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THE IMPACT AND EFFECTIVENESS OF PROJECT-BASED LEARNING IN REMOTE ISLAND SCHOOLS IN SUMATERA

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Abstract. The problem in this research is how the impact and effectiveness of project-based learning in schools on remote islands in Sumatera. The purpose of this study is to analyze the impact and effectiveness of its implementation in remote island schools. The subjects in this research were junior high school students and teachers. The data collection techniques employed were interviews, observation, and documentation, while the data analysis techniques utilized included data collection, reduction, presentation, and conclusion. Project-based learning is an effective learning strategy that can increase students' learning motivation, increase learning effectiveness, and develop their competencies. After introducing project-based learning into the curriculum, research results show that students are interested in this type of learning and can efficiently apply the knowledge and skills they have learned by solving real-world problems, develop creative thinking abilities, practice cooperative learning concepts, accept teamwork, and cultivate career and life planning skills. On the other hand, project-based learning demonstrates self-directed, cooperative, and inquiry-based characteristics. Due to the combination of the lack of progressive teaching strategies and the relative weakness of teaching competence, the traditional teaching methods in these schools give rise to some inefficiencies. This leads to unsatisfactory teaching outcomes, where students from these areas appear to be more passive in their approach to learning compared to their counterparts in urban areas.

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INTRODUCTION

In recent years, education systems worldwide have increasingly adopted innovative teaching methods to meet the diverse needs of learners. Among these, Project-Based Learning (PBL) has gained recognition as an approach that fosters deeper learning through active exploration and real-world problem-solving. By allowing students to engage in hands-on, collaborative projects, PBL moves beyond traditional lecture-based instruction, cultivating critical thinking, creativity, and autonomy. While PBL has shown promising results in urban and well-resourced schools, its application in remote and rural educational settings remains underexplored. These regions often face unique challenges, such as limited access to technology, a shortage of qualified teachers, and scarce educational resources. At the same time, the need for flexible, student-centered approaches like PBL may be even more critical in these environments, where conventional teaching methods may not fully meet students' needs (Suryawan et al., 2024).

In recent years, PBL has gained significant attention as an innovative teaching approach that emphasizes hands-on, student-centered learning. Unlike traditional instructional methods, PBL encourages students to engage in meaningful projects that foster critical thinking, collaboration, and problem-solving skills. These competencies are increasingly recognized as vital for success in the 21st century. However, the implementation of PBL in schools on remote islands, where access to resources, technology, and teacher training may be limited, poses unique challenges and opportunities. Schools on remote islands, often characterized by geographic isolation and limited infrastructure, represent a critical area for educational innovation. Understanding the impact and effectiveness of PBL in these settings is crucial to ensuring equitable learning outcomes for all students (Hennessy et al., 2022).

The rapid shift to remote and digital learning has transformed education worldwide,

especially in rural schools and those on remote islands, where access to resources and educational opportunities is often limited. Traditional teaching methods, which rely heavily on face-to-face interaction and direct instruction, have been challenged by the constraints of virtual learning (Barron & Chen, 2008). In this evolving landscape, PBL has emerged as a promising pedagogical approach, offering students an engaging, interactive, and practical way to acquire knowledge and skills.

PBL emphasizes student-centered learning through hands-on, real-world projects, encouraging critical thinking, collaboration, and problem-solving. These attributes make it an appealing option for schools on remote islands, where traditional resources and direct teacher-student interaction may be less readily available. Despite its potential, however, the impact and effectiveness of PBL in remote educational settings remain underexplored (Holm, 2011). PBL has emerged as a promising approach for enhancing student engagement and learning outcomes, particularly in remote school environments where traditional classroom-based instruction can be challenging (Miqawati et al., 2022). This research paper examines the impact and effectiveness of project-based learning in remote school settings, drawing on a synthesis of existing literature. Existing research, such as that by Sari et al. (2024), demonstrates that PBL can be highly effective in remote school settings. By engaging students in real-world projects, project-based learning can help develop a range of critical skills, including problem-solving, collaboration, and communication. Furthermore, this approach can help bridge the gap between classroom learning and practical, hands-on experiences, making the content more relevant and engaging for students.

