

VALUE-BASED LEARNING FOR SDGs: INTEGRATING BUGIS–MAKASSAR CULTURAL VALUES (*SIRI' NA PACCE*) IN BIOLOGY EDUCATION

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Abstract

Biology education often emphasizes conceptual knowledge while overlooking the integration of values and real-life contexts, which are essential for sustainability-oriented learning. This study explored biology education students' perceptions of the potential implementation of Value-Based Learning (VBL) through the integration of Bugis-Makassar cultural values, especially *siri' na pacce*, in biology education. Using an exploratory qualitative design, data were collected from 26 students across undergraduate, master's, and doctoral levels through an expert-validated open-ended questionnaire and analyzed by content analysis. The findings show that students perceive *siri' na pacce* as a meaningful value-based content that aligns with biology concepts, particularly ecology and interdependence. Its integration was viewed as a bridge between abstract scientific concepts and students' lived experiences, fostering contextual, meaningful, and sustainability-oriented learning. Students also reported increased engagement, conceptual understanding, ecological awareness, and social responsibility. However, challenges were identified, including limited teaching materials, lecturer readiness, and concerns about scientific objectivity. Overall, the study suggests that VBL grounded in local wisdom has strong potential to support character-based and SDGs-oriented biology education, provided that curriculum, pedagogical, and institutional support are strengthened.

Keywords: value-based learning, indigenous knowledge, Bugis-Makassar ethnic, *siri' na pacce*, biology education

Abstrak

Pendidikan biologi sering kali menekankan pengetahuan konseptual tanpa mengintegrasikan nilai-nilai dalam konteks kehidupan nyata yang sangat penting untuk pembelajaran berkelanjutan. Penelitian ini bertujuan mengkaji persepsi mahasiswa pendidikan biologi terhadap potensi implementasi pembelajaran berbasis nilai melalui integrasi nilai budaya Bugis–Makassar, khususnya *siri' na pacce*, dalam pembelajaran biologi. Dengan desain kualitatif eksploratif, data diperoleh dari 26 mahasiswa jenjang sarjana, magister, dan doktor melalui angket terbuka yang telah divalidasi oleh ahli, kemudian dianalisis menggunakan analisis konten. Hasil penelitian menunjukkan bahwa *siri' na pacce* dipandang sebagai nilai yang bermakna dan selaras dengan konsep biologi, terutama ekologi dan interdependensi. Integrasinya dipandang mampu menjembatani konsep ilmiah yang bersifat abstrak dengan pengalaman hidup mahasiswa, sehingga pembelajaran menjadi lebih kontekstual, bermakna, dan berorientasi pada keberlanjutan. Mahasiswa juga melaporkan peningkatan keterlibatan belajar, pemahaman konsep, kesadaran ekologis, dan tanggung jawab sosial. Namun, ditemukan pula kendala berupa keterbatasan bahan ajar, kesiapan dosen, serta kekhawatiran terhadap objektivitas ilmiah. Pembelajaran berbasis nilai yang terintegrasi dengan kearifan lokal berpotensi kuat mendukung pendidikan biologi yang berkarakter dan berorientasi SDGs, jika didukung oleh kurikulum, kemampuan pedagogi, dan kebijakan institusional yang memadai.

Kata kunci: pembelajaran berbasis nilai, pengetahuan lokal, suku Bugis–Makassar, *siri' na pacce*, pendidikan biologi

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Introduction

Biology education plays a crucial role in shaping students' knowledge, values, and attitudes toward life and the natural

environment (Hardianto, et al., 2025; Hiong & Osman, 2013). However, biology learning systems in many countries, including Indonesia, continue to face significant

challenges in connecting scientific concepts with students' real-life contexts (Sangur & Rumahlatu, 2023). Learning processes that emphasize factual and theoretical mastery often overlook the dimensions of values and meaning that are inherently embedded in every biological phenomenon (Jamaluddin et al., 2024). Consequently, students frequently struggle to relate classroom content to their personal roles and responsibilities in sustaining life. This condition highlights the need to transform biology education toward a more holistic approach that integrates cognitive, social, moral, and ecological dimensions of learning (Hardianto et al., 2025).

