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Development of project-based learning model based on ethno-steam to improve numeracy literacy skills

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ABSTRACT

21st-century learning is learning that prepares students to have the ability to think creatively, critically, and innovatively and master technology. This research aims to analyze and describe the development design, feasibility, and effectiveness of a project-based learning model based on ethno-steam (science, technology, engineering, mathematics, and art) to improve numeracy literacy skills. This research uses the R&D method with ADDIE (Analyze, Design, Development, Implementation, Evaluation). This research was conducted in class VIII MTsN 3 Lima Puluh Kota in mathematics. PjBL, STEAM, and Material experts have validated this learning model. The results of the expert validation obtained an average value of 91% with a very feasible category. The N-Gain results to determine the effectiveness of the ethno-STEAM-based project-based learning model to improve numeracy literacy skills obtained a value of 0.69 in the medium category. The Ethno-STEAM-based project-based learning model is classified as adequate based on the N-Gain results. Developing an ethno-STEAM-based project learning model (Science, Technology, Engineering, Art, and Mathematics) is highly recommended to be applied in mathematics learning and implementing Kurikulum Merdeka.

ABSTRAK

Pembelajaran abad 21 merupakan pembelajaran yang mempersiapkan peserta didik memiliki kemampuan berpikir kreatif, kritis, inovatif serta menguasai teknologi. Tujuan penelitian ini untuk menganalisis dan mendeskripsikan desain pengembangan, menganalisis dan mendeskripsikan kelayakan serta menganalisis dan mendeskripsikan efektivitas pembelajaran project-based learning model based ethno-steam (sains teknologi teknik seni matematika) dalam meningkatkan kemampuan literasi numerasi. Penelitian ini menggunakan metode R&D dengan ADDIE (Analyze, Design, Development, Implementation, Evaluation).Penelitian ini dilaksanakan di kelas VIII MTsN 3 Lima Puluh Kota pada mata pelajaran matematika. Model pembelajaran ini telah divalidasi oleh ahli PjBL, ahli STEAM dan ahli Materi. Hasil validasi ahli tersebut memperoleh nilai rata-rata sebesar 91% dengan kategori sangat layak. Hasil N-Gain untuk mengetahui keefektifan model project-based learning berbasis ethno-STEAM untuk meningkatkan kemampuan literasi numerasi memperoleh nilai sebesar 0,69 dengan kategori sedang. Berdasarkan hasil N-Gain penggunaan model project-based learning berbasis Ethno-STEAM tergolong efektif Pengembangan model pembelajaran proyek berbasis etno-STEAM (Science, Technology, Engineering, Art, and Mathematics) sangat dianjurkan untuk diterapkan dalam pembelajaran matematika, khususnya dalam menyambut kurikulum merdeka

Kata Kunci: Etno-STEAM; literasi numerasi; model pembelajaran berbasis proyek

INTRODUCTION

21st-century learning must prepare a generation that can welcome information and communication technology advancement in social life. 21st-century learning is an implication of the development of society from time to time (Rahayu et al., 2022). Modern educational trends emphasize a student-centered and constructivist approach to teaching students 21st-century skills, the most important of which is the development of mental and metacognitive abilities and problem-solving abilities (Wahba et al., 2022). The rapid development of knowledge and technology in the 21st century did not necessarily improve the ranking of Indonesian students on PISA and TIMSS. In 2015, Indonesia was ranked 64th out of 72 countries participating in PISA and 45th out of 48 in TIMSS (Saraswati & Agustika, 2020). The results of the 2018 PISA Mathematics test taken by junior high school equivalent students, Indonesia was ranked 5th from the bottom, and out of a total of 78 countries that took the PISA test, Indonesia was ranked 73rd with an average score of 379.

