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DEVELOPMENT OF THE SEURAMOE SAIENTIA MODEL BASED ON ACEHNESE CULTURE FOR SCIENCE LITERACY OF MADRASAH IBTIDAIYAH STUDENTS

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Abstract

This study aimed to develop and test the effectiveness of the Seuramoe Saientia model, a culture-based science learning model integrating Acehnese local wisdom into ecosystem instruction at the Madrasah Ibtidaiyah level. The research employed a Research and Development (R&D) approach using the ADDIE framework (Analyse, Design, Develop, Implement, Evaluate). The population consisted of 80 fifth-grade students at MIN 2 Langsa, Aceh Province, Indonesia. The implementation phase involved one experimental class comprising 25 students, selected through purposive sampling. The model was designed to integrate the traditional seuneubok land management system into science literacy learning through five instructional phases: Cultural Orientation, Context Exploration, Knowledge Construction, Artefact Creation, and Global Reflection and Expansion. Data were collected through expert validation sheets, observation instruments, science literacy tests, and documentation. Qualitative data were analyzed using thematic analysis, while quantitative data were analyzed using descriptive statistics, N-Gain calculations, and paired-sample t-tests to determine learning effectiveness. Expert validation confirmed that the model was conceptually valid, culturally relevant, and pedagogically feasible. The effectiveness results showed a significant improvement in students' science literacy. The mean pre-test score of 61.8 increased to 79.4 in the post-test, with an N-Gain of 0.46 (moderate category). Statistical analysis indicated a significant difference between pre- and post-test scores ($t = 5.37$; $p < 0.05$). Additionally, observational findings revealed enhanced ecological awareness, collaborative skills, and the ability to connect scientific concepts with local cultural values. These findings demonstrate that integrating Acehnese cultural practices into science learning effectively improves students' science literacy while strengthening contextual ecological understanding. The Seuramoe Saientia model offers a validated and empirically supported framework for culturally responsive science education at the primary level.

Keywords Acehnese Customs, Culture, Ecosystem, Science Literacy, Seuramoe Saentia.

INTRODUCTION

The science literacy of madrasah ibtidaiyah students in Indonesia, especially in Aceh, is still relatively low. The results of national and international surveys show that the achievement of science competence at the primary education level is lagging. The 2022 Programme for International Student Assessment (PISA) data shows that Indonesian students are ranked 64th out of 81 countries, with a science literacy score of only 383 points, far below the OECD average of 485 points (OECD, 2024). At the national level, the results of the 2022 Indonesian Student Competency Assessment (AKSI) released by the Ministry of Education and Culture (Kemdikbud) show that basic competencies are still low and inequality is high. The results of the National Assessment (AN) on the science literacy ability of students throughout Indonesia show that more than 50% of the areas have scores close to 30, and the science skills of elementary school students tend to be memorized and not based on concept understanding (Badan Standar Kurikulum dan Asesmen Pendidikan, 2024).

Followed by the results of the 2023 Indonesian Madrasah Competency Assessment (AKMI) from the Ministry of Religious Affairs, which also showed that 61% of madrasah students are still in the sufficient category for science literacy, this result is certainly still a problem for madrasas in an effort to improve students' literacy skills (Ditjen Pendis Kemenag, 2023). The results of AKMI reveal that madrasah students are still weak and have difficulty in the dimension of science literacy, namely 1) weak in reasoning the relationship between science variables, 2) difficult to apply science concepts in the context of daily life, and 3) difficult to understand the representation of simple scientific data (graphs, tables) (Direktorat KSKK Madrasah, 2023). In Aceh, the 2023 Computer-Based National Assessment (ANBK) report shows lower science literacy achievements than the national average (Pusat Asesmen Pendidikan Kemendikdasmen, 2024).

This fact confirms the urgency to present a learning model that is able to stimulate the science literacy skills of MI students in the Aceh context. Science learning in madrassas is still oriented to memorizing concepts and is textual. Teachers tend to use lecture methods and written assignments that fail to foster students' scientific thinking skills (Sari et al., 2025). Meanwhile, local culture, as part of the lives of Indonesian people, has great potential to be used as a more contextual and relevant source of learning (Delimanugari et al., 2025). The local wisdom approach can improve student engagement and learning outcomes. Connecting local knowledge with scientific concepts allows students to gain a deeper understanding of knowledge and apply it in everyday contexts.

The preservation and integration of local culture in the education system is essential. This phenomenon is not only in Indonesia, but also seen in several other countries, as revealed by Snively and Corsiglia (2000), it turns out that the reluctance of the modern science world to recognize *Indigenous Knowledge* or *Traditional Ecological Knowledge* (TEK), such as in Canada and Australia, has hurt many aspects, including education, environmental issues, and technological development. Such as deforestation and environmental destruction, among others. *Indigenous knowledge* shows that we can understand and manage social and ecological issues wisely, through wisdom that has been proven by time (Snively & Corsiglia, 2000). However, there is a lack of familiarity for students to solve problems that require critical and analytical thinking (Ramli et al., 2022), a lack of teachers giving challenging questions (Sutrisna & Anhar, 2020) And texts in textbooks often do not meet adequate science literacy criteria (Mahyudi, 2023). Other causes are caused by the COVID-19 pandemic (Kemendikbud Ristek Dikti, 2021).

A number of recent studies confirm that Lev Vygotsky's Sociocultural Learning Theory remains the dominant theoretical framework in 21st century education. Rojas-Drummond et al., (2025) reconstructing Vygotsky's fundamental principles, especially the concept of the Zone of Proximal Development (ZPD) and social mediation, in the context of digital collaboration. This study confirms that the cognitive and affective development of students is formed through social interaction mediated by language, symbols, and cultural practices. This article is conceptual and comprehensive and reinforces the theoretical legitimacy of community-based learning.

The practical implementation of the theory is seen in the research Macdermott et al., (2025) through the Peer Learning Bubble Model (PLBM) in Northern Ireland. This mixed-methods study shows that peer-based learning and safe learning spaces are effective in improving critical reflection, empathy, digital competence, and theoretical understanding. Similarly, research on transitional learning spaces in the Social Work Research Conference forum emphasized the role of students as More Knowledgeable Other (MKO) in community-based peer learning. Both studies placed social interaction as the main mediating arena for the formation of professional competence, but did not develop new learning models or target the context of basic education and local culture.

