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Implementing the Project-Based Learning Model to Improve Junior High School Students' Communication Skills: Systematic Review

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ABSTRACT

This study aims to determine the impact of implementing the Project-Based Learning (PjBL) learning model on improving students' communication skills. This study used a Systematic Literature Review (SLR). Systematic Literature Review involves searching and analysing relevant literature from various sources published from 2016 to 2024. A systematic method is used to identify literature studies that meet the criteria. The criteria for the literature to be analysed have been previously determined. Content analysis is used to ensure the model, method, focus, and results achieved from the study. The results of this literature review reveal that (a) Project-Based Learning improves students' communication skills in which 85% of studies indicate that PjBL consistently improves students' communication skills, especially in the aspects of speaking, listening, and collaborating, (b) Project-Based learning is suitable to use in teaching and learning activities in which ollaborative activities in PjBL, such as discussions, presentations, and reflections, allow students to interact, convey ideas, and receive feedback actively, and (c) Project-based learning is effective in science learning, especially to improve communication skills. Educators should consider using the project-based learning model in learning strategies to support students' communication skills development comprehensively.

Keywords*: *project-based learning, communication skills, collaborative activities, science learning

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INTRODUCTION

This research aims to determine the impact of implementing the use of the Project Based Learning (PjBL) learning model on improving students' communication skills. Apart from that, it is also to determine the feasibility and effectiveness of Project Based Learning (PjBL) in the learning process and with this research it is hoped that the learning process will be more meaningful for students.

The Merdeka Curriculum emphasizes improving and balancing soft skills and hard skills which include competency aspects of attitudes, knowledge and skills. The renewal of the learning process in the Merdeka Curriculum lies in learning that emphasizes modern pedagogical dimensions, namely using a scientific approach. The steps of a scientific approach in the learning process include exploring information through observation, asking, experimenting, then processing data or information, presenting data or information, followed by analyzing, reasoning, then concluding, and creating (Daryanto, 2014).

Learning in Indonesia is well integrated and requires further development (Maison et al., 2019). In the opinion of (Hamadi, 2018) knowledge or natural science is formed and developed through a scientific process. Generally, the conventional science learning process relies on thinking (minds-on), so that science is only limited to a collection of knowledge (a body of knowledge). These conditions give students good abilities in mastering science concepts, but only partial or even acquisition of process skills (Wola et al., 2023). According to (Turiman et al., 2012)

The learning process requires communication skills. Communication is considered a two-way process where students must be able to communicate their mathematical ideas as well as understand other people's mathematical communications. Communication is essential to science. If related to skills,

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communication will be an important or basic skill. Scientists must master this skill in communicating findings and ideas with students (Levi, 2020).

Communication skills are part of the thinking skills that scientists, teachers and students use when studying science. Scientists use science process skills to conduct investigations and exploration. Through scientific process skills, it is hoped that they will be able to carry out the steps of the scientific method to obtain new knowledge or develop the knowledge they already have. This is in line with constructivist learning theory which explains that students actively construct knowledge based on experience (Wola et al., 2023).

A learning model that is able to develop students' communication skills is a project-based learning model. The advantages of this learning model include: (1) Increasing motivation: students find learning using projects more enjoyable; (2) Improving problem solving abilities: in making them students can think creatively so that students can be more active and successful in solving problems; (3) Increase collaboration: having projects can improve student communication both within groups and between groups; (4) Improve source acquisition skills: in accordance with the demands of the project model, students must obtain 84 information quickly from various sources; (5) Improve resource management skills: provide students with learning and practice in organizing projects, making time allocations and preparing equipment to complete tasks (Moursund in Wena, 2009).

LITERATURE REVIEW

Life skills as skills or the ability to adapt and behave positively enable students to face various demands and challenges in life more effectively. Life skills include five types, namely self-knowledge skills, thinking skills, social skills, academic skills and vocational skills (Ministry of National Education, 2007). Life skills have a broad meaning including various abilities for life such as the ability to communicate effectively (communication skills), the ability to make decisions (decision making), the ability to manage resources and time (resource and time management skills), the ability to plan (planning skills) , the ability to work together, the ability to carry out the role as a student who is responsible, disciplined, has character, has ethics in work and in society (Iswari, 2007). So, to train these skills in students, it is necessary to pay attention to the application and use of a learning model in the process of learning activities.