Mathematics is a subject that must be taught to students starting from elementary and secondary to tertiary levels. Math learning can train students to think critically, creatively, and logically. In addition, math learning uses calculations or formulas and involves students' reasoning skills in solving a problem (Intan et al., 2020). Mathematics is so essential that at every level of education, from primary to higher education, mathematics is always taught by adjusting to the development of student's cognitive, affective, and psychomotor aspects (Arnidha & Noerhasmalina, 2018). The project-based learning (PjBL) model is a project-based learning that brings many practical benefits to students (Cuong & Tuan, 2021). The project-based Learning model is a learning model that emphasizes the activities of citizens in solving various open-ended problems and applying their knowledge in working on a project to produce a specific authentic product (Fauzi et al., 2019). In its implementation, the project-based learning model is developed with a method that collaborates several related elements, namely science, technology, engineering, art, and mathematics (STEAM).

Zubaidah in (Mu'minah & Suryaningsih, 2020) STEAM (Science, Technology, Engineering, Art, and Mathematics) empowers teachers for project-based learning that involves five disciplines (science, technology, engineering, art, and math) and fosters an inclusive learning environment where all students involved contribute. Science, technology, engineering, art, math (STEAM), which proposes that the relationship between various disciplines should occupy an essential place in the classroom at all stages so that math can be worked on in connection with science, technology, engineering, and art (Rodríguez-Nieto & Alsina, 2022). However, in this research, the author integrates again with the local culture known as Ethno-STEAM. Learning with the PjBL model-based Ethno-STEAM will positively impact students, one of which is improving students' numeracy literacy skills. Literacy is not only the ability to read but also the ability to analyze reading and understand the concepts behind what is read. On the other hand, the power of numeracy is the ability to analyze using numbers.

Preliminary studies at MTsN 3 Lima Puluh Kota based on the results of ANBK (Computer-Based National Assessment) and AKMI (Indonesian Madrasah Competency Assessment) obtained information that for the implementation of ANBK students who participated in ANBK only 45 students were selected directly by the Ministry of Education and Culture which was implemented in 2022 obtained a score of 1.92 for numeracy literacy with the following distribution: students with advanced numeracy skills as much as 13.33%, students with proficient numeracy skills as much as 44.44% and students with basic numeracy skills as much as 42.22% can be concluded that numeracy literacy is still dominated at the proficient level. Then, at the AKMI, which all students at the 8th-grade level attended, the results obtained for the numeracy literacy of students at MTsN 3 Lima Puluh Kota were also at the proficient level. The low level of higher order thinking skills and numeracy literacy skills of MTsN 3 Lima Puluh Kota students can also be seen in

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the results of Madrasah Science Competitions (KSM), which is a science competition organized by the Ministry of Religion for all madrasas starting from Madrasah Ibtidaiyah (MI), Madrasah Tsanawiyah (MTs) and Madrasah Aliyah (MA) throughout Indonesia.

For the MTs level, the contested fields of study are Mathematics, Science, and Social Studies. Based on the results of interviews with the Deputy Head of Academic Affairs and Deputy Head of Student Affairs, information was obtained that since 2016, MTsN 3 Lima Puluh Kota has not succeeded in reaching the national level, especially in the field of mathematics, but in 2018 and 2019 MTsN 3 Lima Puluh Kota students were only able to compete at the provincial level while in 2020 and 2021 they were only able to compete at the district level as well as in 2022 they were only able to reach the district level. To overcome this problem, it is necessary to develop a learning model to achieve the learning objectives of mathematics. One form of development is developing a learning model following the above problems, namely the development of an Ethno-STEAM-based Project Based Learning model (Science, Technology, Engineering, Art and Mathematics).

A study conducted by Rohmantika and Kurniawan (2021) related to using ethno-STEM to improve student creativity showed increased student creativity after using ethno-STEM-based teaching materials. In addition, a study on science education through project-based learning by Santos et al. (2023) found that PjBL in a school setting supported the design of high-quality research projects related to science education and helped students provide evidence to gather information and guided them to involve the local community in science education. Project-based learning model development is considered one form of effective learning model that can be applied in learning mathematics because this model is a learning model that exposes students to a problem so that it can develop students' thinking skills and skills in solving problems and obtaining new knowledge related to existing problems.