Amidst current global challenges, this shift strongly resonates with the Sustainable Development Goals (SDGs), especially concerning quality education, environmental conservation, and responsible conduct. Modern education must transcend the mere acquisition of scientific knowledge to cultivate ecological mindfulness, ethical accountability, and a mindset geared toward sustainability (Frolova, 2020). Consequently, embedding Value-Based Learning within biology curricula is increasingly vital to advance Education for Sustainable Development (ESD) and realize the SDGs in pedagogical practice (Rahmawati et al., 2023; Wijayanti, 2025).

The practice of biology education in Indonesia still demonstrates a dominant tendency toward cognitive aspects, with a strong emphasis on memorizing concepts and mastering scientific theories (Fachrunnisa et al., 2020; Raharjo et al., 2018). Lecturers often deliver biological content in a textual manner, detached from students' social and environmental contexts. Such an approach leads students to perceive biology merely as a collection of scientific facts to be remembered rather than as a discipline closely connected to everyday life (Çimer, 2012). As a result, students struggle to develop ecological awareness, social empathy, and a sense of environmental responsibility. This condition highlights a persistent gap between the intended goals of biology education and its classroom implementation (Cotner et al., 2017). Therefore, biology education should be redirected toward learning that not only

emphasizes knowledge acquisition but also fosters humanistic values and environmental care through the integration of students' cultural and social contexts (Arifin et al., 2025).

The local wisdom of the *Bugis-Makassar* community holds great potential as a source of cultural values that can be integrated into biology learning content (Arifin et al., 2025; Jamaluddin et al., 2024). The *Bugis-Makassar* culture embodies noble values that align with the principles of sustainability and ecological balance in biology, such as *siri' na pacce*, which encourages human dignity, empathy, and social solidarity, as well as *getteng*, *lempu'*, and *reso*, which emphasize honesty, perseverance, and hard work in facing life's challenges (Buchori & Fakhri, 2018; Jamaluddin et al., 2024; Nurannisa et al., 2022; Rahman, 2023). The *Bugis-Makassar* people promote respect for nature as an integral part of life, reflected in the concept of *pangngadereng*, a moral order that harmonizes human relations with others and with the environment (Rijal et al., 2024; Veryani et al., 2025). These values can serve as a conceptual foundation for fostering students' ecological character through contextual and meaningful biology learning. Although *Bugis-Makassar* culture encompasses various local wisdom values (e.g., *getteng*, *lempu'*, *reso*, and *pangngadereng*), this study specifically focuses on *siri' na pacce* due to its strong emphasis on internalized moral consciousness particularly empathy, dignity, and social responsibility which are directly transferable into students' affective and character development in biology learning contexts, especially in fostering ecological awareness and responsible environmental behavior.

The Value-Based Learning (VBL) approach in biology education offers a relevant conceptual framework for integrating cultural values into the science learning process. VBL places values at the core of learning, viewing scientific knowledge not merely as objective facts but as a means to cultivate students' moral, social, and ecological consciousness (Rahmawati et al., 2023; Rhodes et al., 2020). Lecturers are encouraged to design learning

experiences that simultaneously foster critical thinking skills and strengthen humanistic values. The implementation of VBL enables students to understand natural phenomena not only from theoretical perspectives but also through ethical dimensions and human responsibility toward life (Rahmawati et al., 2023). This approach aligns with the principles of social constructivism, emphasizing meaning-making through the interaction of scientific knowledge, culture, and lived experiences (Yakar et al., 2020). A VBL model grounded in Bugis-Makassar local wisdom can serve as an innovative learning strategy that bridges modern science with traditional values while narrowing the gap between academic knowledge and students' real-life experiences.