PBL is often characterized as an expression of deeper learning methods, a bottom-up approach designed to engage students in solving problems, answering questions, or addressing real-life issues and challenges. PBL has the power to challenge students to take risks, think critically, solve problems, work collaboratively, and produce high-quality artifacts responsive to an authentic task. Advocates claim that PBL can achieve deeper learning by reinforcing student engagement, interest, and commitment; take place in a range of learning contexts; and involve the application of theoretical models in real-world settings. However, PBL can be complex and messy, particularly when these processes occur over time in contexts full of action, response, and revision. As a consequence, implementing these practices on the ground in schools on remote islands can be potentially fraught. In part, the challenges associated with PBL stem from the traditional way schools are structured, timetabled, governed, and assessed, often around a range of institutional metrics that can be in tension with the implementation of such practices (Barican, 2022).

This chapter presents the findings of a recent project that explored the implementation and effectiveness of PBL in remote Western Australian schools. The chapter is structured as follows. The following section sets the context for the research. It situates PBL as part of broader debates related to deeper learning and associated strategies to ensure high student engagement and optimal outcomes in schools on remote islands. Two further sections provide more detail about our research, introducing the methods and materials used, as well as the central questions under consideration. The chapter proceeds to present the research findings, discusses the implications of those findings, and suggests possible ways forward to enhance the impact and effectiveness of PBL in remote school contexts. We conclude with a summary of the significant findings and key recommendations for better integrating PBL into practice in Western Australian schools on remote islands (Jasmine, 2014). PBL is an instructional methodology that promotes active engagement and deep understanding of subject matter through the implementation of projects. This approach shifts the focus of student learning from traditional, teacher-centered pedagogies to more collaborative, student-centered ones. By integrating real-world problems and challenges, PBL encourages learners to analyze, evaluate, and create solutions, thus fostering critical thinking and problem-solving skills (Miller et al., 2021).

Historically, PBL has its roots in constructivist theories posited by educational theorists such as John Dewey and Jean Piaget, who emphasized the importance of experiential learning. In contemporary educational settings, particularly in schools on remote islands where access to resources is limited, PBL serves as an effective means of delivering the curriculum while

engaging students in meaningful ways (Hira & Anderson, 2021). The emphasis on collaboration and communication in projects also prepares students for future academic and career environments that increasingly value teamwork and interpersonal skills. In the context of remote learning environments, PBL can be particularly advantageous. It allows teachers to design comprehensive learning experiences that can be conducted with minimal physical resources, relying instead on students' creativity and resourcefulness. This is crucial in schools on remote islands, where challenges such as limited internet access and a lack of physical infrastructure may impede traditional educational approaches. By focusing on projects that require research, critical inquiry, and creative expression, students are better able to connect their learning to their immediate contexts and environments.

Additionally, project-based learning incorporates assessment methods that reflect students' understanding and abilities more holistically. Rather than relying solely on standardized testing, PBL evaluates students through their engagement with the project process, their collaboration with peers, and the quality of the finished product. This multifaceted assessment aligns with diverse learning styles and promotes inclusivity, enabling all students to showcase their strengths and abilities. Overall, PBL represents a transformative educational approach that not only enhances student engagement but also cultivates essential skills needed for success in a rapidly evolving world. This research aims to determine and analyze the impact and effectiveness of project-based learning in schools on remote islands in Sumatra. The benefit is that it can be used as a reference in the project-based learning process.

RESEARCH METHODS

The method used in this research is qualitative, which involves examining a natural object to obtain an in-depth picture/description and understanding. In this context, the researcher serves as an instrument. This qualitative method is also used to seek an in-depth understanding and meaning of a symptom, fact, or reality that occurs (Hollstein, 2015). This research was conducted at schools on remote islands in Sumatra, specifically Enggano Island, Deltaupang Island, Deltaaersugihan Island, Central Bangka Island, and Buku Limau Island. The subjects in this research were junior high school students and teachers. The researcher is the primary instrument in this research, directly involved in the learning process; other researchers serve as observers and conduct literature reviews. The data collection techniques used were interviews, observation, and documentation (Hasibuan et al., 2022). Observation data were collected in this research through PBL model learning activities conducted by one of the researchers, while the other researchers served as observers and interviewers. Interviews were conducted with students and teachers, as well as documentation in the form of analyses of process results (core activities) and learning outcomes (evaluation questions) (Hasibuan et al., 2022). Apart from that, the researcher also reviewed existing journal literature to obtain library data, took notes, and managed research materials. Qualitative descriptive data analysis techniques include data collection, reduction, presentation, and conclusion.

