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Agricultural literacy among junior high school students in Indramayu

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ABSTRACT

Indramayu Regency as one of the leading agrarian regions in West Java with the highest rice production, demonstrates a strong interconnection between its community and the agricultural sector. However, challenges related to farmer regeneration and negative perceptions of agriculture pose a threat to the sector's sustainability. Agricultural literacy is a crucial factor in enhancing junior high school students' understanding of agriculture's roles in social, economic, and environmental contexts. This research aims to examine the urgency of agricultural literacy among junior high school students in Indramayu Regency. A descriptive quantitative method was employed, utilizing a survey with a standardized test adapted from the Judd-Murray Agricultural Literacy Instrument (JMALI). The research was conducted at a junior high school in Indramayu, which was selected for its representation of the local farming community, as most students come from farming families and the school is situated in an agricultural area. Purposive random sampling was used to select participants. The results indicate that students' agricultural literacy is generally low, with most students lacking knowledge, particularly regarding the connections between agriculture and economic, social, health, cultural, and environmental aspects. The study also discusses approaches to improve students' agricultural literacy by integrating agricultural concepts into curriculum development.

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ABSTRACT

Kabupaten Indramayu merupakan salah satu daerah agraris dengan produksi padi tertinggi di Jawa Barat, memiliki keterkaitan erat antara masyarakat dan sektor pertanian. Namun, tantangan regenerasi petani dan persepsi negatif terhadap pertanian mengancam keberlanjutan sektor ini. Literasi pertanian menjadi kunci penting untuk meningkatkan pemahaman siswa SMP tentang peran pertanian dalam aspek sosial, ekonomi, dan lingkungan. Penelitian ini bertujuan untuk melihat urgensi literasi pertanian pada siswa sekolah menengah pertama di kabupaten Indramayu. Metode yang digunakan adalah kuantitatif deskriptif dengan menggunakan survey. Instrumen yang digunakan untuk pengumpulan data adalah tes standar yang diadaptasi dari Instrumen Literasi Pertanian Judd-Murray (JMALI). Lokasi penelitian ini disalah satu SMP di Indramayu. Sekolah ini dipilih karena dianggap merepresentasikan masyarakat Indramayu yang bermata pencaharian sebagai petani, karena letak geografisnya berada di wilayah pertanian dan mayoritas peserta didik adalah keluarga petani (family farmer). Teknik sampeling penelitian ini menggunakan purposive random sampling. Hasil uji pemahaman siswa terkait literasi pertanian menunjukan dikategori Rendah, Mayoritas siswa belum mengenal literasi pertanian terutama yang berkenaan dengan hubungan pertanian dengan ekonomi, sosial, kesehatan, budaya dan lingkungan. Dalam penelitian ini juga membahas terkait pendekatan untuk meningkatkan pemahaman siswa terkait literasi pertanian dengan mengintegrasikannya ke dalam pengembangan kurikulum.

Keywords: *kurikulum integrasi; literasi pertanian; pembangunan berkelanjutan*

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INTRODUCTION

The global community in the 21st century faces numerous significant challenges, including environmental issues, population growth, inadequate employment opportunities, and food crises (Kasztelan, 2017). These problems pose serious threats to sustainable development, in which food and agriculture play a crucial role as basic human needs and fundamental rights for every individual (Candel, 2014). Every human being has the right to earn a livelihood from the earth, particularly in fulfilling food needs. Therefore, natural resource management must be conducted sustainably to ensure intergenerational welfare (Lal, 2020; Schreefel et al., 2020). However, the agricultural sector faces complex challenges, such as the climate crisis, lengthy distribution chains, suboptimal policies, farmer regeneration, and industrialization processes. Sustainable food production efforts require wise resource management and the application of environmentally friendly methods.

To ensure such sustainability, a global movement has been initiated through the Sustainable Development Goals (SDGs), emphasizing the importance of food and ecosystem sustainability, particularly in Goals 2 (Zero Hunger) and 15 (Life on Land), as stated in the United Nations document—the SDGs direct development towards social, economic, and environmental dimensions, with target achievement by 2030. Sustainable development is based on five dimensions: people, planet, prosperity, peace, and partnership, which provide new guidelines for every intervention to achieve appropriate development while addressing global societal challenges.