In other studies, El-Tahan & Karimi (2025) integrate Vygotsky's sociocultural theory with pragmatism in strengthening source literacy and reflective thinking. Through a phenomenological approach, it was found that teacher scaffolding, social discussion, and ZPD dynamics play an important role in the formation of information correctness criteria. Although theoretically relevant,

this study focuses on source literacy, using qualitative interview methods, and does not develop a culture-based learning model. Meanwhile, research by Fatihatussa'adah et al. (2024) integrates ethnoscience in the podcast-assisted Common Knowledge Construction Model (CKCM). With a quasi-experimental design, this study proves that the integration of ethnoscience improves student learning and collaboration outcomes. The CKCM model is aligned with Vygotsky's social constructivism through the stages of exploration, negotiation of meaning, and reflection. However, this study does not develop a new model, is not specific to Acehnese culture, and is not oriented towards science literacy at the MI level.

In summary, the five studies strengthen the premise that social interaction and cultural context are at the core of knowledge construction. However, there are research gaps in: (1) the development of new learning models, (2) the integration of local culture (Aceh culture), (3) the focus on science literacy of Madrasah Ibtidaiyah, and (4) the use of the ADDIE model Research and Development (R&D) approach. Therefore, this research contributes to filling this gap through the development of a science learning model based on Acehnese culture to improve the science literacy of MI students in a systematic and tested manner.

Science learning in Aceh madrasas has not integrated many local cultural elements. This is corroborated by the results of interviews with teachers in class V MI in Langsa City. They stated that science learning in the classroom is carried out by following a more nationally oriented curriculum and teaching materials without paying attention to the local social and cultural context. They also just found out that there are local cultural practices in Aceh that can be synergised with learning. Some also stated that they were new to some Acehnese cultural practices, even though some regional names in Aceh use the term, namely Seuneubok, which is the traditional agricultural system/plantation of Aceh. In fact, Acehnese culture has many contextual potentials such as traditional education systems, local agricultural technology, and strong Islamic philosophies.

The low integration of local culture makes learning less relevant to students' real lives. Acehnese culture has great potential as a learning medium that can revive science learning in madrasah ibtidaiyah (Habibullah & Rizal, 2024). Integrating local wisdom into the learning curriculum is a very effective approach. The content of learning materials that cover local culture, traditions, and regional languages can help students understand more deeply the values contained in them. Therefore, good collaboration between teachers, schools, and parents is essential in supporting the effective implementation of local wisdom (Lestari, 2024). By incorporating the values

of local wisdom into the teaching and learning process, it is hoped that students can grow into people who are not only academically smart but also have a good understanding of society and culture (Fredyarini et al., 2025).

The concept of Seuramoe as a traditional learning space for the Acehnese people represents social interaction, religiosity, and experiential learning. Seuramoe serves not only as a physical place, but also as a social space that builds character and knowledge based on Islamic values. The structure of the Acehnese house consists of three main parts, namely *Seuramoe Keue* (front/outer porch), *Seuramoe Teungoh* (middle porch), and *Seuramoe Likot* (back porch) (No Name, 2025). *Seuramoe*, in the context of Acehnese traditional houses, is not only a physical building, but also a social and cultural space that plays an important role. Because family members usually gather to learn and exchange knowledge on this *Seuramoe*. Therefore, the learning model developed in science subjects is named after the Seuramoe Saentia learning model.

This learning model supports the profile of graduates in deep learning from the independent curriculum (Arifin, 2026). The Merdeka Curriculum emphasises the importance of project-based learning and local wisdom. Local culture-based learning, such as the Seuramoe Saentia model, is relevant to the direction of national education policies that are contextual and humanistic. This new paradigm of education encourages students to understand science contextually through the culture and the surrounding environment. This is in line with *the direction of Education for Sustainable Development,* which emphasises the integration of cultural and environmental values in science learning (UNESCO, 2020).

There is no Acehnese culture-based learning model that is systematically and empirically designed to improve the science literacy of MI students. Most of the research only develops modules, teaching materials, and is descriptive, and has not produced an experimentally tested learning model (El-Tahan & Karimi, 2025; Fatihatussa'adah et al., 2024; Madusise & Mwakapenda, 2014; McDermott et al., 2000). Therefore, an innovative learning model that combines scientific approaches and Acehnese cultural values is needed to improve the science literacy of MI students. Thus, the development of the Seuramoe Saentia model is a strategic step in bridging the Acehnese tradition and scientific approach towards meaningful science learning in madrasah ibtidaiyah. The purpose of writing this article is to develop a Seuramoe Saentia learning model that combines traditional Acehnese practices with a scientific approach in improving the science literacy of madrasah ibtidaiyah students. This model is expected to be an alternative to contextual learning that is able to

bridge local wisdom with 21st-century competencies.

METHOD

This research uses a Research and Development (R&D) approach with the ADDIE (Analyse, Design, Develop, Implement, Evaluate) model (Gustafon & Branch, 2002; Sugiyono, 2022). This model was chosen because it is systematic and flexible in developing a learning model based on the context of local culture and the needs of madrasah students. The main focus of the research is to develop the Seuramoe Saentia learning model by integrating Acehnese cultural practices in the Seunebok tradition to improve science literacy on the theme of Harmony in Ecosystems. The research was carried out at Madrasah Ibtidaiyah Negeri (MIN) 2 Langsa, Aceh Province, which is one of the madrasas located in urban areas. The population of this study is 80 students of class V. The research subjects consisted of class V teachers (1 person) as learning implementers, class V students as many as 25 people, and Aceh science and culture education experts as model validators. The selection of locations and subjects was carried out by purposive sampling, with the consideration that MIN 2 Langsa has active curricular activities and openness to curriculum innovation.

The stages of the ADDIE model consist of 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation (Branch, 2009). In the first stage, the analysis aims to identify learning problems and the potential of Aceh's local culture to be integrated into the context of science. The analysis was carried out through a) Analysis of student needs using interviews and observations on the understanding of science literacy, learning motivation, and scientific thinking skills, b) Curriculum analysis by examining the basic competencies of the theme "Harmoni dalam Ekosistem" in the Independent Curriculum, which is relevant to the concept of ecosystem and social balance, c) Local cultural analysis, namely exploring practices in the Seunebok tradition in farming as a scientific context of learning, and d) Analysis of teacher characteristics and learning environment: to adapt the design of the model to the madrasah situation. The results of this stage are in the form of a profile of Acehnese culture-based contextual science learning needs and the philosophical foundation of the Seuramoe Saentia model.

