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LOCAL WISDOM-BASED TEACHING MATERIALS TO SUPPORT THE INDEPENDENT CURRICULUM IN SCIENCE LEARNING: A *SYSTEMATIC LITERATURE REVIEW* (SLR)

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ABSTRACT

The addition of local wisdom to the curriculum is a very relevant issue, considering that Indonesia has a very diverse cultural wealth. Although various studies and publications have been conducted on various topics and levels of education, a comprehensive study of how local knowledge is used in the science curriculum at the senior high school (SMP) level is still relatively limited. This study aims to explore in depth the implementation of local wisdom in the science curriculum at junior high school. The approach used is a systematic literature review, by analysing 20 scientific articles published between 2015 and 2025 and indexed in the Scopus and Google Scholar databases. The integration of local knowledge in middle school science classes has great potential to improve the quality of education while supporting the preservation of local culture. This integration process can be applied through various forms of activities, including intracurricular, co-curricular and extracurricular. In intracurricular activities, local wisdom is adapted into teaching materials, learning methods, learning media, and evaluation systems. Co-curricular activities may include the Pancasila Student Profile Strengthening (P5) programme, environmental education, field studies, and educational visits. Meanwhile, in extracurricular activities, integration can be done through traditional arts such as puppet shows. It is expected that through this approach, there will be improvements in science literacy, ecoliteracy, science process skills, disaster knowledge, critical thinking skills, and overall student learning outcomes.
Keywords: *Teaching Materials, Science, Local Wisdom*

ABSTRAK

Penambahan kearifan lokal ke dalam kurikulum merupakan isu yang sangat relevan, mengingat Indonesia memiliki kekayaan budaya yang sangat beragam. Meskipun berbagai penelitian dan publikasi telah dilakukan pada berbagai topik dan jenjang pendidikan, namun kajian komprehensif tentang bagaimana pengetahuan lokal digunakan dalam kurikulum IPA di jenjang Sekolah Menengah Atas (SMP) masih relatif terbatas. Penelitian ini bertujuan untuk mengeksplorasi secara mendalam implementasi kearifan lokal dalam kurikulum IPA di SMP. Pendekatan yang digunakan adalah kajian pustaka sistematis, dengan menganalisis 20 artikel ilmiah yang diterbitkan antara tahun 2015 dan 2025 dan terindeks dalam basis data Scopus dan Google Scholar. Integrasi pengetahuan lokal dalam kelas IPA SMP memiliki potensi besar untuk meningkatkan kualitas pendidikan sekaligus mendukung pelestarian budaya lokal. Proses integrasi ini dapat diterapkan melalui berbagai bentuk kegiatan, baik intrakurikuler, kokurikuler, maupun ekstrakurikuler. Dalam kegiatan intrakurikuler, kearifan lokal diadaptasi menjadi bahan ajar, metode pembelajaran, media pembelajaran, dan sistem evaluasi. Kegiatan kokurikuler dapat berupa program Pemantapan Profil Siswa Pancasila (P5), pendidikan lingkungan hidup, studi lapangan, dan kunjungan pendidikan. Sementara itu, pada kegiatan ekstrakurikuler, integrasi dapat dilakukan melalui kesenian tradisional seperti pertunjukan boneka. Diharapkan melalui pendekatan ini, akan terjadi peningkatan literasi sains, ekoliterasi,

keterampilan proses sains, pengetahuan bencana, keterampilan berpikir kritis, dan hasil belajar siswa secara keseluruhan.
Kata Kunci: *Bahan Ajar, Sains, Kearifan Lokal*

INTRODUCTION

Integrating together local knowledge in the science curriculum at the secondary school level has a high level of urgency, considering that Indonesia is one of the countries with the largest cultural plurality in the world which is rich in cultural diversity. Local wisdom represents cultural identity, values, norms, and knowledge developed and inherited by a community through the process of their experiences and interactions with the natural and social environment (Komalasari, 2022) . Local wisdom has a significant role in conserving natural resources, developing the quality of human resources, preserving cultural heritage, advancing science, and upholding ethical and moral values.

Integrating local wisdom into the curriculum can increase the relevance and context of learning for students, as well as foster a sense of pride and concern for local culture and the surrounding environment (Anggito et al., 2023). When learning materials are connected to students' everyday experiences and the realities of their local environment, students are more likely to engage actively and develop a deeper understanding of the subject matter. This approach not only enriches the learning process but also helps students appreciate and preserve their cultural heritage, which is essential in an increasingly globalized world.