As an agrarian country that considers agriculture a vital sector in supporting food needs, Indonesia ranks among the top five agricultural exporters globally, with leading commodities including rice, coffee, cocoa, and others. One of the regions with the most considerable agrarian resources is Indramayu Regency. Indramayu possesses locational, geographical, socio-cultural, and historical characteristics closely related to agriculture. The regency is also known as the National Food Barn, being the highest rice producer in West Java (link access http://www.jawapos.com/read/2017/03/13/115737/jadi-lumbung-padi-nasional-petani-indramayumasih-miskin). According to BPS 2023, Indramayu Regency produced 1,424,303 tons of rice, the highest in West Java for the past three years. Furthermore, according to the Indramayu Civil Registry Office in 2023, the majority of residents in Indramayu work as farmers, totaling 182,642 individuals. This also highlights the strong bond between the Indramayu community and agriculture, as evident in various traditions and cultures, such as Ngarot, Sedekah Bumi, and Mapag Sri, among others.

However, over time, agriculture in Indramayu and other regions faces various problems, particularly in terms of farmer regeneration. Many Rural youth in Indonesia aspire or intend to work outside the agricultural sector (White, 2023; Ngadi et al., 2023). Consequently, agriculture is increasingly abandoned, and the culture embedded within it is eroding. This indicates that agriculture has not yet been integrated into the education system. Education plays a crucial role as a prerequisite for driving change and equipping all citizens with the key competencies needed to participate in addressing global issues, including those related to food and agriculture.

Agricultural literacy aims to enhance a better understanding of agriculture and its role in society (Bature et al., 2023; Gong et al., 2024). One way to achieve this is by implementing a strong commitment to education at the junior high school (SMP) level, which can serve as a foundation for promoting agricultural literacy nationwide. Educational curriculum that incorporates agriculture in junior high schools requires a well-organized lesson schedule, specific objectives, and learning experiences designed to achieve educational goals (Abdullahi et al., 2022).

The educational curriculum that incorporates agriculture in junior high schools aims to disseminate agricultural information, facilitate personal growth, and correct various misconceptions about the agricultural sector. Unfortunately, due to the negative perceptions associated with agriculture, where

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farming is often considered an unappealing occupation, students are often reluctant to pursue careers in this field. This hesitation may stem from a lack of agricultural literacy, which is crucial for comprehending the diverse fields and opportunities within the agricultural sector. Agricultural literacy differs from agricultural education in that its focus is on educating students about agriculture, rather than preparing them to work in the agricultural sector (Vallera & Bodzin, 2016; Clemons et al., 2024). Agricultural literacy should be viewed as a driver within the curriculum, monitored and fostered through a formal agricultural literacy framework that incorporates a multidisciplinary curriculum, values, and agenda. The primary objective of this approach is to meet the standards of the agricultural literacy framework by integrating it with academic content, thematically weaving agricultural material through academic subjects, thereby establishing agricultural literacy as a content area within the curriculum.

Additionally, agriculturally literate individuals understand the goals and values of agriculture and can articulate them. They possess critical thinking skills and make informed value judgments regarding the impact of agriculture on the economy, environment, technology, lifestyle, and its relationship with the world. They are also aware of the social and political pressures arising from such judgments (Powell et al., 2008). An agriculturally literate person has a strong understanding of how the agricultural industry operates. This extends beyond merely knowing where food comes from or who grows it to encompass an understanding of its impact on various aspects of society.

However, current school students have limited involvement in agricultural production, minimal understanding of food systems, and limited knowledge about the origins of the food they consume daily, as understanding and concepts of food and agriculture are only focused on vocational high schools or agricultural colleges. Through learning reorientation, it is possible to incorporate agricultural concepts into every subject at the basic education level, including junior high school. The lack of agricultural literacy can have significant consequences, including public misunderstandings of the vital role of agriculture in society, which can lead to disruptions in food security (Chris et al., 2018; Febianti et al., 2024). Negative perceptions of agriculture are a significant contributor to food security issues in Indonesia, and addressing this requires an improvement in agricultural literacy within society.

