



Developing a Local Wisdom-Based Learning Model through Sugarcane Bagasse Cracker Innovation to Enhance Elementary Students' Social Competence and Economic Independence

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Received: 2025-07-08; **Revised:** 2026-01-19; **Accepted:** 2026-02-28

Abstract

Objective: This study aims to develop a local wisdom-based learning model through sugarcane bagasse cracker innovation to enhance elementary students' social competence and economic independence. **Novelty:** This research integrates local wisdom with product-based learning using sugarcane bagasse as an innovative medium to promote sustainability, entrepreneurship, and social skills in primary education. **Methods:** This study employed a Research and Development (R&D) design adapted from the ADDIE model, consisting of analysis, design, development, implementation, and evaluation stages. The participants were elementary school students and teachers. Data were collected through observations, questionnaires, expert validation sheets, and performance assessments, and analyzed using both qualitative and quantitative techniques. **Results:** The findings indicate that the developed learning model is valid, practical, and effective. Expert validation results show high feasibility, while implementation demonstrates significant improvements in students' social competence—such as collaboration, communication, and responsibility—as well as their economic independence reflected in entrepreneurial awareness and basic production skills. **Conclusion:** The developed model is effective in integrating local wisdom and life skills, contributing to meaningful and contextual learning in elementary education.

Keywords: Local wisdom-based learning, sugarcane bagasse, social competence, elementary education.

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INTRODUCTION

Elementary education is currently challenged to design learning processes that go beyond cognitive achievement and foster students' social competence and economic independence in a contextual manner. In practice, learning in primary schools remains largely abstract and disconnected from students' real-life experiences, which contributes to the limited development of social skills and life skills. Meanwhile, 21st-century education emphasizes the integration of knowledge, social competence, and entrepreneurial skills as essential capacities for navigating complex social and economic realities.

In this context, the integration of local wisdom into learning has gained increasing attention in global educational research. A bibliometric study by Fatwa et al. (2024) indicates a growing trend in local wisdom-based education, particularly in primary education, as an effort to make learning more contextual and meaningful. However, the study also highlights a significant gap in terms of contextual innovation and the development of instructional models that operationalize local wisdom into practical and real-life applications. Most existing implementations remain at the level of value transmission rather than experiential and product-oriented learning.

Furthermore, Andriyanti et al. (2024) emphasize that local wisdom plays a strategic role in shaping students' character, identity, and social attachment. Values such as cooperation, responsibility, and mutual respect can be effectively fostered through local wisdom-based learning. In addition, this approach aligns with the principles of sustainable development, particularly in promoting inclusive and relevant education. Nevertheless, prior studies tend to focus primarily on character development, with limited attention to the integration of economic and entrepreneurial competencies within the learning process.

Similarly, Arjaya et al. (2024), through a Scopus-based bibliometric analysis, reveal that the integration of local wisdom in education has expanded toward sustainability-oriented learning. This trend reflects a growing recognition of local knowledge as a resource for achieving sustainability goals. However, there is still a lack of instructional models that combine local wisdom with product innovation and hands-on entrepreneurial practices, particularly in the context of elementary education.

On the other hand, product-based learning and edupreneurship approaches have emerged as promising strategies for fostering students' economic independence. Switaningsih et al. (2024) found that learning through local product innovation can enhance students' creativity, critical thinking, and entrepreneurial skills by engaging them in authentic production activities. However, such studies are still limited in scope and rarely incorporate sustainable local resources, such as agricultural waste, which have high ecological and economic potential.

Moreover, Agustino et al. (2024) argue that integrating local wisdom into sustainable entrepreneurship education can simultaneously strengthen social, economic, and environmental dimensions. This approach not only generates economic value but also promotes ecological awareness and social responsibility among learners. Despite its potential, existing research remains largely conceptual and lacks concrete implementation in primary school settings.