Furthermore, local wisdom embedded in students' daily lives serves as a form of authentic experience that can be leveraged to facilitate contextual understanding of academic concepts. Local wisdom encompasses knowledge that has been validated through generations of experience and contains values highly relevant to everyday life, particularly in areas such as environmental management, health, and sustainability principles (Kisworo et al., 2022). By integrating these values into the learning process, educators can provide students with practical insights and life skills that are directly applicable to their own communities, thereby supporting holistic and meaningful education.

The application of local knowledge has the potential to improve the achievement of learning outcomes and develop positive character in students. The combination of science and local knowledge in the learning process aims to instil understanding while preserving local culture that develops in the world where students live. The cultivation of local wisdom values in the learning process can be done through the cultivation of cultural values through the population observation method in the student's environment. The observation results obtained can be implemented in the classroom learning model, so that students are able to develop knowledge and form positive attitudes that are rooted in the ambient environment. Through the integration of local wisdom, learners not only gain theoretical understanding of science, but also able to recognise and appreciate the cultural values that develop in the surrounding environment (Mohamed & Ali, 2024) .

A number of studies have examined the integration of local wisdom in various subjects, themes of study, and levels of education (Widiana et al., 2021) . Specifically in the context of science learning, the results of these studies generally indicate that the application of local wisdom in the school curriculum has a positive impact on the holistic development of learners. A number of systematic literature reviews have also discussed local wisdom-based learning models (Mohamed & Ali, 2024) . However, systematic literature reviews that specifically examine the inclusion of local cultural knowledge in scientific inquirí teaching educational resources utilized in schools are still not widely found. Therefore, this study aims to comprehensively explore the integration of local wisdom in instructional resources for science education at the lower secondary level, focusing on the urgency of local wisdom, integration

strategies, and their impact on the science curriculum. By analysing the existing literature, it is expected to find various strategies and approaches that are effective in developing teaching materials that not only support academic achievement, but also play a role in preserving local cultural values. Thus, this article is expected to contribute to improving the quality of science learning that is more contextualised and inclusive in Indonesia.

The purposes of this study are: (1) to analyze the important role of local wisdom in science education at the junior high school level, particularly in building contextual understanding of scientific concepts, fostering positive character, and increasing students' appreciation for regional culture; (2) to identify and describe strategies for integrating local wisdom values into science teaching materials in junior high schools, including the use of ethnoscience approaches, discovery-based learning models, and the incorporation of indigenous knowledge into the learning process; and (3) to examine the educational implications of implementing local wisdom-based science materials for junior high school students, such as enhancing scientific literacy, promoting environmental awareness, strengthening character, and increasing the relevance of science learning to everyday life and local culture.

RESEARCH METHODS

This research is a Systematic Literature Review that adopts Kitchenham's model. This research aims to undertake a comprehensive examination of various findings and studies that examine the assimilation of local traditional knowledge into the development of science teaching materials at the primary school level. The initial research process involved searching for scientific articles published between 2015 and 2025 using the Publish or Perish application, which accesses the Scopus and Google Scholar databases, using the specific keywords "local wisdom", "science education", and "teaching materials". The selection of these keywords aims to capture articles published in English and Indonesian. The collected articles were then systematically selected based on the inclusion and exclusion criteria. Articles that passed the selection were exported in RIS format and visualised using VOSviewer software. The next step was to analyse the articles based on the Research Question (RQ) that formed the basis of the data analysis process.

A search of articles on the Scopus and Google Scholar databases identified a total of 1,410 publications published in the period 2015 to 2025. Details of the search results based on the keywords used as presented in Table 1 below :

Table 1.Keywords in Database Search

Database	Number of Articles
Scopus	9
Google Shoolar	1.410
Total	1.419

The article search process adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram, which includes four main stages, namely identification, screening, eligibility assessment, and data inclusion. The four stages are presented visually in Figure 1 below.

