

## A systematic literature review about local wisdom and sustainability: Contribution and recommendation to science education

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Received 10 October 2023 ▪ Accepted 04 January 2024

### Abstract

The theme “local wisdom, sustainability, and education” attracted the attention of researchers, and the number of publications began to increase, making it interesting to study. This systematic literature review (SLR) aims to review various research published in journals indexed in Scopus database related to the theme “local wisdom, sustainability, and education”. The review focuses on publication trends as well as the contributions and recommendations that can be obtained. Disbursement was focused on the largest database in the world (Scopus), where 186 articles were obtained. preferred reporting items for systematic reviews and meta-analysis model was used to obtain suitable articles, so that finally only 10 articles met the criteria to be analyzed. We obtained data that the dominant research was conducted using a qualitative approach or method. There is no dominant author, and all authors are not related to each other. Local wisdom and sustainability “meet” in the word Indonesia, showing Indonesia’s position and urgency in this study. The theme “local wisdom, sustainability, and education” is still not an interesting issue asking for international collaboration, so research collaboration is still local. We discuss all the findings. We also discuss the contributions and recommendations of the 10 articles analyzed, which can be grouped into aspects of sustainable agriculture, sustainable watershed management, implementation of environmental education curricula, and teacher professionalism development. Contributions and recommendations are aimed at all aspects of education (both formal, non-formal and informal education). Findings can be a consideration or baseline for researchers to study theme of “local wisdom, sustainability, and education” according to their respective backgrounds and objectives.

**Keywords:** Asia, local wisdom, science education, Scopus, sustainability

### INTRODUCTION

Local wisdom and sustainable development goals (SDGs) have a close relationship in efforts to preserve the sustainable environment (Hasriyanti et al., 2021; Sandoval-Rivera, 2020). Local wisdom includes knowledge, practices and values that have been formed from generation to generation in local communities. This knowledge has recognized as having a wealth of knowledge regarding sustainable and cultural ways or techniques in utilizing and caring for natural resources and promoting sustainability (Kaya & Seleti, 2013; Mazzocchi, 2020; Mekonnen et al., 2021; Senanayake, 2006). Applying local wisdom in everyday life means that we will continue to strive to help preserve the

environment, reduce negative impacts on nature, and encourage the preservation of local culture. Apart from that, local wisdom can also strengthen community participation in decision-making processes related to the environment and development, thereby creating opportunities that truly consider the interests of local communities and ensure sustainability (Chandra, 2023; Jundiani, 2018; Kongprasertamorn, 2007). This means that the integration of local wisdom with the concept of sustainability will encourage the achievement of SDGs that are balanced between economic, social and environmental (Budiana et al., 2022; Pujiati et al., 2018).

Local wisdom and practices that have existed in society have been proven for centuries to ensure

### Contribution to the literature

- The researchers focus on the original publication about local wisdom, sustainability and education, something that no other academics have done so that a baseline study may be provided.
- The review of the scope of material we utilize only contains research/original publications, offering an overview of the researchers' focus and alignments on this theme.
- The scope of information used is limited to the original article; thus, providing an overview of the researcher's focus and alignment with the specified theme. The researchers discuss the contributions and recommendations the publication about local wisdom, sustainability and education so that it can become a reference or basis for researchers on this theme.

sustainability (Arifiani et al., 2019; Osawa, 2023). Mainstreaming local wisdom supports the design of more holistic and sustainable solutions that enable economic growth that remains in harmony with environmental preservation and cultural sustainability (Fatimah et al., 2020; Lubowiecki-Vikuk et al., 2021; Maspul, 2023). Thus, the link between local wisdom and sustainability is the key to maintaining the balance of the functions of our planet (Earth), while promoting the importance of realizing the welfare of local communities fairly (Dwijendra, 2020; Hasbiah, 2015; Susanto et al., 2022).

On the other hand, the link between local wisdom and education is manifested in the use of knowledge, cultural values and sustainable practices in the learning process, whether formal or informal (Darong et al., 2021; Zakiyah et al., 2022). The integration of local wisdom in the curriculum can enrich students' learning experiences, learn cultural values, and at the same time support knowledge about environmental sustainability.

Local wisdom-based education also mainstreams community involvement and preservation of local traditions, while ensuring the realization of active or student-centered learning (Irwan et al., 2020; Kuhnlein & Chotiboriboon, 2022; Marlina et al., 2023; Sitohang & Purnomo, 2023; Windarsari et al., 2017). In this way, education that combines local wisdom helps students understand and appreciate local culture, care for the environment and strengthen their cultural identities.

Local wisdom and sustainability in the context of education are mutually supportive. The integration of local wisdom in the curriculum helps students understand sustainable practices and local cultural values (Parwati et al., 2018; Supriatna, 2016). Education plays a role in educating people about the concept of sustainability and providing sustainable skills.