As a form of renewal, developing the project-based learning-based Ethno-STEAM. The development of this learning model is also feasible to improve students' numeracy literacy in learning mathematics. This research will determine: 1) How is the development design of the Ethno-STEAM (Science, Technology, Engineering, Art, and Mathematics) based on a project-based learning model? 2) How is the feasibility of a project-based learning model based on ethno-STEAM? 3) How is the effectiveness of project-based learning model based ethno-STEAM in improving numeracy literacy skills? This research aims to analyze and describe the development design, feasibility, and effectiveness of project-based learning model based on ethno-STEAM to improve numeracy literacy skills.

LITERATURE REVIEW

Project Based Learning

21st-century learning prepares a generation with several skills, including thinking skills. These thinking skills include creative thinking, critical thinking, problem-solving, and decision-making (Mu'minah & Suryaningsih, 2020). Project-based learning originated in Rome and Paris in the late 16th century, when architecture evolved from a profession to a school subject (Craig & Marshall, 2019, Muis & Dewi, 2021). The project-based learning teaching model is often referred to as a teaching method that uses problem issues in its system to make it easier for students to understand and absorb the theory given (Anggraini & Wulandari, 2020). Project-based learning has a strategic role in developing 21st-century skills in communication, collaboration, critical thinking, and creativity (Samsudi et al., 2019, Dewi, 2022). The various competencies students need in the current era of globalization are often referred to as 21st-century skills (Andrian & Rusman, 2019). The characteristics of PjBL include: 1) Completion of tasks is carried out independently, starting from the planning stage, preparation, to product exposure; 2) Learners are fully responsible for the project to be produced; 3) Projects involve the role of peers, teachers, parents, and even the community; 4) Train creative thinking skills; 5) The classroom situation is very tolerant of

shortcomings and development of ideas. The steps in the project-based learning model are as shown in the table below:

Table 1. Steps of project-based learning model

No	Steps of project-based learning model
1	Basic question
2	Designing Product Planning
3	Prepare a Manufacturing Schedule
4	Monitor Project Activity and Development
5	Testing Results
6	Evaluation of Learning Experiences

Source: Almuzhir (2022)

Modern educational trends emphasize student-centered and constructivist approaches to teaching 21st-century skills (Wahba et al., 2022). Mathematics is one of the basic sciences that plays a role in improving the abilities of the nation's next generation (Inayah et al., 2021). The project-based learning model involves students actively, personally and in groups, in achieving learning objectives by producing actual products or works (Dinda & Sukma, 2021). Project-based learning applies constructivist principles where students explore knowledge by finding new solutions to main problems or questions (King & Smith, 2020). The project-based learning method brings many practical benefits to students, helping with documentation and thinking systematically (Cuong & Tuan, 2021). In PjBL, students combine knowledge, skills, and practical experience from various fields. Using PjBL is an option to facilitate understanding of the subject matter being discussed because it provides direct practice (Aini et al., 2022).

Ethno-STEAM *(Science, Technology, Engineering, Art, Mathematics)*

The term Ethno comes from the term ethnic in *Kamus Besar Bahasa Indonesia* (KBBI), which means related to social groups in a social or cultural system that has a specific meaning or position because of descent, custom, religion, language, and so on. The STEAM education model holistically combines Science, Technology, Engineering, Arts, and Mathematics and has been implemented globally, primarily in developed countries (Cabello et al., 2021). STEAM was started by the Rhode Island School of Design, which added "art" to the STEM framework. According to the Rhode Island School of Design, the goal is to foster innovation development by combining the thinking of scientists and engineers with the thinking of artists and designers. It is essential as a practice to add the following "arts" to the STEM framework. Modeling, developing explanations, and generating critiques and evaluations (arguments). This is often emphasized in the context of math and science education (Zubaidah, 2019). Education based on solid cultural principles will make students less easily influenced by outside culture. Ethno-STEAM-based PjBL in mathematics learning is related to the independent curriculum, often called the Pancasila Student Profile Strengthening Project, one of the contents of which is the development of local wisdom/culture. STEAM (science, technology, engineering, arts, and mathematics) is designed to integrate the arts into STEM to reshape education in the sciences and humanities (Wahba et al., 2022).