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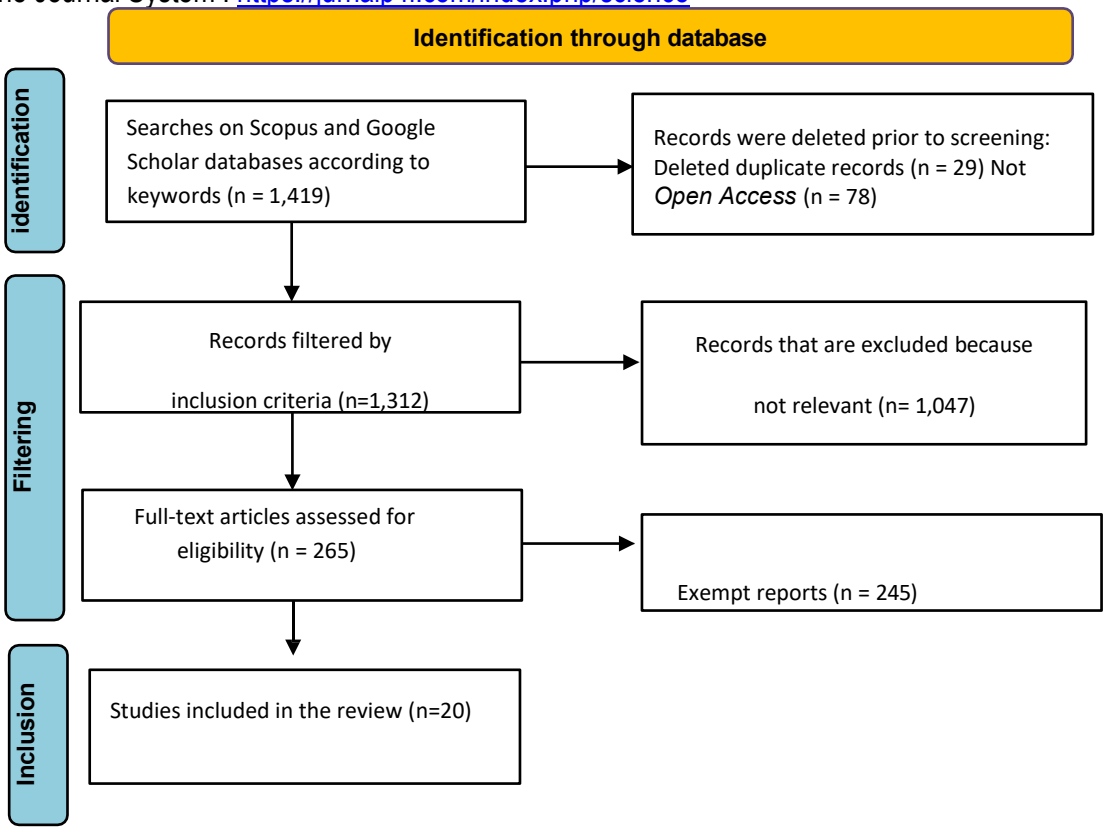

Figure 1. Prism Flow Diagram

The initial search yielded a total of 1,419 articles, but not all articles were used for the review. At the screening stage, 29 articles that were duplicates and 78 articles that were not available in open access were eliminated, leaving 1,312 articles. Furthermore, the selection process based on the inclusion criteria resulted in 265 eligible articles. The inclusion criteria used in this study included: (a) scientific articles that have gone through the peer-review process, (b) indexed in the Scopus or Google Scholar database with publication years between 2015 and 2025, (c) written in Indonesian or English, (d) available in full PDF format, (e) published in journals with open access, (f) contains discussions about the incorporation of indigenous knowledge into the development of sains teaching materials, and (g) is the result of empirical research based on primary data. From this process, 1,047 irrelevant articles were excluded, leaving 265 articles for further evaluation. At the feasibility assessment stage, the 265 articles were read thoroughly and 20 articles that were considered relevant and in line with the focus of the research questions were selected for further analysis. The articles were then imported into the Mendeley application and saved in RIS format for the purpose of mapping the initial thematic relevance network using the VOSviewer application.

RESULTS AND DISCUSSION

This section presents the findings obtained from the 20 articles, summarised based on information such as the author's name, publication title, and the main findings of each study. The details of the identification results are presented systematically in Table 2.