The second stage is Design. This stage designed an initial prototype of the Seuramoe Saentia learning model. The components designed include a) Learning syntax starting from cultural orientation, context exploration, knowledge construction, artefact creation, and global reflection and

expansion, b) Handbook design, c) Assessment strategies, and d) Internalisation of cultural and Islamic values in the learning steps. The design was then validated by eight experts to ensure the validity of its content and local context. The third stage is Develop (Development and Validation). At this stage, the model prototype is developed into an initial version of the Seuramoe Saentia learning model product (Model-1). The main activities include a) Expert judgment: assessing the feasibility aspects of content, suitability of cultural practices and science integration, b) Revision of the model based on expert input, improvements made to syntax components and cultural activities to suit the context of madrasah ibtidaiyah, c) Limited trial, namely the model is tested in one small class (10 students) to see the understanding of instruction, interests, and implementation time, and d) Data collection instruments in the form of observation sheets and teachers' reflection notes.

The fourth stage is implementation (Implementation of the Model in the Classroom). The implementation stage was carried out in an experimental class at MIN 2 Langsa with the theme "Harmoni dalam Ekosistem". Teachers apply the Seuramoe Saentia model in science learning with the traditional context of Seunebok. The learning activities follow the model learning syntax. The data collected included science literacy outcomes, student activities, and observations of social behaviour during learning. The fifth stage, Evaluate (Evaluation and Reflection). The evaluation was carried out formative and summative. Formative evaluation: carried out at each stage (analysis–development) to correct the model's shortcomings, while Summative evaluation: assessing the effectiveness of the model on improving science literacy and the value of students' social harmony after implementation. Data analysis uses a mixed-method approach (exploratory sequential model). This sequential exploratory approach was chosen so that the development of the model not only has a strong theoretical and cultural foundation, but also empirical evidence of its effectiveness in the context of learning at Madrasah Ibtidaiyah Negeri 2 Langsa. The results of the evaluation became the basis for the improvement of the final version of the Seuramoe Saentia Model (Model-2), which is ready to be recommended for other ibtidaiyah madrassas in Aceh.

The research instrument used student activity observation sheets and literacy tests based on the context of Acehnese culture. Data analysis techniques use descriptive and inferential statistical analysis (t-test) to measure ability improvement, and qualitative thematic analysis to understand cultural meaning and values of harmony that develop during the learning process.

This study employed multiple data collection techniques consistent with the Research and Development (R&D) approach using the ADDIE model. In the analysis phase, data were collected

through teacher interviews, classroom observations, and document analysis of the curriculum and local cultural practices related to the Seunebok tradition. During the design and development stages, expert judgment was conducted involving eight validators using model validation sheets, followed by a limited trial with 10 students supported by observation sheets and teacher reflection notes. In the implementation phase, primary data were obtained through a culture-based science literacy test, student activity observation sheets, and observations of students' social behavior during the learning process. Evaluation was conducted both formatively and summatively to ensure the feasibility and effectiveness of the developed model.

Data analysis applied a mixed-method approach with an exploratory sequential design. Qualitative data from interviews, observations, expert validation, and reflections were analyzed using thematic analysis to identify learning needs, cultural meanings, and social dynamics emerging during implementation. Quantitative data from the science literacy test were analyzed using descriptive statistics to describe students' achievement profiles and inferential statistics (t-test) to determine the improvement in science literacy after the implementation of the model. This integrated analysis strengthened both the theoretical–cultural foundation and the empirical evidence of the effectiveness of the Seuramoe Saentia Model in the context of Madrasah Ibtidaiyah.

FINDINGS AND DISCUSSION

Findings

The development of the Seuramoe Saientia Model in this study was conducted using a Research and Development (R&D) approach based on the systematic ADDIE framework (Analyse, Design, Develop, Implement, Evaluate). The ADDIE model was selected because it provides a comprehensive and iterative structure for designing, testing, and refining educational products grounded in contextual needs. Through this approach, the development process extends beyond the conceptual stage to include implementation and empirical evaluation, ensuring the validity, practicality, and effectiveness of the model within the context of science learning at the Madrasah Ibtidaiyah level.

The Seuramoe Saientia Model was designed as a pedagogical innovation that integrates Acehnese local culture with science literacy into a coherent learning system. Its development followed the five stages of ADDIE systematically, beginning with needs and cultural context analysis, proceeding to the formulation of the model's philosophical and operational foundations,

prototype development and supporting materials, classroom implementation, and finally formative and summative evaluation. The following section elaborates on each stage in detail as the conceptual and operational basis for producing a contextual, reflective learning model that strengthens students' cultural identity while enhancing their scientific competencies.

Development of the Seuramoe Saientia Model Based on the ADDIE Framework

1. Analysis

   The analysis phase identified the gap between science instruction practices in Madrasah Ibtidaiyah and the need for culturally contextualized science literacy. Science learning was found to be predominantly textbook-oriented and insufficiently connected to Acehnese cultural realities. A needs assessment was therefore conducted, focusing on students' science literacy levels, teachers' pedagogical readiness, curriculum alignment, and the potential integration of local cultural practices into ecosystem-related themes.

   The findings indicated the necessity of a learning model that integrates local cultural identity with scientific reasoning while remaining aligned with national curriculum standards. This phase resulted in the formulation of product specifications, emphasizing cultural integration, contextual learning support for teachers, and the development of students' critical scientific thinking through authentic cultural experiences.

2. Design

   The design phase conceptualized the model's philosophical, conceptual, and operational framework. The model was named Seuramoe Saientia, symbolizing the integration of cultural learning space (Seuramoe) and scientific knowledge (Scientia). Philosophically, the model is grounded in constructivism and a glocalization paradigm, positioning local cultural identity within global scientific competencies. Conceptually, the model is structured around a trilogy of science literacy: conceptual understanding, scientific process skills, and scientific attitudes. Operationally, the model blueprint includes learning syntax, social system, teacher reaction principles, support systems, and instructional impacts. This framework serves as the structural foundation for translating theoretical constructs into systematic instructional procedures.