Based on the above explanation, research was conducted on the urgency of agricultural literacy. The research location was a junior high school in Indramayu Regency. This school was selected because it is considered representative of the Indramayu community, the majority of whom are farmers, given its geographical location in an agricultural area and the fact that most of its students come from farming families. Therefore, the community's need to understand and communicate agricultural resources and values is increasing. Based on this explanation, this study will examine the level of understanding of agricultural literacy among students and discuss the importance of agricultural literacy for junior high school students. Thus, the objectives of this study are to identify the level of agricultural literacy among students in one junior high school in Indramayu Regency, analyze the factors influencing students' agricultural literacy levels, and provide recommendations for improving agricultural literacy through curriculum and learning processes at the junior high school level.

LITERATURE REVIEW

Curriculum Integration

Curriculum integration is an educational approach that organizes learning to transcend subject boundaries and combine different aspects of the curriculum into meaningful connections, thereby focusing on broader areas of study. This approach views learning and teaching holistically, reflecting the interactive nature of the real world. The goal is to develop students' ability to face the challenges of life, especially in the 21st century, by connecting concepts, skills, and abilities from various fields of study, enabling students to understand complex problems in their surrounding environment with a holistic view (Akib et al., 2020).

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According to UNESCO in “Education for Sustainable Development Goals: Learning objectives”, there are two main approaches to environmental education: the interdisciplinary approach and the multidisciplinary approach. The interdisciplinary approach involves integrating various subjects and organizing them into a single, specialized subject focused on environmental issues. In contrast, the multidisciplinary approach employs an infusion strategy, in which environmental topics are incorporated into different scientific disciplines or individual subjects. For instance, this infusion strategy can be applied by integrating agricultural literacy into social studies learning. Such curriculum integration requires a systematic, participatory, and contextual approach, with sustainability positioned as a core principle in education aimed at fostering behavior change and holistic understanding (Menon & Suresh, 2020).

Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) in this study focus on the second and 15th goals, namely Zero Hunger and Life on Land. SDG 2 aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture, adopting a broader approach than MDG 1, which includes transforming the food system and empowering small-scale farmers, especially women (Atukunda et al., 2021). Key challenges in SDGs 2 include rising food demand due to population growth, environmental degradation and climate change impacts that could reduce crop yields by up to 25% and the COVID-19 pandemic worsening the continent's hunger and food security situation, leaving many countries far from achieving SDGs 2 targets by the set deadline (Otekunrin, 2021). Agriculture also contributes significantly to greenhouse gas emissions, mainly from livestock, fertilizers, and land clearing. Intensive agricultural practices have damaged soil, water, and biodiversity, and made food systems vulnerable to pests and diseases. Therefore, sustainable agricultural systems that can maintain ecosystems, reduce emissions, and protect biodiversity are needed as the foundation of long-term food security (Sporchia et al., 2024). Achieving SDG 2 requires cross-sectoral cooperation, including improved connectivity and investment in agricultural technology, to holistically address food issues and ensure food security for all communities worldwide (Arora & Mishra, 2022; Chen et al., 2023).

Sustainable Development Goal (SDG) 15, "Life on Land," aims to protect, restore, and promote the sustainable use of terrestrial ecosystems, including sustainable forest management, combat desertification, halt, and reverse land degradation and biodiversity loss (Arana et al., 2020; Gulseven & Ahmed, 2022; Krauss, 2022). While there has been some progress in sustainable forest management and biodiversity protection, overall progress remains insufficient to achieve the targets set. Key challenges include extensive land degradation due to urbanization, deforestation, and climate change, as well as threats from invasive species that undermine biodiversity (Arora & Mishra, 2022; Krauss, 2021).

Agricultural literacy plays a strategic role in supporting the achievement of SDG 15, particularly in the sustainable management of terrestrial ecosystems. Adequate knowledge and understanding of sustainable agricultural practices enable communities, particularly farmers, to manage their land efficiently, prevent soil degradation, and conserve biodiversity. Improving agricultural literacy also encourages the adoption of environmentally friendly technologies and agricultural innovations that can minimize negative impacts on terrestrial ecosystems. Thus, strengthening agricultural literacy is a crucial strategy in addressing the primary challenges to achieving the targets of SDG 15.

Agricultural Literacy

Agricultural literacy refers to an individual's ability to understand, analyze, and communicate basic information about food and fiber systems, encompassing their historical, social, economic, and environmental aspects (Coman et al., 2020; Cosby et al., 2022). Agricultural literacy extends beyond

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knowing or being aware of limited aspects of agriculture to encompass a comprehensive understanding of agricultural production processes, food supply chains, and their impact on society and the environment.