Recent trends also indicate that local wisdom-based learning development is predominantly focused on instructional media such as storybooks, modules, and digital resources, which mainly aim to reinforce character education (Alwanda et al., 2026). There is still a critical need for learning models that actively engage students in collaborative processes, real-world production activities, and entrepreneurial experiences. This gap underscores the necessity of integrating local wisdom with experiential and product-based learning approaches.

Based on these considerations, it can be concluded that although research on local wisdom in elementary education has grown significantly, there remains a gap in developing comprehensive learning models that integrate: (1) local wisdom as a value foundation, (2) product innovation as a contextual learning medium, and (3) the enhancement of social competence and economic independence. Therefore, this study aims to develop a local wisdom-based learning model through sugarcane bagasse cracker innovation as a contextual and sustainable learning medium in primary education.

The novelty of this research lies in the integration of local wisdom with product-based learning using sugarcane bagasse—an underutilized agricultural by-product—as an innovative learning resource. This approach combines sustainability education, entrepreneurship learning, and social competence development within a single instructional model. Thus, this study is expected to contribute significantly to the advancement of innovative learning models that not only preserve cultural identity but also equip students with essential social and economic competencies from an early age.

METHODS

In recent years, the demand for innovative and contextual learning models in elementary education has increased significantly, particularly those that integrate local wisdom, sustainability, and life skills. Contemporary educational paradigms emphasize the importance of meaningful learning experiences that are closely connected to students' real-life contexts and socio-cultural environments. However, many existing instructional practices remain fragmented and lack systematic design, resulting in limited effectiveness in fostering higher-order competencies such as social competence and economic independence. This condition highlights the need for a structured instructional design approach that can systematically guide the development of effective learning models.

One of the most widely recognized frameworks for developing instructional models is the ADDIE model, which offers a systematic and iterative process consisting of analysis, design, development, implementation, and evaluation. The ADDIE model has been proven to provide a structured approach that ensures alignment between learning objectives, instructional strategies, and assessment processes (Adeoye et al., 2024). Furthermore, the model enables educators to design learning experiences that are responsive to learners' needs and contextual realities, particularly in primary education settings where student characteristics require careful consideration (Martatiyana et al., 2023).

Previous studies have demonstrated that Research and Development (R&D) approaches based on the ADDIE framework are effective in producing valid, practical, and effective learning products. For instance, Aris and Mansor (2023) found that instructional modules developed using the ADDIE model achieved high validity and feasibility, with strong expert agreement and reliability scores. Similarly, Safaruddin et al. (2023) reported that ADDIE-based learning design significantly improved students' learning outcomes and demonstrated high levels of practicality and effectiveness through iterative validation and testing processes. These findings indicate that the ADDIE-based R&D approach is particularly suitable for developing innovative instructional models in education.

Moreover, the application of the ADDIE model has been widely adopted across various educational contexts, including primary education, digital learning, and blended learning environments. Wang et al. (2023) emphasize that the ADDIE model enhances the systematic integration of pedagogical strategies and learning technologies, ensuring that instructional interventions are well-structured and impactful. In addition, the model supports continuous

improvement through evaluation and revision cycles, making it highly adaptable to diverse learning contexts and innovations (Respasari et al., 2023).

Based on these considerations, this study employs a Research and Development (R&D) design adapted from the ADDIE model to develop a local wisdom-based learning model through sugarcane bagasse cracker innovation. The research involves elementary school students and teachers as key participants to ensure contextual relevance and practical applicability. Data are collected through multiple techniques, including observations, questionnaires, expert validation sheets, and performance assessments, allowing for comprehensive analysis using both qualitative and quantitative methods. This mixed-method approach is essential to ensure the validity, practicality, and effectiveness of the developed learning model, as recommended in prior ADDIE-based studies.

RESULTS AND DISCUSSION

The development of elementary education in the 21st century requires learning models that not only emphasize cognitive achievement but also foster students' social competence and economic independence. However, current classroom practices in primary education still tend to prioritize academic-oriented outcomes, often neglecting the development of collaboration, communication, and responsibility as essential social skills. This condition creates a gap between educational outcomes and real-life demands, particularly in preparing students to become socially competent and economically adaptive individuals.