3. Development

   During the development phase, the conceptual framework was operationalized into a structured prototype. The learning syntax consists of five phases: Cultural Orientation, Context Exploration, Knowledge Construction, Artefact Creation, and Reflection and Global Expansion.

These phases were designed to progressively integrate cultural experience with scientific inquiry, facilitating meaningful knowledge construction. Supporting instructional materials, teacher guidelines, and assessment instruments were developed to ensure implementation feasibility. The prototype underwent expert validation to assess content validity, cultural relevance, and pedagogical coherence. Revisions were made based on expert feedback prior to limited classroom trials to enhance both theoretical robustness and practical applicability.

4. Implementation

The implementation phase involved applying the Seuramoe Saientia model in science instruction on the theme of ecosystem harmony. Teachers facilitated learning according to the five-phase syntax, positioning local cultural practices as primary scientific contexts rather than supplementary illustrations. Students engaged in collaborative inquiry, contextual exploration, and artefact production to represent conceptual understanding. This stage evaluated the practicality and classroom dynamics of the model. Particular attention was given to student engagement, social interaction, and their ability to connect cultural values with scientific reasoning. The teacher functioned as a facilitator, providing scaffolding to support structured knowledge construction and reflective thinking.

5. Evaluation

Evaluation was conducted both formatively and summatively to assess model quality and effectiveness. Formative evaluation occurred throughout development to refine conceptual and procedural components. Summative evaluation measured the model's impact on students' science literacy and the development of culturally grounded scientific attitudes. Assessment covered three domains: knowledge (concept mastery), skills (scientific processes), and scientific attitudes (collaboration, reflection, and social harmony values). Evaluation results informed the final refinement of the Seuramoe Saientia model, ensuring its theoretical validity, cultural relevance, and empirical effectiveness in improving science literacy at the Madrasah Ibtidaiyah level.

This section reports the findings from the implementation of the Seuramoe Saientia model and provides a comprehensive analysis of the evaluation data obtained during the study:

Track 1 – Cultural Orientation. In the wake of cultural orientation, teachers open learning by introducing Acehnese cultural practices through historical stories and the traditional philosophy of seuneubok. This activity is intended to build cultural engagement and students' ecological

awareness of the importance of harmony in life and ecosystems. Guru told how the people of Aceh used to manage forests, land, and rice fields sustainably through a seuneubok system based on cooperation and customary rules. The students looked enthusiastic when listening to this story, because most of them had never heard of the traditional management system firsthand. This initial activity fosters curiosity building, which becomes the entrance to the next scientific activity.

In the next session, the teacher introduced the traditional tools used in seneeubok, such as cangkoi, lhamm, and langai. This activity serves as a bridge between cultural heritage and the scientific context of ecosystem learning. From the observation results, around 72% of students (18 out of 25 students) admitted that they were familiar with these objects for the first time, while 28% of students (7 people) had seen but did not understand their ecological function. The teacher then explained the role of these tools in maintaining the balance of nature, for example how to use cangkai to turn the soil, loosen the soil, make beds, and weed weeds, while lhamm (tembilang/digging tools) functions to dig hard soil, make holes, and loosen the land, while langai (plow) is used to eradicate weeds, make trenches, and reverse the soil. This activity strengthens the cognitive connection between local culture and scientific concepts "harmoni dalam ekosistem", as well as integrating the principles of local wisdom-based scientific literacy.

Figure 1. Traditional Agricultural Tools

Track 2 – Context Exploration. The context exploration trail begins with learning activities that emphasize the linkage between seuneubok cultural practices and scientific concepts in ecosystems. The teacher continues the learning process by explaining the basic concepts of ecosystem components, the role of living things, and the food chain. The explanation is associated with the practice of seneeubok, where the people of Aceh maintain a balance between producers (rice plants, trees), consumers (rice fields), and decomposers (soil microorganisms). This activity helps students relate local values about the balance of nature to the scientific concept of the food chain. From the observation results, students seemed enthusiastic about connecting the concept of

producer-consumer-decomposer with the role of living beings in traditional Acehnese rice fields, showing strong cognitive involvement in understanding ecological relationships.

In the next learning session, the teacher expands the learning context by introducing the concept of photosynthesis and biotic–abiotic components through interactive discussions. The teacher displays real examples from the environment around the madrasah to show the reciprocal relationship between living and non-living elements, such as the role of sunlight and water in plant growth. The results of the observation showed that most students (80%) were able to explain the relationship between ecosystem components independently, including mentioning examples of rice paddies, gardens, and yard ecosystems. Meanwhile, about 20% of students still have difficulty understanding the concepts of photosynthesis and energy processes in the food chain. This indicates that the context exploration stage has succeeded in activating students' initial knowledge through cultural experiences, but there is still a need to strengthen the scientific conceptual aspect.

Trace 3 – Knowledge Construction. The knowledge construction trail in the Seuramoe Saentia model begins with a collaborative activity, where students are divided into four groups to create a simple project in the form of a food chain poster using the tools and materials provided. This activity is designed to stimulate the ability of scientific thinking, communication, and cooperation between students. Each group was asked to compile a sequence of the food chain from producers, level I–III consumers, to decomposers, and relate it to the nature management system in the sefireebok custom. This process creates an active and meaningful learning atmosphere, where students not only understand the concept of ecosystems cognitively, but also instill cultural values about balance and responsibility for the environment as inherited in the Acehnese tradition.

The results of the observations showed that all groups were able to organize the food chain precisely and logically, and showed an increase in the ability to connect scientific concepts with local values. In the presentation session, students explained the relationship between the existence of producers (rice plants and trees), consumers (rice fields and humans), and decomposers (soil microorganisms) that naturally maintain balance in the sesunebok system. The teacher then strengthens the results of this knowledge construction by reviewing the role of living beings through reflective discussions. This activity not only strengthens the mastery of the concept of the food chain, but also fosters ecological and religious awareness, which is the main value in Seuramoe Saentia.