Agricultural literacy is developed during schooling through formal education and informal experiences, such as involvement in family agricultural enterprises, non-farm social discussions, and traditional and social media. The concept encompasses the ability to make personal decisions, participate in civic and cultural affairs, and contribute to agricultural economic productivity (Cosby et al., 2022). In curriculum development, agricultural literacy enables students to become active, lifelong learners, capable of making informed decisions related to agricultural, environmental, and technological issues (Vallera & Bodzin, 2020).

METHODS

The research method employed in this study was a descriptive, quantitative approach, utilizing a survey. This method was employed because it was suitable for addressing the study's questions and objectives related to students' understanding of agricultural literacy. The research design employed was a cross-sectional design, which is a research approach aimed at collecting data from a sample at a single point in time. The research location is a junior high school in Indramayu Regency. This school was selected because it is considered representative of the Indramayu community, whose primary occupation is farming, due to its geographical location in an agricultural area and the majority of students coming from farming families (family farmers). The research subjects were students in grades 7, 8, and 9 at a junior high school in Indramayu Regency, selected using purposive random sampling, with the criterion that the sample must come from farming families, resulting in a total of 40 students.

The instrument used for data collection was a standardized questionnaire adapted from the Judd-Murray Agricultural Literacy Instrument (JMALI) in his 2019 dissertation entitled "*Development and validation of an agricultural literacy instrument using the national agricultural literacy outcomes*". The JMALI instrument is an agricultural literacy tool designed to measure an individual's proficiency level (i.e., exposure, factual literacy, and applicable competencies) using an adaptation of the PISA model (link access http://www.oecd.org/pisa/sitedocument/PISA-2015-technical-report-final.pdf). The instrument used in this study consists of a questionnaire with 15 questions. Each item allows respondents (students) to select one, some, or all of the answers they consider correct. The questionnaire was completed online via Google Forms. The questionnaire's questions cover aspects of understanding sustainable agriculture and its application, food literacy, agricultural products, geographical and environmental conditions, natural resources, local agricultural culture, and the application of technology in agriculture.

The data analysis technique in this study follows three stages as proposed by Saldana in the book entitled Thinking qualitatively: Methods of mind", namely:

1. In the data reduction stage, quantitative data collected through questionnaires were selected and grouped based on agricultural literacy indicators. This process included organizing data relevant to the research objectives.
2. In the data presentation stage, the reduced data was analyzed using Microsoft Excel software and presented in the form of descriptive statistics. The results of the analysis are presented in tables that display the mode, median, mean, standard deviation, minimum, and maximum values. Additionally, percentages are calculated to categorize students' levels of agricultural literacy. The analysis also includes the use of partial scores for each question item, where students receive a score for each correct answer without penalty for incorrect answers.

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3. The final stage, namely, concluding, involved interpreting the results of the data analysis descriptively by relating them to agricultural literacy concepts. This interpretation was used to formulate implications for the learning process, particularly in the context of strengthening students' agricultural literacy.

RESULTS AND DISCUSSION

The test results on students' understanding of agricultural literacy in one of the junior high schools in Indramayu Regency, with 40 students as respondents and 15 questions in the instrument, were categorized as still very low, with an average score of 37%. The majority of students are unfamiliar with agricultural literacy, particularly in the areas of sustainable agriculture, agricultural practices, geographical conditions, environmental issues, natural resources, and cultural aspects.

From the results of the research data analysis carried out, it can be described in tabular form as follows in **Table 1**.

Table 1. Description of agricultural literacy level results

Statistics	Score
N	40
Mean	37,3
Median	33,3
Mode	26,7
St. Deviation	9,75
Range	40
Minimum	13,3
Maximum	53,3

Source: Sutisna dalam Buku "Statistika Penelitian"

The data above can be described as the level of students' agricultural literacy with an average of 37.3, a median value of 33.3, a frequently occurring value of 26.7, and a standard deviation of 9.75. The highest score was 53.3, and the lowest score was 13.3. From these results, the level of agricultural literacy of students of one junior high school in Indramayu Regency can be categorized as shown in the following **Table 2**.