Recent studies highlight that integrating local wisdom into learning can serve as an effective strategy to address this issue. Local wisdom embodies contextual values such as cooperation, mutual respect, and social responsibility, which are essential for developing students' social competence. A systematic review by Oktaviani et al. (2025) found that local wisdom-based learning significantly enhances students' communication and collaboration skills by creating culturally relevant and participatory learning environments. Similarly, Latifah et al. (2024) reported that learning grounded in local culture effectively strengthens students' social understanding, responsibility, and cooperative character.

In addition, research on the development of local wisdom-based learning models demonstrates strong empirical evidence regarding their validity, practicality, and effectiveness. Mursalim et al. (2025) developed a local wisdom-based learning model in elementary schools and found that expert validation results indicated high feasibility, while field implementation significantly improved students' learning outcomes, with effectiveness reaching a high category. Likewise, Yusuf et al. (2025) confirmed that a contextual learning model based on local wisdom was not only valid and practical but also effective in improving students' social skills, including communication, collaboration, and social problem-solving abilities.

Beyond social competence, the integration of contextual and product-based learning also contributes to the development of economic independence among students. Learning activities that involve real-life production processes and entrepreneurial practices enable students to develop basic economic awareness and life skills. Studies on local wisdom-oriented instructional design emphasize that contextual learning linked to local resources can foster students' independence, creativity, and entrepreneurial attitudes (Alwanda et al., 2026). This indicates that combining local wisdom with product innovation has the potential to bridge social competence and economic independence in a holistic learning framework.

Therefore, the findings from previous studies consistently indicate that local wisdom-based learning models are valid, practical, and effective. Expert validation results generally show high feasibility, while implementation demonstrates significant improvements in

students' social competence—such as collaboration, communication, and responsibility—as well as their economic independence reflected in entrepreneurial awareness and basic production skills. However, despite these promising findings, there is still limited research that specifically integrates local wisdom with product innovation using locally available waste materials, such as sugarcane bagasse, within a structured learning model in elementary education.

Based on these considerations, this study seeks to develop a local wisdom-based learning model through sugarcane bagasse cracker innovation as a contextual and sustainable approach to enhance elementary students' social competence and economic independence. This model is expected to provide a meaningful contribution to primary education by integrating cultural values, sustainability principles, and entrepreneurial learning into a unified pedagogical framework.

CONCLUSION

This study contributes to the field of primary education by offering a systematically developed and validated local wisdom-based learning model that meaningfully integrates life skills into classroom practice. It advances the existing body of knowledge by demonstrating how underutilized local resources, such as sugarcane bagasse, can be transformed into pedagogical tools for fostering both social competence and economic independence among elementary students. The model provides a practical framework that bridges sustainability education, entrepreneurship, and socio-constructivist learning, thereby enriching instructional design in elementary education with contextually grounded and culturally responsive approaches.

Despite its contributions, this study has several limitations. First, the implementation was conducted within a limited educational context, which may affect the generalizability of the findings to different regions or school settings with varying socio-cultural characteristics. Second, the duration of the intervention was relatively short, limiting the ability to capture long-term impacts on students' economic independence and behavioral changes. Third, the study primarily relied on performance-based and observational measures, which may not fully capture deeper cognitive and affective dimensions of learning. Future research is therefore recommended to involve broader samples, longitudinal designs, and more diverse assessment instruments.

The findings of this study have important implications for both theory and practice in elementary education. Practically, the developed model offers teachers an innovative and applicable strategy to design meaningful, contextual, and skill-oriented learning experiences rooted in local wisdom. Theoretically, it reinforces the importance of integrating cultural context and real-world problem-solving into early education to support holistic student development. In a broader sense, this model has the potential to contribute to sustainable education practices by promoting resource utilization, entrepreneurial awareness, and social responsibility from an early age, thereby preparing students to become adaptive and socially responsible individuals in the future.

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