Integrating cultural values into science education offers clear benefits, yet it may risk conflicting with scientific objectivity. While science is grounded in universal empirical evidence, cultural values are context-specific and rooted in local traditions. Therefore, a balanced approach is needed to ensure that cultural perspectives enrich rather than compromise scientific rigor. Empirical studies show that such integration is both feasible and beneficial. In biology education, the use of ethnobiological knowledge, such as local ecological practices and indigenous classifications enhances students' conceptual understanding and ecological awareness without reducing scientific validity (Jacinda et al., 2023; Suciwati et al., 2021). Similarly, research in environmental education shows that the integration of indigenous knowledge increases students' awareness of sustainability and ecological responsibility, in line with the principles of Education for Sustainable Development (Febrian et al., 2024; Nesterova, 2020). Overall, these findings indicate that, when applied critically and reflectively, integrating cultural values can effectively contextualize scientific knowledge and promote meaningful learning.

Studies on value-based and culture-oriented biology learning remain limited, particularly within the context of the Bugis-Makassar ethnic group, which possesses a rich heritage of life wisdom. Most previous research has focused on the implementation of Value-Based Learning (VBL) in the

domains of moral or general education (Rahmawati et al., 2023; Rombout et al., 2022; Škėrienė & Jucevičienė, 2020), while its application in biology education has been rarely explored in depth. Existing studies have yet to thoroughly examine the perceptions and readiness of prospective biology teachers to integrate local cultural values into teaching practices. This condition reveals a research gap between the globally developed theoretical discourse on VBL and its practical implementation within higher biology education in Indonesia. Investigating the perceptions of Bugis-Makassar preservice biology teachers is therefore essential to understand how they interpret the potential of local wisdom-based VBL in shaping learning experiences and character formation. Findings from such studies can provide an empirical foundation for developing contextual biology learning models rooted in cultural values, thereby strengthening the humanistic and sustainable direction of science education. This study aims to analyze biology education students' perceptions of the potential implementation of Value-Based Learning (VBL) through the integration of Bugis-Makassar cultural values, particularly *siri' na pacce*, in biology education.

Methods

Research Design

This study employed a qualitative design with an exploratory approach to examine biology education students' perceptions of the potential implementation of Value-Based Learning (VBL) through the integration of Bugis-Makassar cultural values, particularly *siri' na pacce*, in biology education. The design was intended to explore and understand how students across different academic levels (undergraduate, master's, and doctoral) construct meaning and form their perspectives on cultural values as contextual value-based content in biology learning. The use of an exploratory design was guided by an interpretive paradigm, emphasizing the importance of subjective meanings and socio-cultural contexts in understanding educational phenomena (Creswell, 2012).

Participants

The participants of this study consisted of 26 students from the Biology Education Program at Universitas Negeri Makassar (UNM), selected through purposive sampling based on specific inclusion criteria. The participants represented three academic levels: 14 undergraduate (S1), 7 master's (S2), and 5 doctoral (S3) students. Selection criteria included: (1) having a *Bugis–Makassar* cultural background, (2) having completed at least one course related to educational philosophy or instructional strategies, (3) having prior exposure to educational theory and biology learning contexts, particularly in ecology and environmental topics that are closely related to sustainability issues and the integration of value-based content in biology learning, and (4) voluntarily agreeing to participate in the study. The inclusion of participants from multiple academic levels aimed to capture a diversity of perspectives that reflect variations in conceptual understanding and academic experience, specifically related to the interpretation and potential application of *siri' na pacce* as a core cultural value in Value-Based Learning (VBL) within biology education.

Instrument

The study utilized an open-ended questionnaire designed to explore biology students' perceptions of the implementation of Value-Based Learning (VBL) grounded in *Bugis–Makassar* local wisdom within biology education. The instrument comprised a series of reflective questions that encouraged participants to express their views in depth regarding the relevance of *Bugis–Makassar* cultural values to the concepts and practices of biology learning.

The instrument was developed based on key indicators, including: (1) understanding of *siri' na pacce* as a cultural value (e.g., dignity, empathy, and social responsibility), (2) perceived relevance of these values to biological concepts (particularly ecology and environmental topics), (3) perceived benefits for learning and character development, and (4) perceived

challenges and implementation support. To ensure content validity and cultural sensitivity, the questionnaire was reviewed and validated by three experts representing the fields of biology education, educational psychology, and local cultural studies.