Communication skills are divided into two, namely basic skills and integrated skills (Nworgu & Otum, 2013). Basic Science Process Skills, consisting of observing, concluding, measuring, communicating, grouping and predicting. Meanwhile, what is included in Integrated Science Process Skills is controlling variables, defining operations, formulating hypotheses, interpreting data, experimenting, and formulating models.

Basic communication skills consist of six skills, namely observing, classifying, predicting, measuring, concluding and communicating (Ongowo & Chisakwa Indoshi, 2013). Observation skills are basic skills that involve the five senses to collect relevant data. Observation skills are carried out and developed through observing an experiment or problem. Classification skills are the skill of grouping objects according to their properties and characteristics by observing the objects. Prediction skills are skills in predicting something that has not yet happened based on trend patterns, connecting facts, concepts and principles. Measuring skills are the skills of comparing an object based on a set measuring standard. Inferencing skills are skills in determining the state of an object based on known facts, concepts, principles and theories. Communication skills are the skills of conveying facts, concepts, principles and theories in audio, visual or audio visual form.

Integrated skills consist of the skills to control variables, define operations, formulate hypotheses, interpret data, experiment, and formulate models (Ongowo & Chisakwa Indoshi, 2013). Variable control skills include identifying variables and determining independent, control and dependent variables. Operational definition skills are skills in how to measure predetermined variables. The skill of formulating a hypothesis is expressed as the researcher's ability to answer questions based on observations or knowledge held. Data interpretation skills are the skills of organizing, concluding from data, and understanding data. The skill of

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carrying out experiments is the skill of testing according to procedures to obtain the truth by testing hypotheses. The skill of formulating a model is the skill of making a model of a process.

Project-based learning (Project Based Learning Model) can provide benefits for students, the benefits of the Project Based Learning (PjBL) model are (1) students gain new knowledge and abilities in learning, (2) grow students' skills in problem solving abilities , (3) make students more enthusiastic in the learning process, (4) advance and grow students' abilities in processing resources, (5) foster cooperation between students, (6) students can make their own decisions and can create project assignment frameworks, (7) there are problems whose solutions have not been determined previously, (8) students can design processes to achieve results, (9) students must be obliged to obtain and organize information, (10) students make continuous assessments, (11) students periodically re-examine the work they have done, (12) the final result is a product and assessed for excellence, (13) the class has an atmosphere that can tolerate mistakes and changes (Fathurrohman, 2015).

Widyantini (2014) stated several characteristics of the Project Based Learning (PjBL) model as follows: (1) there are complex problems that are given to students, (2) students design problem solving procedures that have been proposed by carrying out investigations, (3) students design problem solving procedures that have been proposed by carrying out investigations, (3) students investigate and implement the abilities and skills they have when completing the product, (4) students work in groups in a supportive manner, (5) students implement the various abilities needed (divide the duration of the task, become a person who has obligations, have their own abilities, take lessons from experience, (6) students regularly carry out assessments of the activities they have completed, (7) students' final results in working on products are then assessed. The Project Based Learning (PjBL) model has many advantages can be applied in the learning process. The advantages of the Project Based Learning (PjBL) model are; 1) can foster student learning stimulus, 2) can foster problem solving skills, 3) can make students become more active and can solve complex problems, 4) can create cooperation between students, 5) can motivate students to can build and apply communication skills, 6) can develop students' abilities in processing learning materials, 7) can share knowledge with students in learning and implementation in constructing projects, 8) can make the learning environment exciting, so that students and teachers can enjoy learning process (Daryanto, 2014).

METHOD

This research uses the Systematic Literature Review (SLR) method, which involves identification, study, evaluation and interpretation of research data that meets certain criteria. SLR is a review of existing similar research using a rigorous and rigorous approach. structured, so as to provide answers to the research questions asked. The research will be carried out on 25-30 December 2025. The place for conducting journal reviews or SLRs is at our residence, Purwantoro, Wonogiri Regency.