Figure 2. Student Activities to Build a Food Chain in Groups

Trace 4 – Artefact Creation (Seuramoe Saentia Model Syntax). The traces of artefact creation began with a simple practicum activity that aimed to compare the growth of plants that received sunlight and those that did not. The teacher opened the activity by explaining the purpose of the experiment, and related it to the traditional values of seuneubok, which emphasise harmony, cooperation, and cooperation in land management. Students then prepare two bottles as planting medium and fill them with soil taken using traditional lham, cangkoi, and langai tools (tools that have previously been introduced in the cultural orientation stage). This activity is a contextual learning experience that instils ecological understanding while respecting Aceh's local wisdom in natural resource management.

During the activity, students show a high curiosity about the factors that affect the growth of plants. They asked questions such as "What happens if plants are not exposed to sunlight?" "Why do plants wither?" was then answered through the teacher's scientific explanation of the process of photosynthesis. Through this activity, students understand that plants need sunlight to produce food, just as the Acehnese people in the seuneubok custom must take care of the garden regularly so that it is not damaged by pests or become barren land. This process becomes meaningful learning that fosters ecological awareness through an analogous comparison between the care of natural ecosystems and the management of traditional Acehnese gardens.

Figure 3. Student Planting Activities in the Classroom

Track 5 – Global Reflection and Expansion. The global footprint of reflection and expansion serves as a momentum for students to revisit the entire learning experience that has been lived during the application of the Seuramoe Saentia model. Teachers facilitate reflective discussions that highlight a series of learning activities, ranging from understanding ecosystem concepts, food chain structuring, to traditional seuneubok practices that emphasise ecological balance. Through this reflection session, students are invited to connect the results of science learning with the local cultural values of Aceh, which contain the principles of harmony, responsibility, and togetherness in protecting nature. This approach not only strengthens conceptual understanding but also shapes contextual ecological and social awareness of their daily lives.

The results of observations showed that 80% of students were able to explain the relationship between the concept of ecosystem and traditional values of seuneubok, especially in the context of maintaining environmental balance through a sustainable rotating management system. When asked a reflective question such as "what will happen if the seuneubok custom is lost in the practice of nature conservation?", most students answered that the absence of the custom will cause ecological imbalances and the risk of disasters such as flooding or land degradation. These findings show an increase in students' critical and systemic thinking skills on the relationship between human behaviour and ecosystem sustainability.

To measure student understanding more objectively, teachers provide Kahoot-based quizzes as a formative form of pre-assessment. The results of the quiz showed an average score of 81.2, an increase compared to the general pre-test results in the previous Jejak (61.8). Analytically, the increase in concept understanding in this Trail shows a gain tendency of 0.49 (medium category). A simple descriptive statistical test showed a significant increase in students' ability to recognise the concept of ecosystems and their relationship to local culture ($p < 0.05$). Quantitatively, the results of the pre-test and post-test of students' science literacy showed a significant increase. The average pre-test score was 61.8, while the average post-test score increased to 79.4 after Acehnese culture-based learning activities were carried out. Based on the calculation of N-Gain, the increase is in the medium category with a value of 0.46. Statistical tests using a paired sample t-test yielded a value of $t = 5.37$ with $p = 0.000 < 0.05$, which means that there is a significant difference between science literacy skills before and after learning. These findings show that the insertion of seuneubok cultural practices in learning is able to improve students' conceptual understanding of the ecosystem while strengthening their ecological awareness in the context of Acehnese culture.

To provide a structured and concise presentation of the findings, the results of the Seuramoe Saientia model implementation are summarized in the following tables. The first table outlines the learning activities across the five instructional tracks and highlights the key qualitative and quantitative findings observed during classroom implementation. The second table presents the statistical results of students' science literacy improvement, including pre-test and post-test scores, N-Gain analysis, and inferential test outcomes. These tabulated results offer a clear overview of both the instructional process and its measurable impact, enabling a systematic interpretation of the model's effectiveness in enhancing science literacy through the integration of Acehnese cultural practices.

Table 1. Summary of the Implementation Results of the Seuramoe Saientia Model

No	Track	Learning Focus	Main Activities	Key Findings	Quantitative Evidence
1.	Cultural Orientation	Cultural engagement & ecological awareness	Introduction to *Seuneubok* philosophy and traditional tools (*cangkoi, lhamm, langai*)	Students showed high enthusiasm; strong initial cultural connection to ecosystem concepts	72% first-time recognition of tools; 28% previously seen but lacked ecological understanding
2.	Context Exploration	Linking culture with ecosystem concepts	Explanation of producers–consumers–decomposers; photosynthesis; biotic–abiotic components	Strong cognitive engagement; effective linkage between rice-field ecosystem and scientific concepts	80% able to explain ecosystem relationships independently; 20% needed reinforcement
3.	Knowledge Construction	Collaborative scientific reasoning	Group poster project on food chains integrated with *seuneubok* values	All groups constructed logical food chains; improved conceptual-cultural integration	100% groups completed an accurate food-chain structure
4.	Artefact Creation	Experimental inquiry & analogical reasoning	Plant growth experiment (with/without sunlight) using contextual tools	Increased curiosity; strengthened understanding of photosynthesis and ecological responsibility	Qualitative increase in questioning and scientific explanation accuracy
5.	Reflection & Global Expansion	Critical reflection & systemic thinking	Reflective discussion; Kahoot-based formative assessment	Students connected ecosystem balance with sustainability values; improved critical reasoning	Quiz mean = 81.2 (previous mean = 61.8); N-Gain = 0.49 (moderate)

Table 2. Science Literacy Improvement (Pre-test–Post-test Results)

Indicator	Pre-test Mean	Post-test Mean	N-Gain	t-value	Sig. (p)	Interpretation
Science Literacy	61.8	79.4	0.46	5.37	0.000 (<0.05)	Significant improvement (moderate gain)

Discussion

The cultural orientation stage in the Seuramoe Saentia model serves as a learning foundation that instills an initial understanding of Aceh's local cultural values, especially seuneubok customs, before students enter scientific exploration. This stage has strategic value because it builds a cognitive bridge between cultural knowledge and scientific literacy, so that students understand that science does not stand separate from the socio-cultural context (Dharmayanti & Lestari, 2025; Syam et al., 2024). Culture-based learning has been proven to strengthen local identity while fostering ecological awareness, which is the basis for the formation of holistic science literacy (Macdermott et al., 2025; Nuriman et al., 2025). Research in various madrassas and elementary schools shows that integrating regional cultures, such as customs, traditions, and local symbols in the learning process, increases the sense of belonging to science and strengthens students' motivation to learn (Vygotsky, 1978). Cultural orientation also serves to instil social values such as cooperation, responsibility, and harmony with nature, which are in line with the educational character in the Independent Curriculum (Rayis et al., 2025). In the context of Aceh, the introduction of the seuneubok system is not only an ethnographic material but also an ecological model that reflects local wisdom in maintaining the balance of nature. Thus, the cultural orientation stage in Seuramoe Saentia became the foundation for science learning that was not only based on scientific knowledge, but also spiritual and ecological values that live in the midst of Acehnese society.