RESULTS AND DISCUSSION

Impact of PBL in Schools on Remote Islands

In the vibrant tapestry of education, PBL shines as a beacon of hope for schools on remote islands, transforming the learning landscape with its hands-on approach. Engaging students in real-world challenges cultivates critical thinking and fosters collaboration, even in the most isolated settings (Sanborn et al., 2024). Based on the results of an interview with one of the respondents, it was revealed that PBL not only bridges the gap between theory and practice but also empowers students to take ownership of their learning journey, igniting a passion for discovery. As remote educators adopt this innovative model, the ripple effects are profound, resulting in improved academic outcomes and strengthened community ties (Sitar-Tăut et al., 2024). The impact of PBL extends far beyond the classroom, inspiring a new generation of thinkers and problem solvers.

In addition, the results of interviews with other respondents revealed that PBL enhances

the development of interpersonal skills, as students collaborate to tackle complex questions and projects. Through this collaboration, they learn the art of communication, negotiation, and conflict resolution (Hira & Anderson, 2021). These skills are invaluable, not only academically but also in future career paths, where teamwork and effective communication are often key to success. In schools on remote islands, where resources may be scarce, the shared experience often strengthens bonds among students, teachers, and the broader community, fostering a sense of belonging and mutual support.

Additionally, PBL aligns seamlessly with the integration of technology in education, which can be a transformative factor in remote environments. Utilizing digital tools and platforms allows students to collaborate with peers beyond their immediate surroundings, tapping into a global network of knowledge and perspectives. Based on the researcher's observations, PBL can greatly enrich their projects, providing a more well-rounded and comprehensive understanding of the subject matter. It also prepares them for a world that increasingly relies on technology for communication and problem-solving. The versatility of PBL allows it to be tailored to various subjects and age groups, making it an inclusive approach suited for diverse learning environments. An interview with one teacher revealed that teachers can adapt projects to align with local issues, encouraging students to find solutions that can benefit their own communities. This not only enhances civic engagement but also teaches students the importance of service and responsibility towards others. As students engage in projects that bring about positive change, they cultivate a sense of agency and social awareness that is crucial in today's world (Ardhyantama & Widodo, 2020).

Ultimately, the shift towards PBL in schools on remote islands signals a broader recognition of the importance of experiential education. It reflects an understanding that learning is not merely about memorizing facts but about developing capabilities that will serve students well throughout their lives. As we look to the future, it is essential to continue investing in and refining PBL methodologies, ensuring that all students, regardless of their geographical location, have access to meaningful and impactful educational experiences. As PBL continues to evolve, it is essential to recognize the role of educators as facilitators rather than mere transmitters of knowledge (Cubero-Pérez et al., 2024). Teachers in schools on remote islands are increasingly adopting methods that encourage inquiry, creativity, and critical thinking, allowing students to explore topics in depth and with meaning. Professional development programs tailored for these educators can further empower them to adopt innovative teaching practices, equip them with necessary resources, and share successful strategies with their peers. The support and training of educators are paramount, as they are the ones who cultivate an environment where PBL can thrive (Haleem et al., 2022).

Furthermore, regarding assessment methods, based on interview results, the assessment methods in PBL must also be adapted to reflect student learning and progress accurately. Traditional exams and standardized tests may not adequately capture the depth of knowledge gained through hands-on projects. Instead, observations suggest that the application of formative assessment techniques, such as peer evaluations, self-assessments, and portfolios, can offer a more comprehensive understanding of a student's knowledge and skills. This shift in assessment can lead to more meaningful feedback and a better overall grasp of individual learning journeys. Community involvement is another vital aspect of PBL that cannot be overlooked. Collaborating with local organizations and businesses can bring real-world context to projects, while also fostering relationships that enhance students' learning experiences. These partnerships can provide resources, mentorship, and opportunities for students to engage with professionals, often igniting career aspirations and pathways (Mukti et al., 2020). As students work on community-driven projects, they develop a sense of pride and responsibility, recognizing their capacity to make a positive difference and contribute to their surroundings.

