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Mapping Biological Materials Supporting the Implementation of the Project for Strengthening Pancasila Student Profiles

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Abstract

The results of interviews conducted with the Chair of the Biology subject teachers deliberation in Cirebon Regency revealed that biology learning shows that the implementation of the independent learning curriculum in schools has been running, but teachers face several obstacles in its implementation. The research aims to map Biology material to support the implementation of the Strengthening Pancasila Student Profile (P5) Project in eight schools in Cirebon Regency, West Java, for Phase E and Phase F. Using a qualitative descriptive method with a case study approach, this research analyzes the relationship between Biology material with theme P5, designing project-based learning designs, identifying teacher constraints, and formulating student engagement strategies. The research result showed that in Phase E, the Ecosystems and Biotechnology materials were used by two schools (25%), while the Diversity of Living Creatures materials were used by one school (12.5%). In Phase F, Plant Growth and Development material was dominantly used by three schools (37.5%) with the theme Sustainable Lifestyle. Learning design involves applicable projects, such as making compost, biotechnology donuts, reforestation, and using waste to make fashion works. The main challenges are teacher competence (50%) in integrating material and determining project themes, as well as student interest (25%) and limited school facilities (12.5%). These findings emphasize the importance of increasing teacher competency and student engagement strategies to optimize the implementation of P5 with character and environmental insight.

How to Cite

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INTRODUCTION

The integration of P5 in biology learning provides opportunities for students to apply biological concepts in real contexts, such as environmental or conservation projects, which not only deepens understanding of the material but also strengthens students' character. This approach is in line with the demands of 21st century learning which emphasize critical thinking skills, creativity, collaboration and communication. This research is important because it examines the effectiveness of P5 integration in biology learning in shaping student character and 21st century skills. Although several studies have addressed the application of P5 in general, there is still a gap in research that specifically explores its application in the context of biology learning. The novelty of this research lies in its focus on combining P5 with biology material, as well as an in-depth analysis of its impact on strengthening students' character and developing 21st century skills. Thus, it is hoped that this research can make a significant contribution to effective, relevant and contextual learning development strategies, in accordance with the objectives of the Independent Curriculum and educational needs in the modern era.

The implementation of the Merdeka Learning policy encourages the role of teachers both in curriculum development and in the learning process. However, the issues that arise trigger the adoption of the Merdeka Learning curriculum. In this context, teachers play a key role as facilitators in the implementation of the Merdeka Learning curriculum, supported by the necessary professional, pedagogical, personal, and social competencies (Purba, 2022).

Teachers' busy administrative tasks are one of the main issues driving the Merdeka Learning policy. This is due to the ineffectiveness of teachers in carrying out classroom learning processes because of overlapping administrative duties. According to Houtman (2020), schools and teachers often make educational administration their main focus, which leads them to become trapped in routines that emphasize specific methods and goals. This is supported by Daga (2021), who reveals that teachers and schools position educational administration as the primary goal and priority in education.

Teachers and students are seen as active participants in the learning process, as their involvement directly impacts both the process and outcomes of learning. The curriculum is often seen as a challenge for both teachers and students due to its complexity, covering a large amount of material to be taught in a limited time. Teachers must find effective ways to deliver the material, while students need to understand it within that short time frame. Additionally, changes in the curriculum can be a challenge, requiring quick adaptation from both teachers and students to new teaching methods and understanding the new learning objectives. All of this can create additional pressure on both teachers and students, affecting the effectiveness of the learning process (Suhandi & Robi'ah, 2022).

Indarta et al. (2022) state that addressing various challenges in education requires coordinated efforts where each educational subject understands their role clearly. Biology` teachers face several challenges in implementing the Merdeka curriculum, including adapting to a learning approach based on student independence and initiative, the availability and access to relevant and varied learning resources, adjusting to flexible and efficient time management, and a deep understanding of the new curriculum's goals and structure. Additionally, teachers face challenges in creating an inclusive and participatory learning environment and in conducting assessments that align with the principles and goals of Merdeka Learning. By addressing these challenges, biology teachers are expected to enhance the effectiveness and relevance of learning to meet students' needs and potential in an evolving education era. Meanwhile, students are expected to make a sincere effort to engage with the curriculum through dedicated learning. The Merdeka curriculum can be implemented by leading schools in the learning process, including in biology subjects (Størksen et al., 2023). One characteristic of the Merdeka Curriculum is the Project for Strengthening Pancasila Student Profiles (P5), which focuses on developing students' competencies and character through group learning on important real-world issues.