Data analysis

The data were analyzed using content analysis to identify recurring patterns, categories, and major themes emerging from participants' responses. The analysis began with an open coding process, during which all questionnaire responses were read repeatedly to identify meaningful units relevant to the study's objectives. These meaning units were then organized into conceptual categories that reflected shared ideas or perceptions related to the implementation of VBL grounded in *Bugis–Makassar* local wisdom.

To enhance the trustworthiness of the findings, this study employed peer debriefing and iterative data analysis (Creswell, 2012). The analysis process involved regular discussions with peers who have expertise in biology education and cultural studies to critically review the coding process, emerging themes, and interpretations. This process aimed to ensure that the interpretation of *siri' na pacce* as value-based content in biology learning was both culturally grounded and pedagogically appropriate.

Result and Discussion

The findings of this study were organized through an integrated thematic analysis that synthesizes students' perceptions of Value-Based Learning (VBL) grounded in *siri' na pacce* within biology education. The analysis resulted in three overarching themes that reflect the role of cultural values as value-based content, their contribution to contextual and sustainability-oriented learning, and the perceived benefits, challenges, and support for implementation. These themes, along with their corresponding subthemes and representative student statements, are presented in Table 1.

Table 1. Integrated Thematic Analysis of Value-Based Learning Based on *Siri' Na Pacce* in Biology Education

Main Theme	Subtheme	Thematic Description	Representative Student Statement
<i>Siri' na pacce</i> as value-based content in biology learning	Meaning of <i>siri' na pacce</i>	<i>Siri' na pacce</i> is understood as a value encompassing dignity, empathy, and social responsibility relevant to biology learning	" <i>Siri' na pacce</i> teaches us to care for others and the environment."
	Alignment with biology concepts	Cultural values are perceived as compatible with biological concepts, particularly ecology and interdependence	"This value is similar to relationships among living organisms in ecosystems."
Integration of cultural values for contextual and SDGs-oriented learning	Contextualization of biology learning	Cultural values function as a bridge between abstract biological concepts and students' real-life experiences	"Biology becomes easier to understand when it is connected to our culture."
	Meaningful and sustainability-oriented learning	Integration enhances meaningful learning, ecological awareness, and responsibility aligned with SDGs principles	"Learning biology makes more sense when it relates to environmental responsibility."
	Student engagement and participation	Value-based learning increases interest, motivation, and active participation in learning	"We are more active when learning is related to cultural values."
Benefits, challenges, and support for implementation	Learning benefits	Integration improves conceptual understanding, meaningful learning, and character development	"Biology concepts are clearer when linked to culture."
	Implementation challenges	Limited teaching materials, lecturer readiness, and concerns about scientific objectivity	"There are still no learning materials that integrate cultural values."
	Institutional and pedagogical support	Successful implementation requires curriculum alignment, policy support, and instructional model development	"This approach needs curriculum and institutional support."

Theme 1: Siri' na Pacce as Value-Based Content in Biology Learning

The findings indicate that biology education students perceive *siri' na pacce* as a fundamental cultural value that can function as meaningful value-based content in biology learning. This value is understood to encompass dignity, empathy, and social responsibility, which are considered highly relevant to the nature of biology as a discipline that emphasizes life, environmental balance, and relationships among living organisms. Students interpret *siri' na pacce* not only as a socio-cultural principle but also as an ethical framework

that can support the development of responsibility toward living systems and the environment.

Furthermore, students perceive a strong alignment between the values embedded in *siri' na pacce* and key biological concepts, particularly those related to ecology and interdependence. The principle of caring for others and maintaining social harmony is viewed as analogous to the relationships among organisms within ecosystems, where balance and mutual dependence are essential. This perceived alignment suggests that cultural values can be integrated into biology learning without

reducing scientific rigor, as they serve to enrich rather than replace conceptual understanding.

In addition, the integration of *siri' na pacce* is considered to strengthen the ethical dimension of biology learning. Students emphasize that biological knowledge should not only be understood at a conceptual level but also internalized as a form of moral responsibility toward life and the environment. In this context, cultural values play a significant role in humanizing scientific knowledge by linking abstract biological concepts with real-life responsibilities.