Results

Table 1. Article Search Results

No.	Author	Title	Research Results
1.	(Octavius Yoseph Tuta Mago et al., 2022)	Development of Discovery Learning-Based Learner Worksheets (LKPD) on the Material of the Human Respiratory System in Class VII Junior High School	The objective of this study is to design and evaluate the validity of student worksheets developed through the discovery learning method, specifically targeting the human respiratory system material for grade VIII junior high school learners.
2.	(Alifia Nabila et al., 2023)	Development of Science Module Integrating Local Wisdom of Biotechnology Materials for Class IX Junior High School	The objective of this research is to investigate: (1) the validity of a science module incorporating local wisdom in the context of biotechnology, (2) the module's practicality in educational settings, and (3) its effectiveness in enhancing learning outcomes. The development of the module was carried out through three phases of the 4D instructional design model, namely the define, design, and develop stages. Data collection instruments comprised learning achievement assessments, student response questionnaires, and validation instruments for the science module.
3.	(Sihombing et al., 2025)	Integrating Local Wisdom into Environmental Education: A Systematic Review of Ethnoscience Research in Indonesia	This development resulted in learning materials that integrate Tasikmalaya's cultural values. The utilisation of elements such as batik motifs, umbrella geulis, Kampung Naga, and others proved to significantly increase students' learning motivation.
4.	(Yuliana et al., 2023)	Development of mathematics teaching materials with a realistic mathematics education approach based on ngada ethnomathematics on the pythagorean theorem material	This article seeks to present the findings of a needs analysis regarding local wisdom based e-module teaching materials that incorporate ethnoscience elements in the context of South Sumatra. Data collection was conducted through the distribution of questionnaires via Google Forms, completed by 35 science teachers and 69 students from grades VIII and IX at SMPN 1 Madang Suku I during the second semester of the 2022/2023 academic year. The collected data were subsequently

		for class VIII junior high school.	analysed using descriptive statistical methods.
5.	(Setiawan et al., 2017)	The development of local wisdom-based natural science module to improve science literacy of students	The vulnerability of communities in responding to volcanic disasters reflects, in part, a low level of scientific literacy. Limited understanding of volcanic phenomena highlights the need for instructional content that is engaging and contextually relevant, thereby fostering students' science literacy through learning materials closely aligned with their everyday environment. This study aims to develop a natural science module grounded in local wisdom, centred on the Mount Kelud eruption theme, with both theoretical and empirical foundations.
6.	(Damopolii et al., 2024)	An Integration of local wisdom into a problem-based student book to Empower Students' Conservation Attitudes	The limited understanding among students regarding species diversity-especially with regard to endangered local species-has become a matter of concern, as it contributes to a weakening of students' attitudes towards conservation efforts. To mitigate this issue, it is essential to provide learning resources that integrate elements of local wisdom. This study is directed towards the development of a student textbook that is grounded in real-world environmental issues and enriched with Papuan local wisdom, with the objective of fostering stronger conservation-oriented attitudes among learners.
7.	(Sari & Usmeldi, 2019)	Needs analysis in the development of natural science teachers' book of Junior High School based on local wisdom of West Sumatra.	The natural science teacher's guidebook is expected to provide comprehensive instructions for effectively utilising the student textbook. However, existing teacher guides for natural science do not sufficiently comply with the standards set by the 2013 curriculum. Furthermore, observations reveal that numerous natural science teachers do not possess specialised expertise in this discipline, as their academic qualifications are mainly concentrated in physics or biology education. To address this gap, the current study aims to conduct a needs analysis to support the development of a junior high school natural science teacher's guidebook that integrates the

			local wisdom of West Sumatra, thereby ensuring the material meets the actual requirements of educators.
8.	(Sugiani et al., 2019)	The Effects of Electronic Modules in Constructivist Blended Learning Approaches to Improve Learning Independence	This study aims to develop a one-semester electronic module that has been evaluated for its feasibility and effectiveness in enhancing students' learning autonomy.
9.	(Yulando et al., 2019)	Electronic Module Design and Development: An Interactive Learning	This research aims in general to develop a product in the form of an interactive electronic module that is equipped with various features and offers flexibility in its use. Specifically, this research aims to design the product and conduct feasibility testing by involving experts in the field of learning media. The method used in this research refers to the Borg & Gall development procedure. Based on the model, several stages are adjusted as a guide in the product development process which includes: (1) needs analysis, (2) product creation, (3) validation, and (4) final product completion. The focus of this research is limited to lecturers who have competence as experts in the aspect of learning media.
10.	(Solihudin JH, 2018)	Development of Web-Based E-Modules to Improve the Achievement of Physics Knowledge Competencies on Static and Dynamic Electricity Materials	This research aims to develop a web-based e-Module as an effort to improve the achievement of knowledge competence in physics subjects. The research instruments include validation sheets from material experts, validation from multimedia experts, response questionnaires from professional teachers, student response questionnaires, and evaluation tools in the form of multiple choice questions. The results of validation by material experts showed a score of 82.81%, which was classified as very good, while validation from multimedia experts scored 78.13% in the very good category. Professional physics teacher responses to the material and multimedia aspects obtained a percentage of 85.71% (very good), while student responses reached 80.20%, also in the very good category. To measure the improvement of knowledge competency achievement, this study used One

