of 67%, thus obtaining a valid qualification. The assessment test results conducted by the language expert obtained a percentage value of 96%, thus obtaining a very valid qualification. The results of the validity test conducted by the validators are presented in Table 4.

Table 4. Overall E-Module Validation Results

No.	Rated Aspect	Total Assessment Score	Percentage	Category
1	Material	47	85%	Valid
2	Media	47	67%	Valid
3	Language	72	96 %	Very Valid
Average			63 %	Valid

The validator also provides suggestions for the designed E-learning module. The validator suggests each material should include a Grand Theory for early childhood 5-6 using basic colors and attractive images. Images and writing in the module should be clear, images should be lively and clear, and attention should be paid to the writing of letters, punctuation, and sentences that are not effective. Furthermore, the developed Project-Based Learning E-Module was revised according to the input given by the expert. A practicality test was carried out after revising the e-module according to the validator's suggestions. The assessment results given by the teacher were 92%, so they were in the very practical category. The assessment results the child gave were 90%, so they got a very practical category.

Fifth is the evaluation stage. At the evaluation stage, an evaluation is carried out on the designed e-learning modules, and the effectiveness of the E-module is evaluated. The developed Project-Based Learning E-Module obtained valid and very practical qualifications, and an effectiveness test was carried out to assess character and scientific literacy abilities. The results of the data analysis showed that the average overall value of character abilities was 92%, so it was included in the very effective category. The results of the data analysis showed that the average overall value of scientific literacy was 92%, so it was included in the very effective category. It can be concluded that the Project-Based Learning E-Module can improve character and scientific literacy in early childhood.

Discussion

The results of the data analysis show that the Project-Based Learning E-Module has a valid and very practical qualification. This is due to several factors, namely as follows. First, the Project-Based Learning E-Module can improve children's character. Early age is the most fundamental early period throughout the span and development of a child's life (Redondo et al., 2020; Timmons et al., 2021; Wilt et al., 2021). The early age phase is a basic or foundational phase that greatly determines a child's life future life (Danylchenko et al., 2023; Fináncz et al., 2020; Maureen et al., 2018). Project-based learning (PjBL) can improve children's character by proactively solving problems, improving critical thinking skills, and developing collaborative and creative attitudes (Rati et al., 2017; Wibowo et al., 2022). In project-based

learning, children can learn important themes or issues to take action, contribute, and impact their surroundings. The Minangkabau-themed project-based learning e-module is one of the teaching materials used to guide learning activities for the Pancasila student profile strengthening project in the foundation phase. Children will have difficulty adapting to their social environment [without the ability to manage emotions and interact socially \(Ananda & Fadhilaturrehmi, 2018; Dewi et al., 2020\)](#). This ability will also help children find their real-life identity and role. Project-based learning e-modules can improve positive character in children. The purpose of the P5 Project on the Payakumbuh City Special Food theme is to foster children's love for their regional specialties and develop children's entrepreneurship through marked-day activities at the end of the project.

Second, Project-Based Learning E-Modules can improve children's scientific literacy skills. Scientific literacy is an individual's scientific ability to use their knowledge in the process of identifying problems, acquiring new knowledge, explaining scientific phenomena, and drawing conclusions based on evidence related to scientific issues [\(Afni et al., 2018; Kimianti & Prasetyo, 2019a; Muzijah et al., 2020\)](#). These skills allow children to process new information through real experiences. In addition, children gain basic skills in observing, comparing, classifying, measuring, and communicating to hone skills that are very important for dealing with everyday life [\(Widayati et al., 2021; Zahro et al., 2019\)](#). Awareness of the importance of providing science to children will increase if we realize that we live in a dynamic world that is developing and changing continuously, even moving toward the future [\(P. H. Handayani & Srinahyanti, 2018; Widayati et al., 2021\)](#). Project-Based Learning E-Modules can improve children's scientific literacy skills because this learning method allows students to learn science through direct experience and practicums. In project-based learning, students will be involved in projects that require them to conduct observations, experiments, and data analysis [\(Hasibuan & Suryana, 2021; Rahardjo, 2014\)](#). This will help students to understand science concepts more deeply and strengthen their science literacy skills.

Third, Project-Based Learning E-Modules can create a pleasant learning atmosphere. Early childhood has several characteristics that must be studied and known by parents and educators to provide the right stimulation so that their growth and development can be optimal [\(Widayati et al., 2021\)](#). Project-based learning E-Modules can create a fun learning atmosphere because this learning method emphasizes direct experience and interesting and meaningful practicums for students. This will provide students with a fun and interesting learning experience because they can see how science concepts can be applied in everyday life [\(Nirmayani & Dewi, 2021; Wibowo et al., 2022\)](#).

Previous research also revealed that enjoyable learning activities will make it easier for students to learn [\(Pahenna, 2020; Pratiwi & Tirtayani, 2021\)](#). Other findings also revealed that E-modules can make it easier for students to learn [\(Sari et al., 2020; Sutarna et al., 2021\)](#). Project-based learning also causes students to become active in learning [\(Aghniarrahmah et al., 2017; Amelia & Aisyah, 2021\)](#). Project-Based Learning E-Modules help children develop critical and analytical thinking skills. In project-based learning, students must collect information, analyze data, and draw conclusions based on existing evidence. This will help students develop their scientific literacy skills, including understanding and evaluating scientific information. The limitation of this study is that it only developed Project-Based Learning E-Modules for early childhood. This study implies that the Project-Based Learning E-Modules developed can help children develop communication and collaboration skills, which are important in scientific literacy and character development. The contribution of this study is that Project-Based Learning E-Modules can improve children's scientific literacy skills effectively and enjoyably.

4. CONCLUSION

The results of the data analysis show that the Project-Based Learning E-Module has a valid and very practical qualification. The results of the effectiveness test show that the average overall value of character and scientific literacy is in the very effective category. It is concluded that the Project-Based Learning E-Module is suitable for use in early childhood learning. In addition, the Project-Based Learning E-Module can improve early childhood's character and scientific literacy.

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