These findings are further supported by expert perspectives, which confirm that the values embedded in *siri' na pacce* are pedagogically relevant and culturally appropriate for integration into biology education. Experts highlight that values such as empathy, dignity, and responsibility can be effectively incorporated into topics such as ecology, environmental conservation, and sustainability, without compromising the objectivity of scientific content.

This indicates that *siri' na pacce* can serve as a culturally grounded value framework that enhances both conceptual understanding and character development in biology learning. Value-based learning has been shown to enhance relevance, meaningfulness, and student engagement in science learning without compromising scientific substance (Rahmawati et al., 2023; Saparuddin et al., 2025). Students' positive perceptions of the pedagogical potential of VBL can be explained through constructivist perspectives and meaningful learning theory, which emphasize that knowledge is actively constructed through interactions between scientific concepts and learners' socio-cultural contexts (Apoko & Waluyo, 2025; Barak, 2017). Consequently, the integration of values becomes a crucial element in deepening understanding and supporting the internalization of biological concepts.

Theme 2: Integration of Cultural Values for Contextual and SDGs-Oriented Learning

The findings reveal that the integration of *siri' na pacce* into biology learning is perceived by students as an effective approach to fostering contextual and

meaningful learning experiences. Cultural values function as a bridge that connects abstract biological concepts with students' lived experiences, allowing learning to become more accessible and relevant. Students indicate that when biology content is linked to familiar cultural contexts, complex concepts particularly those related to ecology and environmental systems become easier to understand and more meaningful.

Moreover, the integration of cultural values is perceived to contribute significantly to the development of sustainability-oriented learning. Students recognize that *siri' na pacce*, which emphasizes empathy, responsibility, and care for others, aligns closely with the principles of environmental responsibility and sustainable living. This alignment supports the development of ecological awareness and reinforces the role of biology education in addressing global challenges reflected in the Sustainable Development Goals (SDGs). In this context, biology learning is not only oriented toward conceptual mastery but also toward cultivating a sense of responsibility for maintaining environmental balance and sustaining life.

In addition, students report that value-based learning grounded in cultural contexts enhances their engagement and participation in the learning process. Learning activities that incorporate cultural values are perceived as more engaging compared to conventional approaches that focus primarily on theoretical content. The integration of *siri' na pacce* encourages active discussion, reflection, and deeper involvement in learning, as students are able to relate the material to their own cultural identities and everyday experiences.

From a pedagogical perspective, these findings suggest that the integration of cultural values supports a shift toward more student-centered and meaningful learning. Cultural context serves not only as a learning resource but also as a medium for constructing knowledge in a way that is socially and environmentally relevant. This reinforces the role of biology education as a platform for developing both scientific understanding and sustainability-oriented values, thereby contributing to the broader

goals of Education for Sustainable Development (ESD) and the achievement of SDGs.

The integration of indigenous knowledge in science education has been shown to enrich conceptual understanding and enhance student engagement, as local knowledge systems and cultural values provide meaningful learning contexts (Pangalila et al., 2024). The relevance of cultural values as contextual value-based content in biology learning can be explained through socio-cultural learning and contextual learning approaches, which position culture as an important mediating tool in the process of knowledge construction, ensuring that biology learning remains closely connected to the social, cultural, and environmental contexts in which students are situated (Arifin et al., 2025).

Theme 3: Benefits, Challenges, and Support for Implementation

The findings indicate that the integration of *siri' na pacce* into biology learning is perceived to offer significant pedagogical benefits, particularly in enhancing conceptual understanding, meaningful learning, and character development. Students report that linking biological concepts with cultural values makes learning more comprehensible and relevant, especially in topics related to ecology and environmental systems. This integration allows students to not only understand scientific concepts more deeply but also internalize values related to environmental care and social responsibility. As a result, biology learning is perceived as a holistic process that combines cognitive and affective dimensions.