Moreover, based on observations in the research, the successful experiences emerging from schools on remote islands that implement PBL can serve as powerful models for others. These narratives can inspire change in educational policies and practices on a larger scale, advocating for a more inclusive approach to learning that values experiential education. By showcasing their

achievements and innovations, these schools can attract attention, funding, and support from external stakeholders, thereby further enhancing the resources available to their students.

One of the primary advantages of PBL in schools on remote islands is its ability to foster a sense of community among students. By working on collaborative projects, students can develop essential teamwork and communication skills. This social interaction not only enhances their learning experience but also helps them build relationships with their peers, which can be particularly valuable in isolated environments (Sanborn et al., 2024). Furthermore, PBL encourages students to take ownership of their education. They are often allowed to choose topics or issues that resonate with them personally, making the learning process more engaging and meaningful.

Based on an interview with one of the teachers, PBL, in addition to encouraging collaboration, can significantly improve problem-solving abilities. As students encounter real-world challenges during their projects, they must think critically and devise innovative solutions. This hands-on approach to learning is particularly beneficial in remote areas, where students may have limited access to advanced technology and educational resources. Rather than simply consuming information, they become active participants in constructing their knowledge, which can lead to a deeper understanding of the material (Eticha et al., 2024). Moreover, teachers in schools on remote islands can leverage local contexts and resources to make projects more relevant and engaging. For instance, if a class is studying environmental science, students might conduct projects related to local ecosystems, allowing them to explore their surroundings while applying scientific concepts. This connection to their environment not only enriches their educational experience but also instills a sense of responsibility towards their community and the planet. The implementation of PBL also presents unique challenges. Teachers must be well-prepared to guide students through the complex process of project management, from brainstorming ideas to executing and presenting their projects (Hassan et al., 2020). Professional development and training for educators can enhance their ability to effectively facilitate these learning experiences. Additionally, schools must find ways to assess student learning in this context, developing evaluation methods that go beyond traditional tests and reflect the skills acquired through projects.

As educational institutions continue to adapt to the needs of remote learners, PBL offers a promising avenue for fostering engagement, collaboration, and practical skills. With the proper support and resources, this innovative approach can transform the educational landscape in remote areas, preparing students not only for academic success but for real-world challenges they will face in the future. The momentum behind PBL in schools on remote islands is not merely a trend; it represents a fundamental shift toward educational practices that cherish engagement, creativity, and real-life application. As we navigate an increasingly complex and interconnected world, the ability to think critically, collaborate effectively, and adapt to change will be among the most crucial skills for future success. Thus, the imperative remains strong: to forge ahead with PBL, refine its implementation, and celebrate the diverse voices of students in remote areas, ensuring that their education is as rich and dynamic as they are.

The challenges of implementing PBL in schools on remote islands include: first, limited resources: Schools on remote islands often lack access to advanced technology, internet connectivity, and educational materials. These constraints can limit the types of projects that students can undertake, particularly those that require online research or collaboration tools (Williams, 2022). The second, teacher training and support: teachers in remote areas may not have sufficient training or experience in facilitating PBL. Professional development opportunities are often scarce, and teachers may feel ill-equipped to manage the demands of PBL in addition to their regular duties. Continuous teacher support is critical for the successful implementation of PBL (Williams, 2022). The third, assessment difficulties: assessing student performance in PBL can be more complex than traditional methods. Teachers need to develop new assessment strategies that focus on both the process and the final product. This can be time-consuming and challenging, especially when teachers are already stretched thin. The fourth, Time and Curriculum Constraints: PBL often requires more time than traditional instruction, as students work through

complex projects that may not fit neatly into a standard class schedule. Schools in remote areas may have strict curricular requirements or limited instructional time, making it challenging to implement PBL entirely (Miller et al., 2021).