Table 2. Categorization of agricultural literacy levels

No.	Value Interval	Frequency	Percentage	Category
1	> 20	1	3%	Very Low
2	21 - 40	27	68%	Low
3	41 - 60	12	30%	Average
4	61- 80	0	0%	High
5	81 - 100	0	0%	Very High
	Total	40	100%	

Source: Lestari & Roesdiana, 2023

Table 2 shows that the level of agricultural literacy in one of the junior high schools in Indramayu Regency is low, with 27 students or 68%. The level of student interest in participating in physical education, sports,

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and health learning is categorized as follows: very high (0 students or 0%), high (0 students or 0%), average (12 students or 30%), low (27 students or 68%), and very low (1 student or 3%).

Students' answers regarding the level of agricultural literacy were analyzed using an average analysis per question item, as described in **Table 3**.

Table 3. Question Item Analysis

No.	Question	Number Correct	Percentage correct	Partially Correct (Partial Correct) (%)
1	p1	38	95%	97%
2	p2	10	25%	77%
3	p3	5	12.5%	65%
4	p4	5	12.5%	68%
5	p5	7	17.5%	71%
6	p6	3	7.5%	70%
7	p7	34	85%	87%
8	p8	39	97.5%	98%
9	p9	4	10%	62%
10	p10	17	42.5%	73%
11	p11	1	2.5%	73%
12	p12	36	90%	90%
13	p13	12	30%	72%
14	p14	6	15%	63%
15	p15	7	17.5%	65%
Average		**14,9**	**37,3%**	**75%**

Sources: research data processing 2025
Note: Partial scores are calculated with the consideration that students are scored for correct item selection and not penalized for incorrect item selection.

From **Table 3**, it can be concluded that although the average score of students in one of the junior high schools in Indramayu Regency per item falls into the low category, at 37.3%, the average value of partial correct answers is relatively high, at 75%. This suggests that students do not fully grasp the concepts and implications of agricultural literacy; their knowledge and abilities are primarily derived from experiences within their environment. However, it has not yet reached the operational ability to make simple predictions. This shows the ability to make connections between various agricultural contexts and determine their relevance. Students have also been unable to analyze complex data and connect various conclusions with practical solutions. Students are also not yet able to utilize interrelated ideas and apply given concepts to new settings or situations.

The findings of this study reveal that students of one junior secondary school in Indramayu district have a low level of agricultural literacy. This highlights the importance of enhancing students' understanding of agriculture and integrating agricultural literacy content into the education system, particularly in junior secondary schools.

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Discussion

This study aligns with the assessment of the level of agricultural literacy among high school students in Kwara, Nigeria. The findings of this study recommended revising the curriculum by adding agricultural policy content and improving educational facilities, especially in private schools, as an effort to improve students' agricultural literacy in the region (Bature et al., 2023).

The results of the previous study showed that the level of agricultural literacy among students at one junior high school in Indramayu Regency was relatively low, at 37.3%. This is even though the majority of students come from farming families. Students generally have only a basic understanding of agriculture, which they obtain from their experiences and surroundings. However, they lack a comprehensive understanding of agricultural literacy, particularly regarding sustainable agriculture and the relationships between agriculture, culture, the environment, technology, and the economy. This low literacy is caused by the absence of agricultural learning that is explicitly taught in schools or included in the curriculum. However, the national curriculum is sufficiently flexible to be tailored to the geographical characteristics of individual schools. Agricultural literacy can be integrated into the Pancasila Student Profile Strengthening Project (P5) by incorporating it into specific subjects, such as Social Studies, Indonesian Language, or Natural Sciences, or through a contextual thematic learning approach.

Given the low level of agricultural literacy among students at one junior high school in Indramayu District, there is a need for a design for an agricultural literacy approach in the curriculum to serve as a recommendation for schools, teachers, and curriculum developers, such as the local education office. The following are several approaches that can be pursued in education to improve agricultural literacy among junior high school students. The agricultural literacy approach in learning using Bloom's taxonomy can be described as **Figure 1**.