PjBL has become popular in many countries, such as teaching about traditional culture, preserving intangible heritage, and protecting the ecological environment (Ng et al., 2022). Science, Technology, Engineering, and Mathematics (STEM) are essential for developing a country. Aesthetic and artistic aspects in STEAM research are focused on art and how students communicate about and perceive works of art during STEAM-integrated approach interventions (Tan et al., 2021). It can be concluded that Ethno-STEAM is an approach that collaborates several sciences in one learning and is integrated with local wisdom or local culture. The five sciences can be explained as follows: Science is a systematic thought process of knowledge derived from existing theories, laws, and facts to solve existing problems. In this technological context, technology is using and using technology in education. Engineering, the engineering

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tribute, can be explained as engineering techniques used to solve problems in everyday life. Art is a measure of aesthetics or the value of beauty. In the learning process, every human will appreciate something of good aesthetic value. Mathematics is a thought process related to the basic logic of how everything can be evaluated and helps everyone solve daily problems (Wahono, 2022).

Numeracy Literacy

Mathematical literacy is a student's ability to formulate, use, and interpret mathematics in various contexts (Rismen et al., 2022). Literacy and numeracy skills are essential to the student learning process at school. In the narrow sense, literacy is often defined as the ability to read and write, while numeracy is the ability to count (Fatonah et al., 2023). Using numbers, shapes, and math effectively is a vital numeracy literacy skill for solving everyday problems (Putri et al., 2021). Mastery of mathematics will provide a basis for knowledge in other fields inseparable from science and technology (Situmorang & Sinaga, 2022). This creates the next generation with noble character, literacy skills, and competitive competence in the 21st-century era (Widiantari et al., 2022). Numeracy literacy skills make a real contribution to life. Students with good numeracy literacy skills can make decisions and develop their mindset (Zulfayani et al., 2023). The indicators of numeracy literacy are found in the following table:

Table 2. Numeracy Literacy Indicators

No	Numeracy Literacy Indicators
1	Use numbers and symbols related to basic mathematics to solve problems in various daily contexts.
2	Analyze information displayed in various forms (graphs, tables, sections, diagrams, etc.)
3	Interpret the results of such analysis to make predictions and decisions.

Source: Kemendikbud (https://repositori.kemdikbud.go.id/11628/1/materi-pendukung-literasi-numerasi-rev.pdf)

Numeracy literacy skills are scientific abilities in using numbers and symbols related to essential mathematics learning, which can be used to solve problems that occur in everyday life. Then, the information received is analyzed and presented as graphs, tables, and charts. And so on for conclusions. Ethno-STEAM-based Project Based Learning is expected to improve students' numeracy literacy skills because they collaborated with several scientific disciplines to produce an actual project.

METHODS

Research Design and Procedures

This research uses a development model in English called Research and Development (R&D). This research uses a development method with the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation) developed by Dick and Carey (Wijaya, 2019). The ADDIE model consists of five stages including Analysis (Analyze), Design (Design), Development (Development), Implementation (Implementation), and Evaluation (Evaluation), as shown in the chart below.

Participant

The data sources in this study are students of MTsN 3 Lima Puluh Kota class VIII, totaling ten classes, educators, especially teachers who teach mathematics subjects, and experts in the field of the PjBL model and Ethno-STEAM. The sample of this study were students of class VIII. A with purposive sampling technique. This study uses the independent variable (independent variable) and the dependent variable (dependent variable). The independent variable in this study is the project-based learning model based on ethno-STEAM. In contrast, the dependent variable or the dependent variable is the numeracy literacy skills of students.