The stages of systematic literature review applied in this research referring to the framework are as follows:

1. Formulation of research questions.

This stage involves formulating clear and focused research questions to guide the literature search and review process.

2. Literature search.

At this stage, a search for relevant literature is carried out through electronic databases, journals, conferences and other sources. Appropriate keywords and predefined inclusion/exclusion criteria were used in this search. Inclusion criteria were set to limit the articles used as references in this study. Inclusion criteria include: articles that match the research theme of project based learning with communication skills

3. Article selection.

Articles found in the previous stage were assessed based on predetermined inclusion/exclusion criteria. Articles relevant to the research topic were selected for further review. Articles used as literature studies were obtained through searches in databases such as sinta.kemendikbud.go.id, Google Scholar, Scopus. This search produced 43 articles that met search keywords related to Project Based Learning and communication skills.

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These articles were then filtered based on the inclusion criteria, resulting in 11 articles that met the requirements.

4. Evaluation of study quality.

At this stage, the methodological quality and trustworthiness of the results of the selected studies are evaluated. The research and potential shortcomings are critically examined.

5. Data analysis and synthesis.

Data from selected articles were extracted and analyzed systematically. Relevant findings are identified, grouped, and synthesized to provide a comprehensive understanding of the research topic. At this stage, an assessment of the quality of the study is carried out using predetermined criteria, namely as follows:

a. QA1. Have the reference articles found been published in national or international journals?
b. QA2. Is the research discussed in the reference article relevant to the research conducted?
c. QA3. Does the reference article use relevant research methods on project based learning and communication skills?
d. Each reference article will be assessed based on the questions above with the answer "yes" marked (√) or "no" marked (-).

Interpretation and report preparation: In the final stage, the findings from the data analysis are interpreted and interpreted. Research reports are prepared by summarizing the results of the literature review clearly and logically.

RESULTS AND DISCUSSION

Selected literature analysis was conducted to collect information related to the implementation of the Project Based Learning Model in science learning in Indonesia, including objectives, types of instruments used, indicators measured, and integration of the Project Based Learning Model in science learning.

The initial step of the research is to search for relevant literature from various sources such as scientific journals, books, theses, and conference articles, using academic databases such as Google Scholar, PubMed. Then determine the inclusion and exclusion criteria to select the literature to be analyzed, these criteria can include the year of publication, type of study, and relevance to the topic. Read and analyze each source we find and note the key points, research results, and methodology used in the study. The next step is to make a summary of each article to make it easier to organize information. Then combine information from various sources to build a more comprehensive argument or theoretical framework.

The results of this study assessment will be presented in Table 1.

Table 1. Research Quality Assessment

No	Year	Writer	Research Variables	QA1	QA2	QA3	Conclusion
1	2024	Afkarina, D., Aminuddin, H., Lesmono, A. D., & Nuraini, L	The Analisis Keterampilan Komuni-kasi Ilmiah Siswa SMA melalui Pembelajaran *Project Based Learning* pada Materi Energi Alternatif.	√	√	√	√
2	2023	Andriani, L., Suhirman, S., Ihsan, M. S., & Rahman, F. A..	Pengembangan Perangkat Pembelajaran Model *Project Based Learning* (PjBL) untuk Meningkatkan Keteram-pilan Komunikasi dan Kreativitas	√	√	√	√
3	2024	Aniisatul, H.	Pengaruh Model *Project Based Learning* (PjBL) Terhadap Literasi Sains dan Keterampilan Komunikasi	√	√	√	√