Despite these benefits, students also identify several challenges that may hinder the effective implementation of culturally grounded Value-Based Learning (VBL). One of the primary challenges is the limited availability of teaching materials that explicitly integrate Bugis–Makassar cultural values into biology content. In addition, lecturer readiness emerges as a critical factor, as the implementation of VBL requires both pedagogical competence and an adequate understanding of cultural contexts. Students also express concerns regarding the potential

tension between cultural values and scientific objectivity, indicating the need for a balanced and critical approach in integrating cultural perspectives into science education.

Furthermore, the findings highlight the importance of institutional and pedagogical support in ensuring the successful implementation of VBL. Students emphasize that the integration of cultural values cannot rely solely on individual lecturers but must be supported by curriculum design, institutional policies, and the development of structured instructional models. Such support is essential to ensure consistency, scalability, and sustainability of implementation across different educational contexts. This is particularly important in diverse educational settings, where students and educators may come from varied cultural backgrounds.

Expert perspectives further reinforce these findings by emphasizing that the successful integration of cultural values into biology learning requires systematic instructional design, teacher training, and culturally responsive pedagogy. Experts highlight that culturally grounded VBL should be implemented as complementary to scientific learning, ensuring that cultural values enrich rather than replace scientific knowledge. Therefore, the integration of *siri' na pacce* into biology education should be supported by the development of contextual teaching materials, capacity building for educators, and policy frameworks that recognize the role of local wisdom in advancing sustainability-oriented education.

Value-based learning and character education in science have been shown to positively influence environmental awareness, social responsibility, and student engagement (Sin & Cahyani, 2022; Yousef et al., 2020). These implications can be explained through the frameworks of holistic learning and Education for Sustainable Development (ESD), which emphasize the integration of cognitive, affective, and moral domains in learning. Consequently, biology education not only promotes scientific understanding but also fosters student character oriented toward sustainability (Takala & Korhonen-Yrjänheikki, 2019).

Although VBL grounded in Bugis–Makassar local wisdom, is perceived to have strong pedagogical potential, its

implementation faces several challenges. The main challenges identified by students include the limited availability of teaching materials based on local wisdom, lecturers' pedagogical readiness and competence, and concerns regarding potential conflicts between cultural values and the objectivity of modern science. These findings are consistent with previous empirical studies indicating that the integration of culture into science education is often constrained by a lack of contextual learning resources and limited lecturer capacity to navigate the interface between cultural values and scientific epistemology (Rahmawati & Ridwan, 2017). From a theoretical perspective, these challenges can be understood through the frameworks of pedagogical content knowledge (PCK) and culturally responsive teaching, which emphasize that the successful integration of cultural values into biology learning is highly dependent on educators' ability to connect scientific content with cultural contexts in a reflective, critical, and proportionate manner (Sexton, 2024).

Students expressed strong support for the implementation of Value-Based Learning

(VBL) grounded in *Bugis–Makassar* local wisdom in biology education, with particular emphasis on the importance of systemic support from educational institutions. Students perceive that the sustainability of VBL implementation requires curricular support that explicitly accommodates value- and culture-based learning, as well as the development of applicable instructional models and implementation guidelines. Pedagogical innovation can only be effectively sustained when it is supported by institutional policies, curricular alignment, and the readiness of the educational system (Sriphong, 2019). Educational transformation depends not only on classroom practices but also on supportive policy frameworks, curriculum structures, and institutional cultures that sustain change over time (Tran & Bui, 2023).

The synthesis of the overall research findings resulted in a conceptual framework that positions VBL grounded in *Bugis–Makassar* local wisdom as a strategic approach for transforming biology education toward meaningful, contextual, and character-oriented learning (Figure 1).