Furthermore, maintaining and preserving local wisdom also contribute to cultural and environmental sustainability (Hunaepi et al., 2019; Lasekan & Godoy, 2020; Nugroho et al., 2019; Ufie et al., 2020). This connection creates a positive cycle in which local wisdom influences education, which in turn strengthens sustainable practices and cultural and environmental preservation (Febriani et al., 2020; Lisdiyono, 2017; Nurhayati et al., 2021; Osawa, 2023). Thus, the

integration of local wisdom in education plays an important role in achieving SDGs.

Research on local wisdom, sustainability and education is very important to study or analyze. This will give us a real picture of how far scientists have focused their studies on the integration of them to date. The logical technique most recommended by experts for analyzing research developments in a focused theme is to carry out a systematic literature review (SLR) analysis or study (e.g., see Brereton et al., 2007; Husamah et al., 2022b, 2022c, 2023; Xiao & Watson, 2017).

Search results using the phrase "local wisdom and sustainability" show that there are only two review articles (and all of them are not SLR), namely about local wisdom of farmers in land management (Ngongo et al., 2022) and integrated watershed management (Basuki et al., 2022).

In a search using the phrase "local wisdom and education" only one article was found in the form of a narrative review about disaster preparedness and mitigation (Ayuningtyas et al., 2021). There are no SLR articles related to "local wisdom and environmental education" in Scopus database. Thus, it can be confirmed that there are no SLRs in Scopus database that focus on "local wisdom, sustainability, and education".

This SLR aims to review various research published in journals indexed in Scopus database related to local themes. This SLR will contribute to the development of research on the themes of local wisdom, sustainability and education. It is hoped that SLR findings will be taken into consideration and even become a reference for researchers.

### Research Questions

There are two research questions (RQ), namely:

- RQ1.** What are the publication trends (methods, authors, keywords and research collaboration) related to the theme "local wisdom, sustainability, and education" in Scopus database?
- RQ2.** What contributions and recommendations can be obtained from articles in Scopus database, around the theme "local wisdom, sustainability, and education".

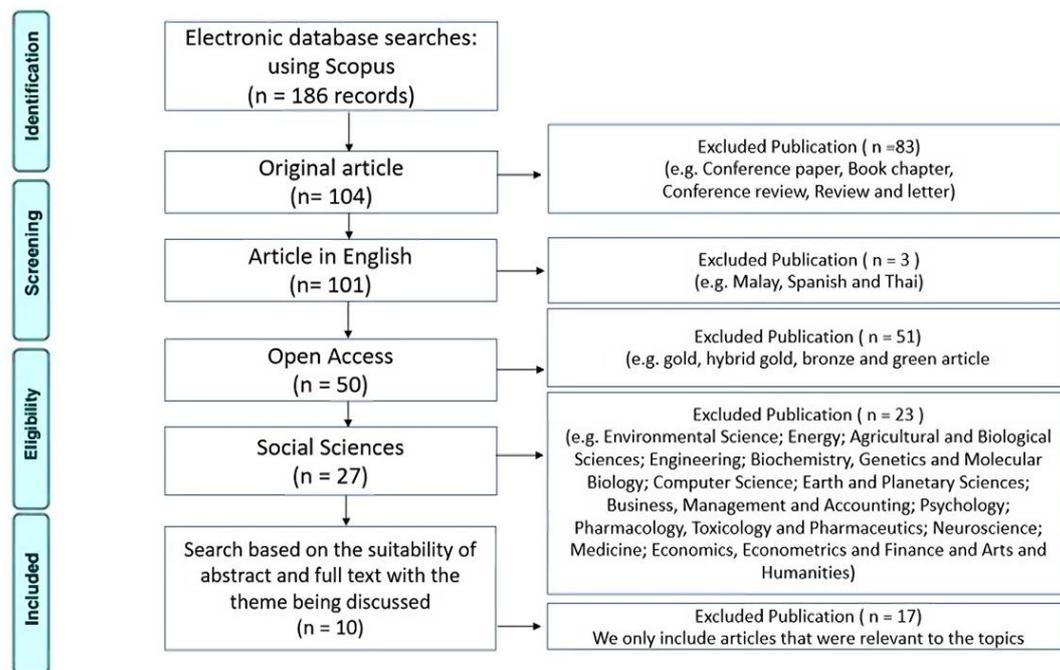


Figure 1. Article selection flow used in SLR using PRISMA model (Source: Result of PRISMA process)

## METHOD

### Research Framework

This article was an SLR aimed at synthesizing information related to the condition of knowledge in a field—in this case related to “local wisdom, sustainability, and education”—so as to help map or recommend future research priorities. Analysis of various publications will be able to answer questions regarding research problems and provide recommendations for further research. Analysis of previous publications can also produce or evaluate theories or phenomena that occurred in previous research (Page et al., 2021).