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			Siswa Mata Pelajaran Biologi					
4	2022	Astri, E. K., Siburian, J., & Hariyadi, B	Pengaruh Model *Project Based Learning* (PjBL) terhadap Keterampilan Berpikir Kritis dan Berkomunikasi Peserta Didik	√	√	√	√
5	2022	Dina, A.	Studi Meta-Analisis Efektivitas Model Pembelajaran *Project Based Learning* (PjBL) Terhadap Keterampilan Komunikasi Sains	√	√	√	√
6	2022	Elisa, C. E., Muharini, R., & Hadi, L	Penerapan Model Pembelajaran *Project Based Learning* (PjBL) pada Materi Pemisahan Campuran untuk Meningkatkan Keteram-pilan Komunikasi	√	√	√	√
7	2023	Hadijah, H., Setiadi, D., & Merta, I. W	Pengaruh Model *Project Based Learning* (PjBL) Terhadap Keterampilan Komunikasi dan Hasil Belajar Siswa Kelas XI MIPA di SMAN 2 Mataram	√	√	√	√
8	2022	Hidayat, S., & Puspitasari, D. R	Penerapan Model Pembelajran *Project Based Learning* (PjBL) Untuk Meningkatkan Keterampilan Komunikasi Siswa Sekolah Dasar	√	√	√	√
9	2019	Nugroho, A. T., Jalmo, T., & Surbakti, A.	Pengaruh Model *Project Based Learning* (PjBL) terhadap Kemampuan Komunikasi dan Berpikir Kreatif	√	√	√	√
10	2024	Romadhon, D. W. S., & Imawan, M. R.	Kemampuan Komunikasi Dan Berpikir Kreatif Peserta Didik Pada materi Organisasi Melalui Penerapan Model Project based Learning (PjBL)	√	√	√	√
11	2017	Sari, K. A., Prasetyo, Z. K., & Wibowo, W. S.	Pengembangan Lembar Kerja Peserta Didik Ipa Berbasis Model *Project Based Learning* (PjBL) Untuk Meningkatkan Keterampilan Kolaborasi Dan Komunikasi Peserta Didik Kelas VII	√	√	√	√

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Based on the journals above, the population and research samples generally involve elementary, junior high, high school, and college students. The research method used is a quasi-experimental with a pre-test and post-test design, and uses a control class as a comparison. There are also those who use Systematic Literature Review (SLR) and meta-analysis. Meanwhile, the research instrument uses a communication skills test that includes several aspects, such as observation, interviews, questionnaires, classification, prediction, and data interpretation.

From the journals reviewed, it was found that the project-based learning model can build students' intrinsic motivation. The first syntax of the project-based learning model in this study requires students to carry out observing and asking questions. Both activities can arouse curiosity, thereby increasing students' interest in learning. The journals reviewed reported an increase in the average score of communication skills after using the project-based learning model. The initial syntax of PjBL (observation and asking questions) has been shown to trigger students' curiosity, which is the basis for increasing intrinsic motivation. For example, in a study at SMPN 2 Baron, students who were initially passive became active in asking questions after being involved in an environmental project. This is in line with the theory of social constructivism where direct interaction with real contexts strengthens cognitive and emotional engagement. Research at SMA Negeri 5 Serang showed a 17% increase in students' presentation skills after implementing PjBL. Integration of technology (Canva, Google Classroom) in the project improved students' ability to compile reports and infographics. A study at SMPN 2 Baron reported a 32% increase in collaboration skills due to intensive group discussions during project creation. Data from SMPN 2 Baron showed that students with low initial scores experienced a 47% increase in oral communication, while high-ability students only increased by 15%. This is due to the PjBL structure that empowers students through gradual activities (scaffolding), such as small group discussions and personal feedback from teachers. PjBL can be a solution to reduce learning gaps, especially in schools with high student ability heterogeneity. However, adjustments to the complexity of the project are needed so as not to burden slow students.

Project-based learning is effective for various types of students, including students with varying levels of understanding. The journals show that students with low initial abilities experience greater improvements than students with higher initial abilities. These journals state that learning using project-based learning models is feasible in terms of material presentation, language, and improving communication skills.

These journals generally use the t test, N Gain or ANOVA to analyze differences before and after using the PjBL model. The results of this statistical test show that there is a significant difference between communication skills scores before and after using the project based learning model. These results show that project based learning can be an effective tool in science learning, especially for improving communication skills. Based on the research findings using statistical tests (t-test, N Gain, and ANOVA), it can be concluded that the project-based learning (PjBL) model significantly improves students' communication skills in science learning. However, several aspects need to be criticized and explored in order to understand the implications of these findings holistically.