			Group Pre-test Post-test design with N-Gain value analysis. The evaluation results showed that on static electricity material, the N-Gain value of 0.84 was classified as high, and on dynamic electricity material obtained an N-Gain value of 0.87 which was also in the high category. Based on these findings, it can be concluded that the development of web-based e-Modules for static and dynamic electricity materials is effective as a learning medium and contributes to increasing students' knowledge competence.
11.	(Zulfah & Aznam, 2018)	Development of Natural Sciences Module with Reflective Learning Journal to Enhance Student's Reporting-Interpretative Skills	Having relevant and adequate teaching resources is one of the key success criteria for Curriculum 2013 implementation. These instructional resources may include interactive videos, mock-ups, virtual labs, textbooks, and more. Nonetheless, a large number of instructional resources continue to be out of compliance with Curriculum 2013. A natural science module with a reflective learning diary is one of the most acceptable teaching resources that must be created as a result. The creation of this natural science module was accomplished through a study that sought to plan and assess the module's and the reflective learning journal's efficacy. The findings demonstrated that the viability of natural science courses combined with reflective learning journals was deemed suitable
12.	(Andriana et al., 2017)	Natural science Big Book with Baduy local wisdom base media development for elementary school	In this research, Big Book media is developed by integrating the local wisdom of the Baduy community as a means to introduce traditional cultural values found in the Baduy customary area.
13.	(Fitriani et al., 2019)	DEVELOPMENT OF LOCAL FAMILY-BASED SCIENCE LEARNING MODULE OF SEMBALUN VILLAGE FOR THE IMPROVEMENT OF KOGNITIVE LEARNING	One strategy that emphasizes the incorporation of local wisdom values into science materials is the creation of science learning modules based on local wisdom.

		RESULTS OF MTs STUDENTS	
14	(Afdalia et al., 2020)	Development of Physics Science Learning Module Based on Sandeq Local Wisdom in Junior High School	The objectives of this study are (i) to describe the results of the development of a validated Sandeq-based physical science learning module for junior high school students; (ii) to explain students' responses to the use of the physical science learning module.
15	(Nonggi, F., Kua, M. Y., & Laksana, 2021)	Development of Science Teaching Materials with Real World Problems Based on Ngada Local Wisdom for Junior High School Students Grade VII	This research focuses on problems related to the use of science teaching materials from certain publishers. After analysis, it was found that the material content in the teaching materials had not been comprehensively integrated.
16	(LESTARI et al., 2019)	Development of Integrated Science Modules Based on Papuan Local Wisdom on the Interaction of Living Things with the Environment	This module incorporates Papuan traditions that play an important role in improving the quality of education related to cultural and practical contexts for learners.
17	(Istyadji, Maya & Hafizah, 2021)	Training on the Creation and Development of Electronic Teaching Materials Using Flip Pdf Professional in Junior High School Science Subjects Based on Wetland Local Wisdom	This article discusses electronic teaching materials in science learning
18	(Batigin et al., 2024)	Development of E-Modules Based on Papuan Local Wisdom on the Material of	This research study developed an electronic science module by utilising elements of local wisdom in Papua.

		Interaction of Living Things with their Environment Class Vii Smp / MTs	
19	(Mardiant i, 2020)	BIO-EDU: Journal of Biology Education Development of Ethnoscience-Based Science Learning Modules on Material	The purpose of this research is to develop an ethnoscience-based science learning module that has the feasibility to be used after validation, wider field, and final product stages.
20	(Purwand ari & Hasanah, 2022)	Development of Science Modules Based on Local Wisdom Batik Gajah Oling Banyuwangi on Plant Classification Material for Junior / MTs Students	In this study, the validity and reaction of junior high school students to the Batik Gajah Oling Banyuwangi local wisdom-based scientific module on plant classification material were described.