Data Analysis Technique

The data analysis technique begins with questionnaire validation by learning experts, expert materials, teacher responses, and student responses. In addition, to obtain student learning outcomes, it is also done by giving pretest and post-test questions after being treated with the project-based learning model based Ethno-STEAM. Thus, quantitative data will be obtained from suggestions input from experts and data on student learning outcomes in the form of numeracy literacy skills. The results of the analysis questionnaire data validation conducted by learning and material experts are used to determine the feasibility of the project-based learning model based Ethno-STEAM. Teacher and student response questionnaires are used to determine the response to learning with the project-based learning model based on Ethno-STEAM that has been developed. The results of the questionnaire data analysis will be interpreted using a Likert scale of 1-4. The effectiveness of the project-based learning model based on Ethno-STEAM to improve numeracy literacy skills using the design used is pre-experimental designs with a one-group pretest-posttest design model, namely the pretest before being given treatment and post-test. The formula used to determine its effectiveness is N-Gain. Hake proposed this formula in Wijaya (2019).

$$N - Gain = \frac{S^{postest} - S^{pretes}}{S^{maksimal} - S^{pretes}} X\ 100$$

Table 3. Classification of N-Gain values

Value (g)	Classification
(<g>) ≥ 0,7	High
0,7 > (<g>) ≥ 0,3	Medium
(<g>) < 0,3	Low

Source: Wijaya (2019)

Research Stage Based on the ADDIE Development Model

The analysis stage is carried out by conducting a preliminary study of the problems related to students' numeracy literacy skills and analyzing the need for learning in supporting 21st-century skills. The design stage is carried out by designing the development design of the project-based learning model based on Ethno-STEAM based on needs. It is developing instruments that will be used as questionnaires and test instruments to determine students' numeracy literacy skills. The development stage is carried out to obtain suggestions, input, and validation from learning PjBL experts, STEAM experts, and material experts on the learning model that has been developed. The implementation stage is carried out through trials with 36 students. The trial was conducted by giving a response questionnaire to the project-based learning model based Ethno-STEAM, and the teacher gave feedback related to the project based learning model based Ethno-STEAM using a questionnaire. Then, they were given pretest and posttest questions to determine the effectiveness of applying the project-based learning model based Ethno-STEAM to determine the improvement of students' numeracy literacy skills. The evaluation stage can be carried out during the implementation of the five steps of the ADDIE development model.

RESULTS AND DISCUSSION

The research was conducted to develop a learning model product. The learning model developed is the Project-based Learning model based on Ethno-STEAM (science, technology, engineering, art, mathematics) to improve students' numeracy literacy skills. Based on the methods used in this study, the research results described in this section include a) analysis, b) planning stage, c) product development,

d) implementation, and e) evaluation. The initial stage involves conducting an analysis, including a preliminary study to find out the gaps in the field, then formulating development objectives, analyzing curriculum and materials, and analyzing the characteristics of students. Then, the development planning stage, at this stage, is done to design the framework of the learning model, make the design and features of the learning model, and make learning tools and instruments.

The development stage is one of the core stages in this research process. At the development stage, the design is validated by developing an Ethno-STEAM-based project-based learning model. Validation was carried out on four validators: experts in learning PjBL, experts in STEAM, and experts in materials. Each validator provides input on the feasibility of the project-based learning model developed based on Ethno-STEAM. The feasibility of the project-based learning model based on Ethno-STEAM has been tested with validation from learning PjBL experts, STEAM experts, and material experts. The results of learning expert validation show a percentage of 91,00%, meaning that the project-based learning model based on Ethno-STEAM is very feasible and can be used.

The developed product will be tested in the implementation of learning in the implementation stage. Implementation is carried out in class VIII mathematics learning at MTsN 3 Lima Puluh Kota. The development of this learning model focuses on improving the numeracy literacy skills of students. The implementation step is combined with the implementation of the learning process with the delivery of learning materials from the teacher. The implementation aims to obtain the practicality and effectiveness of developing the Ethno-STEAM-based project-based learning model. The development of the project-based learning model based Ethno-STEAM was implemented at MTsN 3 Lima Puluh Kota with a total of 315 students divided into ten classes. The research lasted for one month, with eight meetings.

The evaluation stage is carried out throughout the five steps of the ADDIE development model. The evaluation used in the research is formative and summative evaluation. Formative evaluation is related to the research and development stage in improving the developed learning model. Summative evaluation is used during the trial implementation to determine the achievement of students' numeracy literacy skills after being given the project-based learning model based on Ethno-STEAM treatment in mathematics learning. The numeracy literacy skills of students can be seen from the pretest and posttest results, as shown in the table below.