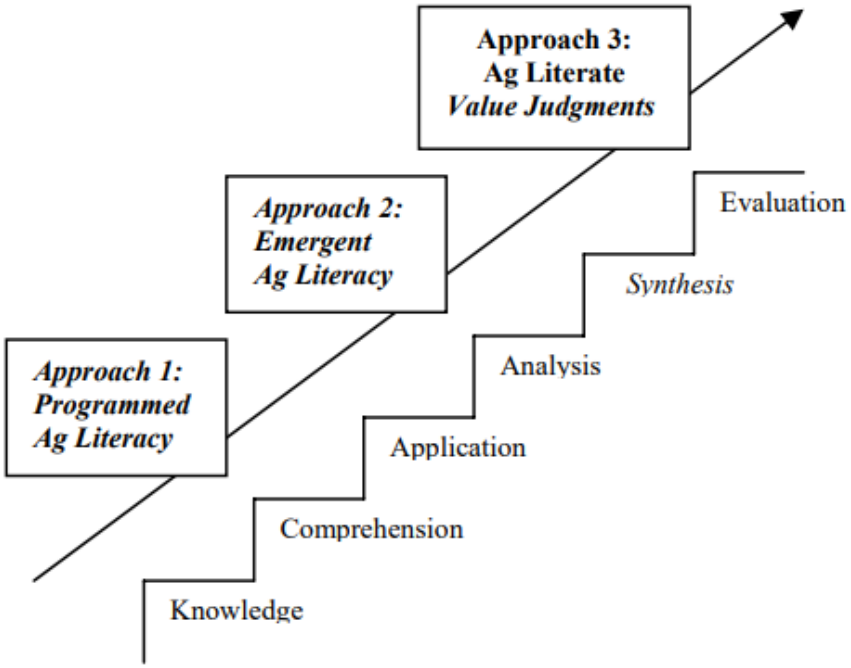

Figure 1. Linear/hierarchical model of agricultural literacy
Source: *Powell et al. (2008)*

The model in **Figure 1** presents a step-by-step approach to developing agricultural literacy integrated with Bloom's cognitive domains. Three main approaches form a tiered process, progressing from mastering basic knowledge to value-based decision-making.

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Approach 1: Programmed Agricultural Literacy

Emphasizes knowledge and comprehension. At this stage, learners are provided with basic information related to agricultural concepts, terms, and facts through a structured learning process. The goal is to build a strong conceptual foundation necessary for the next stage.

This approach emphasizes that agricultural literacy should be positioned as a strategic element and a key driver in curriculum development. Agricultural literacy should not be an add-on, but needs to be monitored and developed continuously through a formal framework that is integrated with the curriculum, values, and multidisciplinary educational agenda.

The main objective of this approach is to ensure that standards in the agricultural literacy framework can be achieved through the integration of academic content. This is achieved by incorporating agricultural material into general subjects, thematically related to areas such as social studies, science, or the Indonesian language. Thus, agricultural literacy can be established as a distinct content area with a clear position in the school curriculum structure.

Approach 2: Emergent Agricultural Literacy

Includes application and analysis skills. Literacy at this stage develops through contextual experiences and direct interaction with the agricultural environment. Students not only understand the material, but are also able to apply it in real-life situations and analyze cause-and-effect relationships in agricultural issues.

In this approach, agricultural literacy is viewed as the result of an integrative process between academic skills and an interdisciplinary approach applied in the context of agricultural problems. Agricultural literacy is not taught separately; instead, it develops naturally through the acquisition of general academic skills that are directly applied to real-world agricultural issues.

Agricultural literacy emerges when students engage in contextual learning that requires them to solve complex agricultural problems. Therefore, the integration of academic skills with agricultural issues requires clear justification in curriculum planning, namely by explicitly linking them to relevant academic frameworks.

In this case, the agricultural context serves as a vehicle for strengthening academic competency achievement. “Emerging” agricultural literacy is not merely knowledge about agriculture, but rather the end product of a learning process that combines critical analysis, problem solving, and the application of interdisciplinary knowledge in a real agricultural context.

One example of implementing this approach in the curriculum is through the Pancasila Student Profile Strengthening Project (P5) in the Merdeka Curriculum. This program offers schools the opportunity to develop learning projects that address local issues, including agriculture. Through projects focused on entrepreneurship, local wisdom, or sustainable living, students can explore agricultural issues directly and apply academic skills in developing solutions.

Thus, the agricultural literacy that emerges from this process not only reflects content understanding but also demonstrates critical thinking, collaboration, and concern for environmental issues and food security—values that are relevant to the goals of 21st-century education.