Discussion

The reviewed articles were analysed with reference to the formulation of the predetermined research questions, and the results of the analysis are presented in descriptive form in the following section:

1. The Importance of Local Wisdom in Science Learning

The integration of local wisdom in science education at the secondary school level has an importance that cannot be ignored. Local wisdom includes knowledge, values, and practices that develop in the culture of local communities and are transmitted from one generation to the next. The addition of this local element provides various significant benefits in science learning at the junior high school level. One of them is to create a relevant context for the science material being studied, so that students can relate abstract concepts in science to real experiences in their environment. This allows students to feel the connection between science theory and everyday practice, enabling them to understand how science plays a role in their lives (Mugambi, 2020). This contributes to a deeper and more meaningful understanding of the subject matter they are learning. Furthermore, integrating local wisdom into the science curriculum also plays a role in fostering a sense of pride and strengthening students' cultural identity. In the context of intensifying globalization, it is important for the younger generation to have a deep appreciation for their cultural heritage (Syarif et al., 2021).

Through an understanding and appreciation of local wisdom, students not only gain insight into the field of science but also develop an awareness of the importance of preserving the cultural values and traditions that make up their identity. Research by Hikmawati et al. (2021) demonstrates that incorporating local knowledge into science curricula increases students' cultural pride by 42% compared to conventional methods. Additionally, integrating local wisdom can inspire students to think critically and creatively in finding solutions to

problems faced by society. When students learn about traditional ways of managing natural resources or environmentally friendly local agricultural techniques, they are invited to explore and formulate innovations that can be applied in this modern era (Rizki et al., 2023). In this way, the integration of local wisdom into the curriculum also makes the science concepts learned more applicable and solutive (Azizah et al., 2022).

In practice, science teachers can use various teaching methods that involve local wisdom, such as research projects related to the surrounding environment or dialogue and collaboration with community leaders. A study by Wahyuni (2017) found that project-based learning using local resources improved students' scientific reasoning skills by 28%. The use of learning tools and materials derived from the local environment can also help students more easily understand the science material being taught (Zidny et al., 2020). For example, Mambu (2023) highlights how place-based education in rural Indonesia enhanced students' engagement by connecting ecological concepts to indigenous farming practices. Thus, the integration of local wisdom in science education not only enriches the curriculum but also builds bridges between science and students' daily lives, making learning more interesting and relevant to them.

All of these benefits show that local wisdom has a very crucial role in shaping a holistic and sustainable understanding of science for students at the secondary school level. As emphasized by Zidny and Eilks (2022), curricula that blend scientific principles with cultural knowledge foster interdisciplinary thinking and environmental stewardship. Similarly, Syarif et al. (2021) argue that such integration prepares students to address global challenges while preserving local heritage, creating a balanced foundation for future innovators.

2. Strategies for Integrating Science Teaching Materials with Local Wisdom

Based on the results of the literature that has been reviewed, it shows:

Type of teaching material	Number
Teaching Module	11
LKPD/LKS	7
Textbook	4
Pocket Book	2
E-Modules	2
Teacher's Book & Student's Book	2
Hand Out	2
android apps	1

Based on the results of the table, it shows that many of the previous researchers used module-type teaching materials for learning activities. Module is a form of teaching material that is structurally designed based on the applicable curriculum and adjusted to the smallest learning unit, with the aim of facilitating independent learning activities within a predetermined period of time. The purpose of module development is to enable students to learn and understand learning materials independently.

3. The Impact of Integrating Local Wisdom in Science Teaching Materials

The integration of local wisdom into the science curriculum at the primary school level possesses a significant positive effect on various aspects, including the development of ecoliteracy, science literacy, character, achievement of learning outcomes, ability to think

critically, in-depth understanding of science concepts, mastery of science process skills, increased concern for the environment, development of high order thinking skills (HOTS), formation of scientific attitudes, strengthening of prosocial behaviour, increased curiosity, and a better understanding of disaster mitigation and knowledge, as well as cultural literacy.

CONCLUSIONS

The results of the Systematic Literature Study (SLR) that have been conducted show that teaching modules are the most widely used form of teaching materials in the development of science learning that integrates elements of local wisdom. This finding is based on an analysis of journal articles published between 2015 and 2025. This integrative approach is proven to have a significant effect on the achievement of learning outcomes and student completion rates. This evidence is obtained through the results of effectiveness tests from various studies that compare student learning outcomes before and after the use of science based on local wisdom teaching materials. Based on these findings, the author suggests that the development of teaching materials in the future should prioritise the integration of local wisdom, both from the culture of the local community and from a wider scope. This aims to improve students' understanding of learning materials as well as broaden their horizons regarding regional cultural diversity.

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