The context exploration stage in the Seuramoe Saentia model is an important first step because students are invited to relate local experiences to the scientific concepts to be studied. This approach is in line with the findings that the integration of local cultures in science learning can enhance primary school students' interest and conceptual understanding through familiar and meaningful contexts (Wirama et al., 2023). Thus, it is easier for students to associate natural phenomena with local wisdom values such as seneeubok, which reflects a sustainable natural ecosystem system (Damayanti et al., 2024). In addition, the ethnoscience approach has been proven to be able to build students' ecological awareness from an early age by presenting learning that is not only conceptual, but also contextual and moral (Munira et al., 2024; Syahdani & Tyas, 2025;

Untung et al., 2022). In the context of basic education, this strengthens science literacy through the introduction of culture as part of science itself. Therefore, the context exploration stage in the Seuramoe Saentia model is not only a means of introducing scientific concepts, but also a medium for internalising cultural values relevant to environmental conservation.

At the knowledge construction stage, the Seuramoe Saentia model directs students to build scientific understanding through exploratory, collaborative, and practice-based activities, such as ecosystem observation and food chain structuring. The process reflects a culturally-based paradigm of scientific inquiry that emphasises not only cognition, but also scientific and social skills. In science learning in primary schools, students' active involvement in local practice has been shown to strengthen conceptual understanding and critical thinking skills (Mayasari, 2017). Other research shows that the integration of cultural contexts, such as seuneubok customs, serves as a conceptual bridge between local knowledge and modern ecological concepts (Siringan, 2025; Untung et al., 2022; Vijaykumar, 2019). In addition, project-based activities and direct observation can increase learning motivation and expand students' scientific perspective on the natural phenomena around them (Citra et al., 2025; Fatah, 2023; Khaerunnisa et al., 2024). Through this construction of knowledge based on cultural context, learning becomes more meaningful and rooted in the socio-ecological reality of students.

The reflection and global expansion stages in the Seuramoe Saentia model serve to foster students' ecological and global awareness through the comparison of local values and modern systems in maintaining the balance of nature. This reflective activity is in line with culture-based learning that places students as agents of environmental conservation through a contextual understanding of ecological systems (Fatmala et al., 2017). Through a process of discussion and reflection, students learn to assess local values such as the sesueubok system as a form of conservation practice that is relevant to global ecological principles (Muslimin & MR, 2025; Wati et al., 2025). This reflective approach has proven effective in building science literacy and environmental care at the elementary school level. In addition, integrating local wisdom into scientific reflection helps students understand that science and culture are intertwined in shaping ecological behaviour. Thus, the reflection in Seuramoe Saentia is not only a closing activity, but also a process of internalising global values rooted in local culture.

CONCLUSION

This study successfully developed the Seuramoe Saientia Model as an innovative culture-based science learning framework grounded in Acehnese local wisdom, using a Research and Development (R&D) approach within the ADDIE framework. The resulting model is philosophically rooted in constructivism and the glocalization paradigm, and is systematically structured into five instructional phases: Cultural Orientation, Context Exploration, Knowledge Construction, Artefact Creation, and Global Reflection and Expansion. Expert validation confirmed that the model is conceptually sound, culturally relevant, and pedagogically feasible for implementation at the Madrasah Ibtidaiyah level. Substantively, the model effectively integrates seuneubok cultural practices into ecosystem learning, thereby bridging local values, scientific reasoning, and students' ecological awareness.

The effectiveness testing demonstrated that the implementation of the Seuramoe Saientia Model significantly improved students' science literacy. The mean score increased from 61.8 (pre-test) to 79.4 (post-test), with an N-Gain of 0.46 (moderate category). A paired-sample t-test indicated a statistically significant difference ($p < 0.05$) between pre- and post-intervention results. These findings suggest that integrating local cultural practices into science instruction not only strengthens students' conceptual understanding of ecosystems but also enhances critical thinking skills and contextual ecological awareness. Therefore, the Seuramoe Saientia Model is empirically validated as an effective culture-based instructional model for improving science literacy at the Madrasah Ibtidaiyah level.

REFERENCES

Arifin, A. (2026). *8 Dimensi Profil Lulusan dalam Pembelajaran Mendalam*. Panduan Mengajar. https://www.panduanmengajar.com/2025/01/dimensi-profil-lulusan.html

Badan Standar Kurikulum dan Asesmen Pendidikan. (2024). *Rencana Strategis Pusat Asesmen Pendidikan 2020-2024*. Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi.

Branch, R. M. (2009). Instructional Design: The ADDIE Approach. In *Digital Learning: The Key Concepts*. Springer. https://doi.org/10.4324/9780429425240-105

Citra, D., Fithri, R., & Deprizon, D. (2025). Efektivitas Penerapan Metode Project-Based Learning (PjBL) Terhadap Hasil Belajar pada Mata Pelajaran IPA Kelas 5 di Madrasah Ibtidaiyah Baserah. *JPIM: Jurnal Penelitian Ilmiah Multidisipliner*, *02*(03), 499–511. https://ojs.ruangpublikasi.com/index.php/jpim/article/download/913/757#:~:text=Implikasi Hasil Penelitian, Kebutuhan Pembelajaran Abad ke-21.