Biology learning not only covers the mastery of concepts and facts related to nature but also involves discovery. Students need to understand core concepts in biology through reasoning, concept discovery, and making connections between concepts in various ways. This is important to develop because biology learning is complex, involving foreign terms and abstract concepts (Hajiriah et al., 2019; Pranoto, 2020). The use of the Merdeka curriculum in biology learning can help both teachers and students explore biological concepts more broadly. This way, students have the opportunity to study concepts in-depth according to their learning stage.

METHOD

The research method used in this research is a qualitative descriptive research method which presents Biology material as a support for the implementation of the Pancasila Student Profile Strengthening Project. The research approach used is a case study. A case study is an in-depth investigation of a social unit. The subjects studied are relatively limited, but the variables and research focus cover broad dimensions. The data in this study is a collection of information related to the mapping of biological material in Phase E, equivalent to class 10 of senior high school or mandarasah aliyah and F, equivalent to class 11 and 12 of senior high school school or madrasah aliyah which can support the implementation of P5, which was obtained using the observation sheet instrument. and interview guidelines through research subjects of biology teachers at Phase who teach at Cirebon Regency High Schools. Researchers took subjects from eight schools.

The author conducted research on mapping biological material to support the implementation of the Pancasila Student Profile Strengthening Project by determining the research subjects, namely Biology Teachers senior high schools (SMA and MA) in Cirebon Regency. The names of schools and addresses where the subjects of this research teach are presented in the Table 1.

Table 1. List of Research Subject Schools

No	School Name	Address
1.	SMA Negeri 1 Susukan	Jl. Prof. Dr. Moh. Yamin, S.H, Susukan, Kec. Susukan,Kabupaten Cirebon, Jawa Barat 45166
2.	SMA Negeri 1 Arjawinangun	Jalan Sutan Syahrir, Arjawinangun, Kec. Arjawinangun,Kabupaten Cirebon, Jawa Barat 45162
3.	SMA Negeri 1 Gegesik	Gegesik Kidul, Kec. Gegesik, Kabupaten Cirebon, Jawa Barat 45164
4.	SMA Negeri 1 Kaliwedi	Jln bandara blok bengkok, Wargabinangun, Kec. Kaliwedi,Kabupaten Cirebon, Jawa Barat 45165
5.	SMA Negeri 1 Ciwaringin	Jl. Urip Sumoharjo No.39, Bringin, Kec. Ciwaringin,Kabupaten Cirebon, Jawa Barat 45167
6.	MA Nahdhatul Umam	Jalan Pompes. Kempek R.T. 003 R.W. 001 Desa Kempek Kec. Gempol Kab. Cirebon 45161
7.	MA Khas Kempek	Jl. Tunggal Pegagan-Kempek Desa Pegagan Kec. Palimanan
8.	MA Darul Faqih	Kompleks Pesantren Al-Jauhariyah R.T. 005 R.W 003, Desa Balerante Palimanan Cirebon.

RESULT AND DISCUSSION

The Level of Relevance of Biology Materials to the Themes of the Project for Strengthening Pancasila Student Profiles

Biology materials have a strong connection with the themes of the Project for Strengthening Pancasila Student Profiles, emphasizing character development, 21st-century skills, and environmental awareness. Themes like Bangunlah Jiwa dan Ragaku enhance understanding of physical and mental health, fostering discipline, responsibility, and self-love. The Sustainable Lifestyle theme integrates Biology topics such as ecosystems, recycling, and biotechnology to promote sustainability, environmental balance, and resource management, instilling teamwork and environmental care. In entrepreneurship, biotechnology provides opportunities to develop science-based businesses through creative and innovative applications, empowering students to address environmental issues like pollution and climate change with practical solutions.

Tabel 2. The Level of Relevance of Biology Materials to the Themes of the Project for Strengthening Pancasila Student Profiles

Phase	Material	F	%	Theme	F	%
E	Ecosystem	2	25	Build the Soul and Body	1	12,5
				Sustainable Lifestyle	1	12,5
	Biotechnology	2	25	Entrepreneurship	2	25
	Biodiversity	1	12,5	Build the Soul and Body	1	12,5
F	Growth and Development of Plants	3	37,5	Sustainable Lifestyle	3	37,5
	amount	8	100		8	100

Based on table 2 above, in Phase E or grade 10 of senior high school, Ecosystem material was used by two schools (25%), with details of one school applying the Build Your Body and Soul theme (12.5%) and one school applying the Sustainable Lifestyle theme (12.5%) 12.5%). Biotechnology material is used by two schools (25%) with the same theme, namely Entrepreneurship. Meanwhile, the material on the Diversity of Living Creatures was used by one school (12.5%) which implemented the Sustainable Lifestyle theme. In Phase F or grade 11 of senior high school to provide a clearer picture, the relationship bet ween Biology material and the P5 theme will be presented in diagram form in Figure 1.