Ten schools from various remote islands in Sumatra participated in this project. This project focuses on developing teachers' pedagogical knowledge and integrating PBL and inquiry-based science teaching and learning into their practice. Participating local project teachers are trained in life skills, scientific content with a focus on land, air, and water topics, programmed learning module themes, and the use of project-based and inquiry-based teaching techniques. Participating students perform project planning, data collection, analysis, and research as part of their projects. Each teacher-student group is taught or learns about food chains, the impact of weather and climate on the water cycle, protecting islands and living in harmony with nature, air and water pollution, or an introduction to sustainable fisheries, all to achieve specific learning outcomes.

The projects were designed in such a way that the students solved problems that the island community is experiencing or might experience, for example, related to land use in the area. They built their projects on explanations of the environment and local human impacts, seeking practical solutions, and produced educational materials for others. The teachers employed an inquiry-based learning approach, involving students in asking questions, planning and conducting investigations, using data and evidence to construct scientific explanations, and evaluating the validity of scientific evidence. Following the action, student self-assessment was the primary tool used to debrief project students and teachers on their inquiry skills, academic objectives, and competencies developed through the programmed learning modules. The most helpful aspect of the project for both groups was its improvement of their learning outcomes in specific areas, such as mapping practice for the teachers and evaluation, argumentation, discussion, and writing the conclusion for the students.

Effectiveness of PBL in Schools on Remote Islands

PBL has emerged as a seminal approach within educational paradigms, particularly in the context of schools on remote islands, where traditional teaching methods face significant constraints. At its core, PBL emphasizes student-centered learning, wherein learners engage in sustained inquiry through the application of knowledge to real-world problems or projects. Based on interview results, the use of PBL makes students more likely to retain information and develop critical thinking skills when they are actively involved in the learning process. The fundamental principles of PBL involve students working on a project over an extended period, culminating in a tangible end product. This approach deviates from the conventional rote-learning model by fostering collaboration, communication, and creativity among students (Eticha et al., 2024). In remote educational settings, these attributes become increasingly essential, as students may have limited access to social interactions and practical experiences. Consequently, PBL serves not only as an educational tool but also as a means of bridging the social gap created by geographical and logistical barriers (Salvador et al., 2023).

Based on observations at the research site, PBL can enhance student engagement and motivation, as learners perceive greater relevance in their studies when addressing real-world issues. For instance, a project might involve evaluating the impact of climate change on local ecosystems, pushing students to conduct field research, engage with community members, and analyze data across various disciplines such as science, mathematics, and social studies. This interdisciplinary approach is particularly effective in remote settings where resource integration may be limited. Moreover, PBL provides opportunities for the development of essential skills that extend beyond academic knowledge. Skills such as problem-solving, adaptability, and teamwork are crucial in today's workforce, and PBL encourages students to cultivate these attributes in a practical context (Abdulsamee, Elkhadem, 2021). Thus, as educational institutions continue to adapt to the demands of remote learning, the adoption of PBL may represent a viable strategy for fostering meaningful educational experiences and preparing students for future challenges.

Our education system is changing. Improvements in digital technology are primarily responsible for the rapid changes currently taking place within our society. Information flows quickly and effortlessly through the World Wide Web, connecting people worldwide in the

process. The future is anticipated to hold further changes due to the so-called 'information revolution.' In times of rapid change, it is challenging to make accurate predictions about what life will be like in the coming decades. However, what is clear is that information, creativity, and innovation are likely to be key drivers of economic change (Haleem et al., 2022).

Knowledge, innovation, and creativity are becoming the raw materials of economic development. People will need to be adequately prepared for this challenging and unpredictable future, as those tasked with preparing students for it have been tasked with preparing students for the unpredictable. However, many teachers in countries around the world depend upon traditional classroom models of teaching. These traditional models were formed within an industrial framework. The metaphor of education drawing upon the industrial model is compelling. In industrial production, materials undergo a standardized process—an assembly line—to deliver goods or services to consumers (Hassan et al., 2020). Education—for many—works analogously. Assembly-line production relies on careful management, the repetition of skills in a standardized manner, and rules that govern the process. These features have come to form the foundation of the mainstream teaching model—referred to by some as teacher-centered or didactic—where the teacher assumes the role of manager (Abdulsamee, Elkhadem, 2021). Post-compulsory school students are guided through materials prepared by the teacher.