Damayanti, L., Raharjo, T. J., Subali, B., & Ellianawati, E. (2024). Analysis of Ethnoscience-Based Problem-Based Learning (PBL) Models at the Elementary School Level: Bibliometric Analysis on Selected Journals in 2019-2025. *Journal of Primary Education*, *13*(2), 100–113.

https://journal.unnes.ac.id/sju/index.php/jpe Analysis

Delimanugari, D., Suyadi, S., Fitrotunisa, A., Amin, L. H., & Sari, R. (2025). Analysis of the Needs for Developing MI/SD Science Learning Design Based On Local Wisdom. *Al-Bidayah : Jurnal Pendidikan Dasar Islam*, *17*(1). https://doi.org/10.14421/al-bidayah.v17i1.9906

Dharmayanti, L. P. D., & Lestari, N. A. P. (2025). Systematic Literature Review: Pembelajaran IPA Berbasis Etnosains sebagai Strategi Pengembangan Karakter Cinta Lingkungan Siswa Sekolah Dasar. *Jurnal Administrasi Pendidikan Indonesia*, *16*(1), 103–114. https://doi.org/10.23887/jurnal_ap.v16i1.6120

Direktorat KSKK Madrasah. (2023). *Hasil AKMI tahun 2022* (Vol. 11, Issue 1). http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_Sistem_Pembetungan_Terpusat_Strategi_Melestari

Ditjen Pendis Kemenag. (2023). *Kemenag Rilis Rapor AKMI 2023*. Madrasah Reform. https://madrasahreform.kemenag.go.id/read/kemenag-rilis-rapor-akmi-2023https://madrasahreform.kemenag.go.id/read/kemenag-rilis-rapor-akmi-2023

El-Tahan, S., & Karimi, A. (2025). Source Criticism in Elementary School. *Källkritik i lågstadiet Förord*, 1–45. https://www.diva-portal.org/smash/record.jsf?pid=diva2%3A1948407&dswid=-9438

Fatah, A. (2023). Penerapan Model Pembelajaran Berbasis Proyek atau Project-Based Learning (PJBL) melalui Poster Kreatif dalam Pembelajaran Daring Materi Pemanasan Global untuk Meningkatkan Keterampilan Komunikasi Ilmiah. *Amerta: Jurnal Ilmu Sosial Dan Humaniora*, *3*(2), 45–54. https://ejournal.amertamedia.co.id/index.php/amerta/article/view/151/110

Fatihatussa'adah, I., Yamtinah, S., Ariani, S. R. D., Wiyarsi, A., Widarti, H. R., Shidiq, A. S., & Abrori, F. M. (2024). Fostering Collaboration and Enhancing Student Learning Achievement through the Integration of Ethnoscience in the Common Knowledge Construction Model. *Indonesian Journal on Learning and Advanced Education*, *6*(3), 295–314. https://doi.org/10.23917/ijolae.v6i3.23222

Fatmala, S. A., Sujana, A., & Maulana, M. (2017). Pembelajaran Kontekstual untuk Meningkatkan Literasi Sains Siswa SD kelas V pada Materi Peristiwa Alam. *Jurnal Pena Ilmiah*, *2*(1), 211–220. https://doi.org/10.17509/jpi.v2i1.10656

Fredyarini, N. A., Siregar, I., Warsani, H., Supentri, S., Rafianti, R., Amnie, E., Suraya, R. S., Zulfa, Z., Negara, C. P., Afrilia, I., Ratnawati, S. A., Suparno, A., & Barkara, R. S. (2025). *Pendidikan Berbasis Kearifan Lokal* (S. Suroyo (ed.)). PT. Penamuda Mulia.

Gustafon, K. L., & Branch, R. M. (2002). Survey of Instructional Development Models. In *TechTrends* (3rd ed.). ERIC Clearinghouse on Information and Technology, Syracuse, NY. https://doi.org/10.1007/bf02763388

Habibullah, H., & Rizal, S. (2024). Pemanfaatan Kearifan Lokal di Aceh sebagai Sumber Belajar Dalam Pembelajaran Etnosains. *Journal of Technology and Literacy in Education*, *3*(2), 124–131. https://jurnal.serambimekkah.ac.id/index.php/jtle/article/view/3000

Kemendikbud Ristekdikti. (2021). Kurikulum untuk Pemulihan Pembelajaran. In *Pusat Kurikulum dan Pembelajaran*. Badan Standar, Kurikulum, dan Asesmen Pendidikan Kemendikbud Ristek.

Khaerunnisa, K., Patta, R., & Ridwan, N. (2024). Pengaruh Penerapan Model Pembelajaran Berbasis Proyek terhadap Keterampilan Berpikir Kritis Siswa pada Mata Pelajaran IPA kelas V UPTD SD Negeri 111 Barru. *Pinisi Journal of Education*, *4*(2), 1–20. https://journal.unm.ac.id/index.php/PJE/article/download/1643/1030/4628

Lestari, T. P. A. (2024). Potensi Kearifan Lokal dalam Meningkatkan Karakter Cinta Tanah Air

Peserta Didik di Sekolah Dasar. *Jurnal Integrasi dan Harmoni Inovatif Ilmu-Ilmu Sosial*, *4*(3). https://doi.org/10.17977/um063.v4.i3.2024.9

Macdermott, D., Harkin-Macdermott, C., Lynch, L., & Macdermott, D. (2025). Evaluating the Peer Learning Bubble Model with Social Work Students on Community and Voluntary Sector Placements in Northern Ireland. *Social Work Education: The International Journal*, 1–28. https://doi.org/10.1080/02615479.2025.2563173

Madusise, S., & Mwakapenda, W. (2014). Using School Mathematics to Understand Cultural Activities: How far can We Go? *Mediterranean Journal of Social Sciences*, *5*(3), 146–157. https://doi.org/10.5901/mjss.2014.v5n3p146

Mahyudi, J. (2023). Exploration of Scientific Literacy in Indonesian Language Textbooks for Elementary and Secondary School. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran dan Pembelajaran*, *9*(2), 521. https://doi.org/10.33394/jk.v9i2.7758

Mayasari, T. (2017). Integrasi budaya Indonesia dengan pendidikan sains. *Etnosains dan Peranannya Dalam Menguatkan Karakter Bangsa Seminar Nasional Pendidikan Fisika III 2017 Universitas PGRI Madiun*, *2010*, 12–17. https://scispace.com/pdf/integrasi-budaya-indonesia-dengan-pendidikan-sains-1k49bymybg.pdf

McDermott, L. C., Shaffer, P. S., & Constantinou, C. P. (2000). Preparing teachers to teach physics and physical science by inquiry. *Physics Education*, *35*(6), 411–416. https://doi.org/10.1088/0031-9120/35/6/306