The Exosite material is used by two schools with different themes, namely Build Your Body and Soul and Sustainable Lifestyle. Biotechnology material is used by two schools with the same theme, namely Entrepreneurship. The material on the Diversity of Living Creatures is used by one school with the theme Sustainable Lifestyle, while the material on Plant Growth and Development is used by two schools with the theme Sustainable Lifestyle. So it can be concluded that the theme that is often used in the P5 project is

Sustainable Lifestyle.

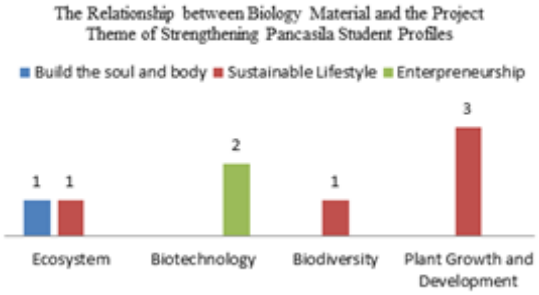

Figure 1. The Relationship between Biology Material and the Project Theme of Strengthening Pancasila Student Profiles

Biology Material Learning Design Supporting the Implementation of the Pancasila Student Strengthening Project

The design of Biology learning materials that support the implementation of the Strengthening Pancasila Student Profile (P5) Project is designed holistically to integrate concepts, values and skills relevant to the selected P5 theme. This learning approach prioritizes student activity, collaboration, and project-based learning, while still emphasizing the applicable curriculum. Each learning activity is structured to build connections between Biology material and real life and develop character in accordance with the Pancasila student profile, such as critical reasoning, creativity, independence, working together and caring for the environment.

Tabel 2. Learning design used to support P5 implementation in schools

No	School	P5 Theme	Biology Material	P5 Project Activity Design
1.	SMAN 1 Susukan	Build the soul and body	Ecosystem	Students make compost by utilizing waste in the school environment
2.	SMAN 1 Arjawinangun	Entrepreneurship	Biotechnology	Students make technology products, namely donuts
3.	SMAN 1 Gegesik	Sustainable Lifestyle	Biodiversity	Students carry out planting activities of various ornamental plants
4.	SMAN 1 Ciwaringin	Sustainable Lifestyle	Plant Growth and Development	Students plant various plants starting from seeds and then present the types of plants they plant and their benefits
5.	SMAN 1 Kaliwedi	Sustainable Lifestyle	Plant Growth and Development	Students plant trees around the school
6.	MA Nahdhatul Umam	Entrepreneurship	Biotechnology	Students make donuts using egg yolks and some only use egg whites
7.	MA Khas Kempek	Sustainable Lifestyle	Plant Growth and Development	Students determine which angiosperm plants will be planted, present the selected plant seeds and their benefits for life
8.	MA Darul Faqih	Sustainable Lifestyle	Ecosystem	Students collect rubbish at school to make clothes from used goods which are displayed at the Fashion Show

Senior High School (SMA) is the level of secondary education at Formal education in Indonesia is carried out after graduating from school Junior High School (SMP) or equivalent. This level of education starts from Grades 10 to Grade 12 with students generally aged 15-18 years. Meanwhile, Madrasah Aliyah (MA) is education that is characterized by Islamic religion at the level of Senior High School (SLTA) or equivalent to Senior High School (SMA), as stated in the PP. Number 29 of 1990 and Decree of the Minister of National Education Number 0489/U/1992 which contains the statement that Madrasah Aliyah as a Middle School General characteristics of the Islamic religion. Network The regulations show that there is no such thing. There is also a difference in status between madrasah education and general education, which means madrasas recognized as part of the National Education System (Alawiyah, 2014)

SMAN 1 Susukan applies the theme Build your Body and Soul with Ecosystem material, in Project P5 activities students make compost by using waste. SMAN 1 Arjawinangun, applied the Entrepreneurship theme with Biotechnology material, in Project P5 activities students made Biotechnology donut products, SMAN 1 Gegesik, applied the Sustainable Lifestyle theme, with material on the Diversity of Living Creatures, in Project P5 activities students carried out planting various ornamental plants . SMAN 1 Ciwaringin applies the Sustainable Lifestyle theme with material on Plant Growth and Development, in Project P5 activities. Students plant various plants starting from seeds and then present the types of plants they plant and their benefits. SMAN 1 Kaliwedi applies the Sustainable Lifestyle theme, in the P5 project activities. Students plant trees around the school. MA Nahdhatul Umam applies the Entrepreneurship theme, in the P5 project activity. Students make donuts using egg yolks and some also use egg whites only. MA Khas Kempek applies the Sustainable Lifestyle theme, with material on Plant Growth and Development, in the P5 project activity. Students determine which angiosperm plants will be planted, presenting the selected plant seeds and their benefits for life. MA Darul Faqih applies the Sustainable Lifestyle theme, with Ecosystem material, in Project P5 activities. Students collect rubbish at school to make clothes from used goods which are displayed at the Fashion Show.