The information is standardized, and the presentations and pathways students take are tailored towards the average student (Cubero-Pérez et al., 2024). That is, the process is not tailored to the needs of individual students. This traditional learning model can contribute to student attrition, in part because students' needs are not addressed by a systemic model that was intended to meet the average need rather than the individual requirement. Technology disrupts the ability to standardize student learning. The internet enables people to interact with information and others in a manner vastly different from the traditional educational model. Programs and sites are becoming 'smarter,' creating unique pathways based on how users interact with the program. However, little has changed within the traditional didactic education model. The expectation is to deliver information and then assess that students have mastered a certain level at the end of a given period.

PBL has emerged as a highly effective educational approach, particularly in schools on remote islands where traditional teaching methods may be less effective. PBL emphasizes student-driven, hands-on projects that promote critical thinking, creativity, and collaboration, essential skills in today's world. Schools on remote islands often face challenges such as limited resources and student disengagement, making engaging methods like PBL invaluable. By fostering a sense of ownership over their learning, students become more motivated and invested in their education. Numerous case studies have demonstrated the successful implementation of PBL in remote settings, highlighting increased student participation and improved learning outcomes. Furthermore, PBL encourages collaboration among students, enhancing their communication skills and ability to work as part of a team. For PBL to be most effective, however, teacher training and support are crucial, as they equip educators with the strategies necessary to guide students through project-based initiatives. In summary, the effectiveness of PBL in schools on remote islands not only addresses educational challenges but also enriches the learning experience for students.

In schools on remote islands, where access to resources may be limited, PBL fosters collaboration among students and encourages them to think creatively. Educators implementing this approach often find themselves acting more as facilitators than traditional instructors, guiding students through the complexities of their projects while providing support and resources. This shift not only enhances the teacher-student dynamic but also enables learners to develop essential interpersonal skills, such as teamwork, communication, and problem-solving, which are invaluable in today's workforce. Furthermore, PBL has the potential to bridge educational gaps often present in remote settings. By allowing students to choose projects that resonate with their local context and communities, educators can cultivate a sense of relevance and urgency around their learning (Almulla, 2020). For instance, a project addressing local environmental issues or community health concerns can empower students to become agents of change, applying their

newly acquired knowledge and skills to improve their surroundings.

Assessment in PBL settings also takes on a more holistic and dynamic approach. Rather than relying solely on standardized tests, teachers can evaluate student progress through presentations, portfolios, and self-reflections, providing a more comprehensive view of student learning (Diani et al., 2018). This multifaceted assessment strategy not only accounts for traditional academic benchmarks but also acknowledges creativity, innovation, and personal growth, important aspects often overlooked in conventional education (Tsybulsky & Muchnik-Rozanov, 2019). Moreover, PBL encourages the integration of technology, which can be particularly beneficial in schools on remote islands. Digital tools enable students to collaborate in real-time, regardless of geographical barriers, and access a wealth of online resources to enhance their projects. This incorporation of technology not only prepares students for a digital future but also fosters global connectivity, allowing learners to engage with experts and peers from around the world, thereby broadening their perspectives and understanding of global issues.

As educators seek to harness the full potential of PBL, continued professional development will be essential (Ott et al., 2018). Teachers must be equipped with the skills and knowledge to effectively facilitate PBL initiatives, ensuring they can guide students through the challenges of project work while maintaining high educational standards (Farrow et al., 2022). This commitment to teacher training, alongside community engagement and resource development, will be critical for the sustainable implementation of PBL in schools on remote islands. In essence, the transformative power of PBL holds immense promise for enhancing education in schools on remote islands. By fostering a collaborative, relevant, and technology-rich learning environment, PBL not only prepares students for academic success but also cultivates the next generation of thoughtful, engaged citizens ready to tackle the challenges of their world. PBL is an instructional approach that engages students in real-world, meaningful projects, promoting critical thinking, collaboration, and problem-solving skills (Nishat, 2024). In schools on remote islands, where students may face unique challenges such as limited resources, teacher shortages, and geographical isolation, PBL has the potential to play a transformative role in education.