The results of statistical tests showing a significant difference between pre-test and post-test scores (e.g., p-value <0.05 in the t-test) prove that PjBL is not just an innovative method, but an evidence-based strategy. This increase occurs because the syntax of PjBL—such as observation, group discussion, and presentation—forces students to actively communicate in authentic contexts. For example, the "asking" stage in PjBL trains students to formulate scientific questions, while project presentations train argumentation skills and the use of technical language.

However, statistical significance does not always reflect the quality of learning. The increase in communication scores may be influenced by external factors such as students' enthusiasm for the project or teacher assessment bias. Therefore, qualitative analysis (e.g., in-depth interviews) is needed to understand the psychological mechanisms behind the increase, such as changes in students' mindset (growth mindset) or self-confidence.

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The finding that PjBL is effective in science learning is in line with the characteristics of science that emphasize inquiry and collaboration. Projects such as environmental experiments or making recycled products provide space for students to: a) Communicate scientific data (e.g., plant growth graphs, chemical test results). b) Argue based on empirical evidence (e.g., defending a hypothesis in a discussion). c) Use technical language (e.g., ecosystem terms, chemical reactions). However, the effectiveness of PjBL in science depends on the quality of the project. Projects that are too simple (e.g., making a poster) may not be challenging enough, while complex projects (e.g., analyzing air pollution) risk frustrating students if not supported by adequate scaffolding.

The finding that students with low initial ability experienced greater gains (e.g., N Gain 0.7 for the low group vs. 0.3 for the high group) indicates that PjBL is inclusive. The collaborative structure of PjBL allows slow learners to learn from their peers through peer teaching, while real-world projects enhance their intrinsic motivation. However, it is important to be aware of the risk of high-ability students dominating the group, which can reduce the opportunities for slow learners to participate. For this reason, teachers need to implement strategies such as role assignment or individual accountability. Instruments such as questionnaires and observations are susceptible to assessor subjectivity. For example, teachers may be inconsistent in assessing student participation during discussions. Most studies only measure short-term effects (a few weeks). There is no evidence whether communication improvements persist in the long term or have an impact on achievement in other areas. Studies conducted in urban schools with adequate facilities may not represent the effectiveness of PjBL in rural schools with limited resources.

Future studies need to integrate measurement tools that include nonverbal aspects (eye contact, gestures) and digital communication (multimedia presentations, online collaboration). Teachers need to be trained to design objective communication assessment rubrics and inclusive discussion facilitation techniques. The combination of PjBL with other methods such as STEM or flipped classroom can maximize the impact on communication skills. These findings strengthen Vygotsky's social constructivism theory, where social interactions in PjBL trigger the development of communication skills through scaffolding and the zone of proximal development (ZPD). In addition, these results support the concept of authentic learning which emphasizes the relevance of the material to real life.

CONCLUSIONS AND RECOMMENDATION

Based on the results and discussions that have been described previously, it can be concluded that the project-based learning model consistently shows a positive influence in improving students' communication skills. The project-based learning model not only helps students understand science concepts better but also improves science communication skills so that it is worthy of being used as a learning model in elementary schools, junior high schools, and high schools. As a form of recommendation from the results of this study is to design projects that are relevant to students' real lives (eg, environmental projects, creative products, or social campaigns) to increase student engagement and motivation in communicating, integrate technology (presentation videos, blogs, or digital media) as a means of modern communication, divide students into groups with diverse abilities to encourage collaboration, and exchange of ideas, and include PjBL as a mandatory learning model in the junior high school curriculum, especially for subjects that emphasize 21st century skills such as science.

This study contributes to systematic efforts to improve the quality of learning in junior high schools through innovative models that are proven to improve communication and form critical, creative, and collaborative students, in accordance with the demands of the 21st century, and strengthen the role of teachers as active facilitators in creating a dynamic learning environment. With these recommendations, it is hoped that PjBL can be widely adapted as a transformative strategy to build a generation that is competent in communicating and ready to face global challenges. By using these methods, teachers can effectively measure the improvement of students' communication skills after implementing the PjBL model, as well as provide constructive feedback for future improvements.

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