Based on this data, it can be concluded that schools apply various P5 themes according to their individual needs, such as "Build your Body and Soul" with ecosystem material at SMAN 1 Susukan through compost making, to "Entrepreneurship" by making biotechnology-based donuts at SMAN 1 Arjawinangun and MA Nahdhatul Umam. The theme "Sustainable Li-

festyle" is implemented in various activities, such as planting ornamental plants at SMAN 1 Gegesik, planting trees at SMAN 1 Kaliwedi, introducing angiosperm plants at MA Khas Kempek, and using waste into fashion works at MA Darul Faqih. These activities demonstrate the diversity of approaches to support project-based learning that is applicable and contextual.

Challenges faced by Biology Teachers in designing P5 Projects on Biology Material

Observation results show that the challenges faced by Biology teachers in designing the Strengthening Pancasila Student Profile (P5) project at eight schools in Cirebon Regency are influenced by several factors, including student interest, teacher competency, availability of facilities, and support from school institutions. Challenges- These challenges are summarized in more detail in the Table 3.

Tabel 3. Challenges faced by Biology Teachers in designing P5 Projects

Aspect	Challenge
Student Interests	The handling when directing students must be appropriate Students' mastery of biology material is very poor
Teacher Competency	Collaborating several chapters of material united under one P5 Project theme Determine what material will be taken for Project P5 Create teaching models that are interesting and easy for students to understand Create modules that are appropriate to biological material which will later be used for P5 activities
Facility	Equipment limitations
School Support	There is less time for teaching and learning activities in schools in the Islamic boarding school environment

The challenges faced by Biology teachers in designing P5 projects can be categorized into four main aspects. In the aspect of student interest, challenges include difficulties in directing students appropriately and students' low mastery of the material. In the aspect of teacher competency, challenges include the need to integrate several chapters of material into one P5 project theme, create teaching models that are interesting and easy to understand, and develop learning modules that are relevant to Biology material to support P5 activities. In the facility aspect, challenges mainly lie in equipment limitations. Meanwhile, in the aspect of school support, challenges that arise include limited time for teaching and learning activities, especially in schools located in Islamic boarding school environments. So it can be concluded that the challenges faced by Biology teachers in designing P5 projects include managing interest and mastery of material, the teacher's ability to design relevant teaching materials, limited equipment, and limited learning time, especially in Islamic boarding school-based schools. The percentage of each aspect of the challenges faced by Biology Teachers in designing P5 projects will be depicted in the Figure 3.

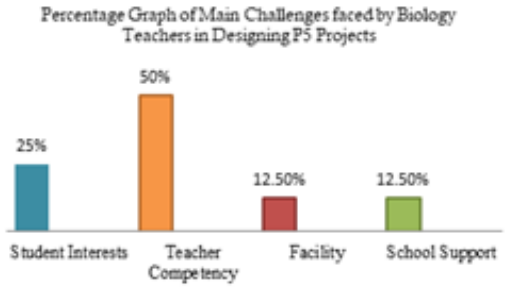

Figure 3. Percentage Graph of Main Chalengges faced Biology Teacahers in Desingning P5 Project

Based on the percentage graph, the challenges faced by biology teachers in designing P5 projects show that the teacher competency aspect has the highest percentage, namely 50%. This shows that the teacher's ability to integrate material, determine themes, and compile teaching tools is the main challenge. Furthermore, student interest contributed 25%, indicating the importance of strategies to increase student engagement. Meanwhile, the aspects of facilities and support from each school have the same percentage, namely 12.5%. These two aspects reflect the need for improvements in the provision of supporting facilities and more conducive scheduling, especially in schools with limited learning time such as in Islamic boarding school environments.

So it can be concluded that this data confirms the importance of paying attention to strengthening teacher competency and increasing student interest to support the success of the P5 project. This percentage was obtained from the results of interviews with each biology teacher from eight schools and then the percentage for each aspect was given.