Key benefits of PBL in schools on remote islands: The first is that PBL promotes Engagement and motivation. PBL allows students to work on projects that are relevant to their lives and communities. In remote areas, projects can focus on local issues, which helps students connect their learning to real-world applications. This relevance fosters motivation and engagement in students who might otherwise feel disconnected from traditional, textbook-based learning (Nava & Park, 2021). Second, PBL fosters 21st-century skills: collaboration, communication, creativity, and critical thinking. For students in schools on remote islands, where opportunities for face-to-face interaction may be limited, PBL can be designed to include digital collaboration, helping students develop essential technological and social skills for the future (Wicaksono et al., 2021). The Third, flexibility in learning: schools on remote islands often face difficulties in providing a standardized curriculum due to resource limitations. PBL enables flexible and adaptable learning experiences that can be tailored to meet the needs of individuals and groups. Students can work at their own pace, and teachers can adjust projects based on available resources, time, and specific community challenges (Roger, 2023). The fourth, Teacher as a Facilitator: In remote settings where teacher-student ratios are often high, the PBL approach shifts the teacher's role from lecturer to facilitator. Teachers guide students in exploring topics, solving problems, and developing their own learning strategies, making it easier to manage large or diverse classrooms. The fifth, connection to community and culture: in rural or indigenous communities, PBL can be used to integrate local culture, traditions, and environmental issues into the curriculum. Students can engage in projects that not only enhance their academic skills but also preserve and promote local knowledge and practices. For example, a project might involve researching the environmental impact of local farming methods or developing solutions for water conservation in the area (Awaliyah, 2023).

Schools on remote islands in Sumatra, particularly those located on small and isolated islands, face unique challenges that often become significant obstacles to the development of 21st-century skills in their students. These challenges hinder the successful implementation of

education for sustainable development. Given the geographic isolation and uniqueness of schools and communities on remote islands, few educational interventions suit these socio-cultural conditions. This project uses an open inquiry-based model to gain insight into competency development at both teacher and student levels through a culturally relevant approach. This project aims to examine its significance in the context of students and teachers, as well as on a remote island. Thus, it is necessary to implement an effective PBL strategy in schools on remote islands, namely:

1. Leverage local expertise and resources.
   Schools can collaborate with local organizations, businesses, and community members to provide resources and expertise for projects. For example, a local farmer could help students with a project on sustainable agriculture, or a community elder could share cultural stories that inspire a history project.
2. Use technology wisely.
   Even in areas with limited internet access, students can still engage in meaningful projects using offline digital tools, mobile devices, or even simple hands-on methods. When technology is available, schools should prioritize its use for PBL activities that enhance learning and collaboration.
3. Professional development and collaboration for teachers.
   Schools should invest in professional development for teachers to ensure they are confident in facilitating PBL. Peer collaboration among teachers, even across different schools on remote islands, can also provide valuable support and idea-sharing.
4. Flexible assessment methods.
   Schools on remote islands can adopt flexible assessment techniques that focus on student growth, creativity, and problem-solving skills rather than solely on traditional tests or grades. Portfolios, peer reviews, and self-assessments can be used to evaluate students' progress and outcomes.

CONCLUSIONS AND SUGGESTIONS

The study demonstrates that PBL can have a transformative impact on schools on remote islands, improving both academic performance and student engagement. Despite challenges with resources and teacher preparedness, the benefits, particularly in fostering collaboration, critical thinking, and cultural connection, make PBL a highly effective teaching strategy. Schools in remote areas should consider investing in PBL, along with necessary teacher training and resource support, to enhance the learning experience and equip students with essential skills for the future. PBL offers a promising approach for schools on remote islands by providing a student-centered, flexible, and engaging learning environment. Despite challenges such as limited resources and teacher training, effective strategies like leveraging local resources, fostering teacher collaboration, and using technology creatively can enhance the impact and effectiveness of PBL in these settings. With the proper support and adjustments, PBL has the potential to improve student outcomes, foster community engagement, and help remote students develop the skills.

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