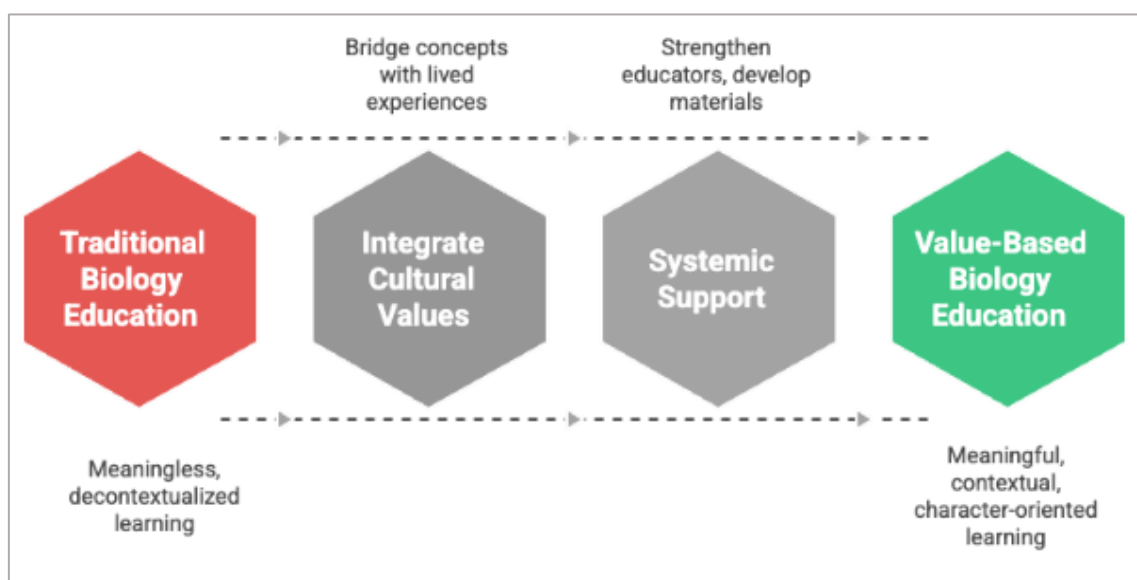


Figure 1. Transformation of Biology Education

Students' positive perceptions of the pedagogical potential of VBL serve as an initial foundation that enables the integration of cultural values into biology learning without compromising scientific principles. Cultural values function as meaningful value-

based content in biology learning that bridges biological concepts with students' lived experiences, thereby strengthening conceptual understanding and the internalization of learning. This integration contributes to enhanced learning

meaningfulness, increased student engagement, and the reinforcement of character development and ecological awareness as important affective outcomes in biology education. Nevertheless, the implementation of VBL is not without structural and pedagogical challenges, including limitations in teaching materials, lecturer readiness, and the need to maintain scientific objectivity. Therefore, this conceptual framework underscores that the successful implementation of culturally grounded VBL requires systemic support, encompassing the strengthening of educators' competencies, the development of contextualized learning materials, and curriculum and institutional policies that are responsive to local cultural contexts. Beyond enriching the theoretical discourse on value-based biology education, this framework also provides practical direction for the development of learning models aligned with sustainability principles and character education within the Indonesian educational context

Conclusion

This study concludes that biology education students hold positive and reflective perceptions toward the implementation of Value-Based Learning (VBL) grounded in *siri' na pacce*. The findings show that *siri' na pacce* is perceived as a relevant value-based content that aligns with key biological concepts, particularly ecology and interdependence, and functions as a bridge between scientific knowledge and students' real-life experiences. Its integration is considered to enhance meaningful learning, student engagement, conceptual understanding, and the development of ecological awareness and social responsibility. At the same time, students recognize that the successful implementation of this approach requires pedagogical adjustments and institutional support.

This study is subject to several limitations. First, the findings are based on a limited number of participants from a single institution, which may not fully represent diverse student perspectives across different educational and cultural contexts. Second, the data were collected through open-ended questionnaires, which may not capture deeper

reflective insights compared to more in-depth qualitative methods. Third, the study focuses on students' perceptions of the potential implementation of VBL rather than its actual application in classroom settings, so the effectiveness of this approach in improving learning outcomes remains untested.

Based on these findings, future research should focus on developing and implementing concrete instructional models that integrate *siri' na pacce* into specific biology topics, particularly ecology and environmental education. Further studies are also needed to explore the effectiveness of this approach through experimental or design-based research, as well as to develop culturally grounded teaching materials and assessment tools. In addition, expanding research across different institutions and cultural backgrounds will be important to examine the broader applicability of value-based learning grounded in local wisdom within diverse educational settings.

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