Approach 3: Agriculturally Literate Value Judgments

This approach occupies the highest position in the model, in line with the dimensions of synthesis and evaluation. At this stage, agricultural literacy is no longer merely cognitive, but also contains affective and ethical dimensions. Learners are expected to be able to integrate information from various sources,

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develop innovative solutions, and make critical judgments based on sustainable and equitable agricultural values.

The third approach to developing agricultural literacy emphasizes the importance of learners' ability to think critically and assess the impact of agricultural activities on economic, environmental, social, and political aspects. Agricultural literacy at this level requires not only conceptual understanding but also the ability to evaluate the consequences of decisions related to agricultural practices.

Individuals with good agricultural literacy are expected to be able to analyze and weigh the trade-offs or exchanges of values that arise from agricultural activities, both for individuals and the wider community. For example, in the context of agricultural policy, a person must be able to consider the impact of increasing agricultural productivity on the risk of environmental degradation or inequality of access to natural resources.

Such decisions and value judgments form the basis for determining the direction of agricultural content taught. A deep understanding of agricultural issues is demonstrated through participation in public discourse and the ability to respond to complex societal choices through reflective and responsible decision-making.

Thus, this approach positions agricultural literacy not only as an academic competency but also as an important civic skill in building a food-conscious, sustainable, and socially just society. This model emphasizes that agricultural literacy is a multidimensional competency that needs to be developed gradually and holistically through an interrelated approach.

The three approaches offered form a progressive process towards comprehensive, contextual, and reflective agricultural literacy that is responsive to social and ecological realities. However, developing the ability to make value judgments in an agricultural context as the highest form of literacy is not only the ultimate goal but also an integral part of the epistemological process of learning. Although cognitive taxonomy facilitates the grouping of skills based on levels, the reality is that cognitive processes do not constantly occur linearly or hierarchically. Therefore, it is more relevant to view the three elements of the approach as interacting components that form synergies, rather than as separate stages. This interactive relationship is more accurately depicted in **Figure 2**.

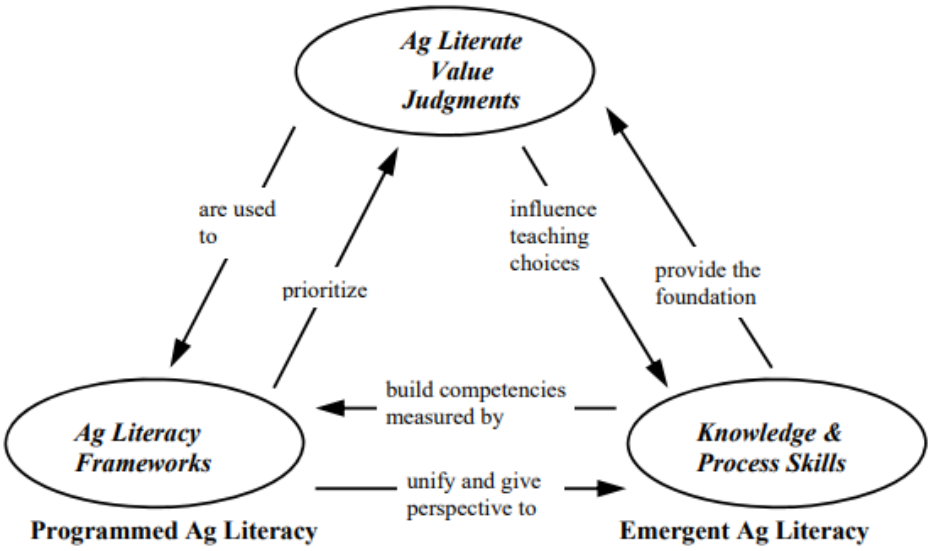

Figure 2. Interactive relationship between values, knowledge and agricultural literacy framework
Source: Powell et al. (2008)

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The conceptual model illustrates the interrelationship between three key components in agricultural literacy development, namely Ag Literate Value Judgments, Ag Literacy Frameworks, and Knowledge & Process Skills. These three elements form a dynamic relationship that underpins the integration between Programmed Agricultural Literacy and Emergent Agricultural Literacy.

The Ag Literate Value Judgments component plays a central role in this model. These agricultural literacy values are used to prioritize aspects of the agricultural literacy framework (Ag Literacy Frameworks) and influence the choice of teaching strategies related to the mastery of knowledge and process skills (Knowledge & Process Skills). Thus, these values provide normative direction for the content and approach of agricultural literacy education.