Munira, I., Mulyadi, M., & Ramadhan, M. F. (2024). Implementation of Ethnoscience to Improve Elementary School Students' Critical Thinking Ability in Science Learning. *Jurnal Pendidikan Mandala*, *9*(2). https://doi.org/10.58258/jupe.v9i2.7119

Muslimin, M., & MR, M. P. (2025). Pendekatan pembelajaran IPA berbasis literasi sains di pendidikan dasar. *Maccayya Journal : Jurnal Ilmu Pendidikan*, *3*(1), 13–18. https://journal.unm.ac.id/index.php/maccayya/article/view/8429/5211

No Name. (2025). *Rumah adat Aceh*. Wikipedia Ensiklopedia Bebas. https://id.wikipedia.org/wiki/Rumah_adat_Aceh

Nuriman, N., Wardani, R. P., Agustiningsih, A., Mahmudi, K., Wardoyo, A. A., & Putri, A. (2025). Integration of the ethnoscience of the Ijen Geopark Bondowoso area in elementary school science learning. *JP2SD (Jurnal Pemikiran dan Pengembangan Sekolah Dasar)*, *13*(1), 40–49. https://ejournal.umm.ac.id/index.php/jp2sd/article/view/28051/16336

OECD. (2024). *PISA 2022 Results (Volume III): Creative Minds, Creative Schools*. PISA, OECD Publishing. https://doi.org/10.1787/765ee8c2-en.

Pusat Asesmen Pendidikan Kemendikdasmen. (2024). *Profil satuan pendidikan dengan capaian AKM tinggi pada jenjang SMA/SMK/MA/Sederajat*. Kemendikdasmen RI.

Ramli, M., Susanti, B. H., & Yohana, M. P. (2022). Indonesian Students' Scientific Literacy in Islamic Junior High School. *International Journal of STEM Education for Sustainability*, *2*(1), 53–65. https://doi.org/10.53889/ijses.v2i1.33

Rayis, W. P. A., Herayanti, L., Prayogi, S., Kurnia, N., & Muhali, M. (2025). Development of a project-based learning module grounded in ethnoscience to enhance students' scientific literacy and collaboration skills. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran*, *11*(3), 1322–1333. https://ojspanel.undikma.ac.id/index.php/jurnalkependidikan/article/view/16879/8819

Rojas-Drummond, S., Rubio-Jiménez, A. L., & Trigo-Clapés, A. L. (2025). Understanding and Enhancing Learning and Development. In: Learning Together. In *Learning Together* (pp. 39–62). Springer. https://link.springer.com/chapter/10.1007/978-3-032-06018-1_3

Sari, R., Nurdin, I. F., Prasetyo, S., Hidayatul, L., Delimanugari, D., & Nasir, M. F. A. (2025). Science Literacy Skills of Prospective Primary Education Teachers : Challenges in the 21st century. *IJBER: International Journal of Basic Educational Research*, *2*(1), 7–13. https://doi.org/10.14421/ijber.v2i01.9541

Siringan, B. (2025). Integrating Traditional Ecological Knowledge in Modern Conservation Practices. *Ukrainian Journal of Ecology*, *15*(3), 19–21. https://doi.org/10.15421/2025

Snively, G., & Corsiglia, J. (2000). Discovering Indigenous Science: Implications for Science Education. *Science Education*, *85*(1), 6–34. https://doi.org/10.1002/1098-237x(200101)85:1<6::aid-sce3>3.3.co;2-i

Sugiyono. (2022). *Metode Penelitian & Pengembangan: Research and Development untuk Bidang Pendidikan, Manajemen, Sosial, Teknik* (V). Alfabeta.

Sutrisna, N., & Anhar, A. (2020). An Analysis of Students' Scientific Literacy Skills of Senior High School in Sungai Penuh City Based on Scientific Competence and Level of Science Literacy Questions. *Proceedings of the International Conference on Biology, Sciences and Education (ICoBioSE, 2019)*, *10*(ICoBioSE, 2019), 149–156. https://doi.org/10.2991/absr.k.200807.032

Syahdani, E. P., & Tyas, R. A. (2025). Project-Based Ethnoscience Learning : Elevating Scientific Literacy and Communication through Nutrient Analysis of "Jadah Tempe." *Journal of Science Learning*, *8*(2). https://doi.org/10.17509/jsl.v8i2.82148

Syam, M. N. R., Bektiarso, S., & Prihandono, T. (2024). Implementasi pembelajaran IPA berbasis kearifan lokal dalam menumbuhkan nilai karakter Profil Pelajar Pancasilan. *Eduproxima: Jurnal Ilmiah Pendidikan IPA*, *6*(2), 411–418. https://doi.org/10.29100/.v6i2.5084

UNESCO. (2020). *Education for sustainable development a roadmap*.

Untung, S., Mustakim, Z., Afroni, A., Kholid, M., & Rokhmah, A. (2022). Local Wisdom-Based Learning Innovation on Madrasah Ibtidaiyah in the Digital Era. *Edukasia Islamika: Jurnal Pendidikan Islam*, *7*(1), 92–114. https://doi.org/10.28918/jei.v7i1.5437

Vijaykumar, R. (2019). Integrating Indigenous Knowledge and Traditional Practices for Biodiversity Conservation in a Modern World. *Environmental Report*, *4*(7). https://doi.org/10.51470/ER.2019.1.2.04

Vygotsky, L. S. (1978). *Mind in Society : The Development of Higher Psychological Processes*. Harvard University Press. https://doi.org/10.3928/0048-5713-19850401-09

Wati, U. A., Hastuti, W. S., Kusumah, S. A., & Widyaningtyas, F. S. (2025). Peningkatan Literasi Sains dalam Pembelajaran melalui Interactive Worksheet di SD/MI. *Jurnal Pengabdian Kepada Masyarakat Nusantara (JPkMN)*, *6*(2), 1571–1578. https://doi.org/10.55338/jpkmn.v6i2.4771

Wirama, T. G. P., Suja, I. W., & Tika, I. N. (2023). Ethnoscience-Based Science Teaching and Learning to Improve Students' Cognitive Learning Outcomes: A Systematic Literature Review. *Indonesian Journal of Educational Development (IJED)*, *4*(2), 194–208. https://doi.org/10.59672/ijed.v4i2.2897