Strategy for Involving Students in project-based learning on Biology material to develop Pancasila values

The strategy for involving students in project-based learning on Biology material to develop Pancasila values involves a planned, collaborative and oriented approach to meaningful learning experiences. Teachers can start by designing projects that are relevant to real-life themes, such as environmental conservation, organic waste management, or biodiversity conservation.

These projects are designed to encourage students to take an active role, work together in groups, and solve problems creatively. This table presenting research data from eight schools based on interviews and observations regarding strategies for involving students in project-based learning.

Tabel 4. Strategy for Involving Students in project-based learning on Biology material to develop Pancasila values

NO	School name	Strategy Student Involvement	Implementation in Project Based Learning
1.	SMAN 1 Susukan	Group Discussion	Create groups, each group must be responsible for the results of the waste management experiment.
2.	SMAN 1 Arjawinangun	Division of Roles in Projects	The teacher chooses the theme, dimensions and elements of the P5 project, socializes it to students, then provides stimulus to develop ideas according to the concepts understood.
3.	SMAN 1 Gegesik	Project Reflectionk	Ask student representatives to provide input or responses to the previous P5 Project in order to improve the agenda for the next P5 Project
4.	SMAN 1 Ciwaringin	Group Discussion	Students are involved in determining the design, starting with Students being involved in determining the design, starting with the formation of groups in each class, from there ideas emerge,,
5.	SMAN 1 Kaliwedi	Division of Roles in Projects	Involving students in the P5 project design process
6.	MA Nahdhatul Umam	Group Discussion	Students work together in groups to create projects and group presentations
7.	MA Khas Kempek	Field Study	Involving students in the P5 design adapts to the conditions of students who live in the Islamic boarding school environment
8.	MA Darul Faqih	Division of Roles in Projects	Involving students in determining project materials, discussing appropriate ideas, and students documenting the process of making projects using used materials from the surrounding environment,,

Strategies for involving students in project-based learning on Biology material to develop Pancasila values in various schools have diverse characteristics. SMAN 1 Susukan uses a group discussion strategy with each group taking responsibility for the results of the waste management experiment. SMAN 1 Arjawinangun implements a division of roles in the project, starting from selecting themes, dimensions and P5 elements, continuing with socialization to students, and providing stimulus to develop ideas according to the concepts they understand. SMAN 1 Gegesik utilizes project reflection, where student representatives provide input for improvements to the next P5 project. SMAN 1 Ciwaringin involves students in group discussions to determine project designs that produce creative ideas. SMAN 1 Kaliwedi also implemented group discussions, involving students in the P5 project design process. MA Nahdhatul Umam uses group discussions to emphasize mutual cooperation in project creation and presentation. MA Khas Kempek integrates field studies in the design of the P5 project, adapting it to the conditions of students living in the Islamic boarding school environment. MA Darul Faqih applies a division of roles in projects, where students determine project materials, discuss ideas, and document the process of making projects from used materials in the surrounding environment. These strategies reflect a varied approach to optimizing students' active participation in project-based learning. Based on table 4 above, it will be depicted more clearly in the graphic image of the percentage of strategies used in involving students in each school as follows.

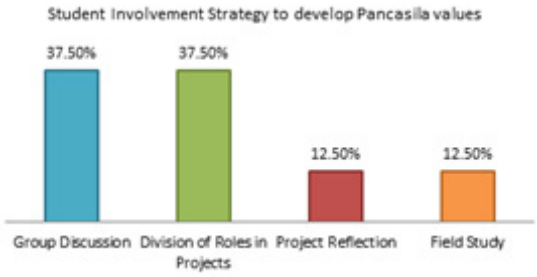

Figure 3. Graphic of students involvement Strategy to Develop Pancasila Values

Observation results in eight schools showed that the most dominant student engagement strategies used were group discussions and division of roles in projects, each with a percentage of 37.50% used by three schools. Meanwhile, project reflection and field study strategies were only used by one school each, with a percentage of 12.50%. So it can be concluded that the dominant strategy for involving students is group discussion and division of roles in projects, each with a percentage of 37.50%.

CONCLUSION

The materials on Ecosystems and Biotechnology in Phase E are each used by two schools (25%), while the material on Biodiversity is used by only one school (12.5%), with varying themes. In Phase F, the material on Plant Growth and Development is predominantly used by three schools (37.5%) with the theme of Sustainable Lifestyle, showing the connection between Biology materials and various P5 themes. The main challenges in the implementation of P5 are teacher competence (50%), followed by student interest (25%), and school facilities and support (12.5% each), which require strengthening teacher capacity, increasing student participation, and improving supporting infrastructure. The main strategies for involving students are group discussions and role division (37.5%), while project reflection and field studies are still rarely applied (12.5%).

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