Table 4. Pretest Results of Class VIII.1 Student

No.	Value Range	Criteria	Number of Students	Total Value
1.	89-100	Very good	-	-
2.	77-88	Good	-	-
3.	65-76	Simply	-	-
4.	0-64	Less	36	959,89
	Total		**36**	**959,89**
	Average			**26,66**

Source: Research 2023

The table above shows the pretest scores of classes VIII.1 before using the project-based learning model based on Ethno-STEAM, with an average score of 26,66, and they are still in the poor category. After applying the project-based learning model based on Ethno-STEAM in mathematics learning, a post-test is carried out to measure the effectiveness of the learning model in improving students' numeracy literacy skills. The following table presents the post-test results of students' numeracy literacy skills after learning with the project-based learning model based on Ethno-STEAM.

Table 5. Post-test Results of Class VIII.1 Student

No.	Value Range	Criteria	Number of Students	Total Value
1.	89-100	Very good	6	573,32
2.	77-88	Good	13	1099,94
3.	65-76	Simply	12	846,61
4.	0-64	Less	5	280,00
	Total		36	959,89
	Average			77,77

Source: Research 2023

The table above shows the results of post-test data for students in class VIII.1 after using the project-based learning model based on Ethno-STEAM, which obtained an average score of 77,77 with good criteria. Based on the pretest and posttest data of students in class VIII.1, there was an increase in the value of numeracy literacy skills from the increasing average value. Analysis of the effectiveness of the project based learning model based on Ethno-STEAM to improve students' numeracy literacy skills is obtained from a large-scale test. The effectiveness test was obtained from the results of the pretest and posttest. The test questions were given to students of class VIII.1 as research subjects at MTsN 3 Lima Puluh Kota. Pretest and posttest questions are given to students to measure the effectiveness of the project based learning model based on Ethno-STEAM on building space material to improve students' numeracy literacy skills. The results of the N gain score can be seen in the table below.

Table 6. N gain score

Class	Pretest	Posttest	N-Gain
VIII.1	26,66	77,77	0,69

Source: Research 2023

Fifteen questions determine the level of effectiveness in learning activities from students against the product. Recapitulation of student learning results data shows that learning with the Ethno-STEAM-based Project-Based Learning model on the building space material can be effective with the acquisition of an N-Gain Score of 0.69.

Discussion

The discussion in this study is about the characteristics of the development design of the project based learning model based on Ethno-STEAM, the feasibility of the developed project based learning model based on Ethno-STEAM, and the effectiveness of the project based learning model based on Ethno-STEAM to improve students' numeracy literacy skills. Project-based learning (PjBL) has been widely used in science education as a promising teaching approach to enhance cognitive, social, and emotional learning (Tsybulsky & Muchnik-Rozanov, 2021). The results of research conducted by Prajoko et al. (2023) on the project-based learning model with a stem approach to conceptual understanding and student creativity show that the project-based learning model with a stem approach affects students' conceptual understanding and creativity about the human motor system. Research conducted by Conradty Bogner (2020) states that STEAM lessons presented show their influence on student creativity and self-efficacy. Project-based learning affects students' science literacy and creative thinking skills (Suryandari et al., 2018).

The characteristics seen in developing this project-based learning model based on Ethno-STEAM consist of title, learning objectives, learning implementation, materials, and practice questions. The characteristics of the material are presented with text animation, audio, video, and images that interest students, as well as video interviews with resource persons related to numeracy literacy knowledge. The material studied

is related to the mathematics subject of flat-sided space building material (cubes, blocks, prisms, and pyramids). The product produced in this learning is a building space, a miniature gadang house rich in science, technology, engineering, art, and mathematics values. The product that has been developed in this research is the project-based learning model based on Ethno-STEAM. The project-based learning model developed based on Ethno-STEAM is adjusted to the characteristics, conditions, and levels of students so that it is feasible to be implemented into the learning process, especially in mathematics learning. The developed learning model supports the learning process in schools that varies between online learning and direct learning. In its implementation, technological devices used in learning are needed to support the project-based learning process. Learning integrated with local/cultural knowledge strengthens students' understanding of obtaining information by involving the culture where they live.