Meanwhile, knowledge and process skills serve as the primary foundation for developing agricultural literacy values and strengthening the literacy framework. This component encompasses the conceptual understanding, critical thinking, and problem-solving skills necessary to address agricultural issues in context. This knowledge and these skills form competencies that are then measured through the Ag Literacy Frameworks.

Ag Literacy Frameworks themselves are formal structures that contain indicators and standards for assessing the achievement of competencies in agricultural literacy. These frameworks not only measure learning outcomes but also gain perspective and coherence from knowledge and process skills. In other words, the framework and process skills reinforce each other in shaping a holistic agricultural literacy.

This model demonstrates that the development of agricultural literacy is not merely an effort to transfer knowledge, but an integrative process involving value dimensions, pedagogical structures, and functional competencies. By understanding these interconnections, agricultural literacy learning strategies can be designed more effectively and contextually appropriate to the needs of learners and local characteristics.

The Relationship Between the Conceptual Model and Agricultural Literacy Findings among Junior High School Students in Indramayu

Based on research conducted in junior high schools in Indramayu Regency, which revealed that students' agricultural literacy level was only 37%, analysis of the conceptual model by Powell et al. provides a framework for understanding the dynamics underlying these findings. This model emphasizes the interaction of three key components.

1. Programmed Agricultural Literacy (Basic Knowledge)

The low scores in sustainable knowledge, agricultural practices, and the connection between agriculture, culture, and environment (average 37.3%) indicate weak mastery of basic knowledge, as outlined in the model's first stage. The lack of integration of agricultural content into core curricula (Social Studies, Science, Indonesian Language) is a crucial factor, as reflected by students' unfamiliarity with agricultural SDGs concepts and agricultural technology.

2. Emergent Agricultural Literacy (Contextual Application)

Although 75% of students were able to answer questions based on environmental experiences (achieving a partial correct score), they failed to connect this knowledge to complex issues such as food crises or economic-ecological impacts. This aligns with findings that students are unable to analyze complex data or propose practical solutions, indicating the absence of a multidisciplinary approach and project-based learning (P5) as proposed by the model.

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3. Agriculturally Literate Value Judgments (Value-Based Assessment)

Students' low ability to evaluate trade-offs between agricultural productivity and environmental degradation (only 13.3% answered correctly) reflects the absence of ethical and value dimensions in instruction. The interaction among these three components, as depicted in Figure 2, explains that the failure to build fundamental knowledge (Programmed Agricultural Literacy) hinders the development of contextual application (Emergent Agricultural Literacy) and value-based judgment (Agriculturally Literate Value Judgments). These findings are consistent with those who emphasize the importance of vertical integration of agricultural content, from foundational knowledge to critical evaluation (Cosby et al., 2022).

Curriculum recommendations should include: infusion of agricultural content in core subjects (SDGs 2 & 15), collaborative project-based learning with local farming communities, and the development of assessment instruments that measure synthesis and value evaluation in agriculture. Thus, this model not only diagnoses the root problem but also provides a roadmap for holistic curriculum transformation.

CONCLUSION

The results of this study indicate that agricultural literacy among junior high school students in Indramayu Regency, particularly in one of the schools, remains low. Most students do not yet possess an adequate understanding of the connections between agriculture and economic, social, health, cultural, and environmental aspects. This research highlights the crucial role of agricultural literacy in addressing the global challenges of the 21st century, including food crises, climate change, and population growth. In Indramayu Regency, which is known for its food barns, the challenges of farmer regeneration and negative perceptions of agricultural professions are significant concerns. Therefore, agricultural literacy education at the junior high school level is essential to address students' limited understanding of agriculture and food. This study emphasizes the importance of integrating agricultural literacy into the curriculum and learning process, not only to impart knowledge but also to promote awareness of the value and impact of agriculture in everyday life. Through a multidisciplinary approach and organized curriculum development, it is expected that students will develop critical thinking skills and a deeper understanding of the role of agriculture in society. Thus, efforts to improve agricultural literacy can support agricultural sustainability, enhance public perceptions, and reduce food insecurity in the future.

AUTHOR'S NOTE

The authors declare that there is no conflict of interest related to the publication of this article. The authors emphasize that the data and content of the article are free from plagiarism.

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