Culture is the main pillar in people's lives that strongly influences one's behavior in acting. The characteristics of the Ethno-STEAM-based project-based learning model that is packaged in a learning model are designed by lifting the local wisdom of the West Sumatra region, especially the Lima Puluh Kota Regency, including the design of Gadang houses, Katidiang, Kombuk, and so on. The element of local wisdom is intended to provide an understanding of the character values in making a product. In addition to elements of local wisdom, the Ethno-STEAM-based PjBL model explains the reconstruction of mathematical concepts that collaborate with science, technology, engineering, art, and mathematics. Material experts and media experts have validated products in the form of learning models. As well as getting suggestions and input regarding the strengths and weaknesses associated with learning media (Aida et al., 2022). The project-based learning model based on ethno-STEAM is a model that can make students collaborate and build knowledge independently. With this STEAM approach, students can know the form of collaboration between science, technology, engineering, art, and mathematics in learning. Learning with the STEAM approach can also foster students' interest in studying scientific phenomena in learning (Shukshina et al., 2021).

The results showed that learning with the project-based learning model based on Ethno-STEAM was very interesting and improved students' numeracy literacy skills. It is proven based on the trial results by getting the appropriate category. The analysis results show differences in the numeracy literacy skills of students before and after being treated with the project-based learning model based on Ethno-STEAM. This can be seen in both classes' average pretest and posttest scores. The results obtained from the analysis of the effectiveness of the project-based learning model based on Ethno-STEAM are effective in improving students' numeracy literacy skills. STEAM (Science, Technology, Engineering, Art, Mathematic) is an approach that collaborates five knowledge disciplines simultaneously. First is science. Learners can read science phenomena that occur in life and are related to learning materials. The second is technology. Learners can utilize technology in learning. Mastery of mathematics will provide basic knowledge in other fields of science that cannot be separated from science and technology (Situmorang & Sinaga, 2022).

Technology is widely integrated with pedagogy, although the relationship between technology and pedagogy is complex (Ayu, 2023). Research conducted by Pittas and Adeyemi (2019) states that both teachers and students enjoy using technology in the teaching and learning process, and they also rate the suitability and effectiveness of the available technology. Current global challenges in the 21st century encourage STEAM (science, technology, engineering, arts, and mathematics) education and digitalization as a means for humans to become critical actors in the development of sustainable societies that prioritize a sense of worth and global well-being (Aguayo et al., 2023). The third is technique. Learners can determine what techniques are used in making a product or project. Fourth is art. Learners can use art to add aesthetic value to producing a work. Fifth is mathematics. Learners can apply mathematical concepts and procedures in this project-based learning, especially in producing a product. Local wisdom-based learning provides knowledge and understanding to learners about racial, social, religious, ethnic, and national differences.

CONCLUSION

Based on the results of research and discussion, it is concluded that the Ethno-STEAM-based Project Based Learning Model, developed with the ADDIE development model, has the characteristics of learning media packaged in a set used in learning that raises the local wisdom of the West Sumatra region. In addition, the Ethno-STEAM-based Project Based Learning model contains interviews related to West Sumatra's local wisdom, presentation of learning competencies, explanation of scientific integration, and evaluation questions. Project-Based Learning Model based on Ethno-STEAM, the feasibility results from material experts and media experts show that the developed Ethno-STEAM-based Project-Based Learning model has very feasible quality. So the Ethno-STEAM-based Project Based Learning model can be used in learning, especially in learning mathematics. The results of the effectiveness test of the Ethno-STEAM-based Project Based Learning model to improve students' numeracy literacy skills can be said to be effective. It is suggested that future researchers use the project-based learning model based on ethno-STEAM in mathematics learning to measure abilities other than numeracy literacy skills, and this can be done in several schools.

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