### Search Article & Inclusion Criteria

Official login access or subscription to Scopus database was assisted by colleagues from the Universitas Muhammadiyah Malang, Indonesia. The search was carried out using the words “local wisdom” + “sustainability” + “education”. The search results were exported in \*CSV format (to facilitate the simulation process) and \*RIS to synchronize with Mendeley. Visualization of the relationship between keywords and authors was processed using VOSviewer software. The following was article search history in Scopus database: “(TITLE-ABS-KEY (“local wisdom” + AND sustainability) AND (LIMIT-TO (DOCTYPE, “ar”)) AND (LIMIT-TO (LANGUAGE, “English”)) AND (LIMIT-TO (OA, “all”)) AND (LIMIT-TO (SUBJAREA, “SOCI”))”.

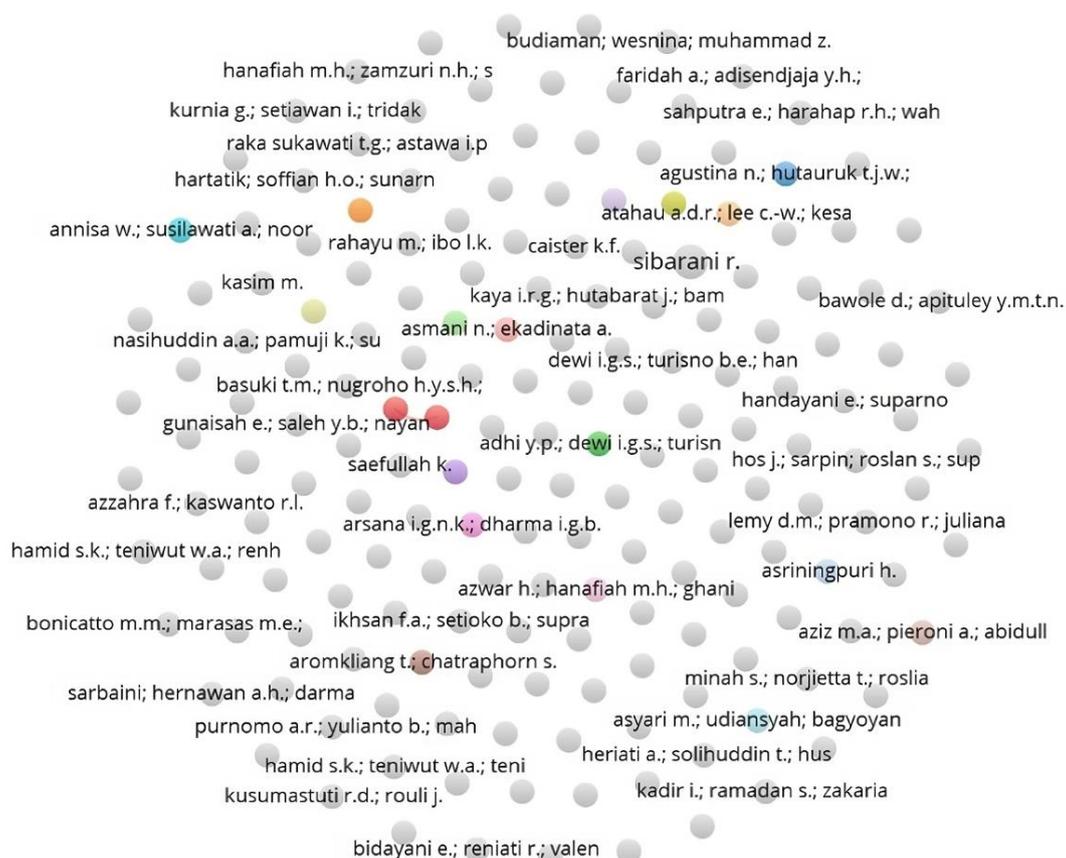
This SLR used preferred reporting items for systematic reviews and meta-analysis (PRISMA) model in selecting articles (inclusion and exclusion of articles)

so that appropriate articles were obtained. This model consists of four stages, namely identification, screening, eligibility and included (Rethlefsen & Page, 2022) and has been practiced by several Indonesian researchers in reputable international publications (Husamah et al., 2022a; Nurwidodo et al., 2023). The order of inclusion and exclusion that we have carried out is presented in Figure 1.

Figure 1 shows that during the initial search (identification) relatively few articles were obtained, only 186 articles. This number is relatively small compared to the initial findings of various SLRs that have been published, whose articles number in the thousands. In the initial screening stage, we only took papers that were original articles, the number of which was 104, which means the number of excluded articles was 83. We excluded the types of articles from conference paper, book chapter, conference review, review, and letter. Next, the criteria for articles published in English were selected, so there were 101 articles, this means there were three articles that were excluded, because they were published in Malay, Spanish and Thai. Next was the selection of articles based on “open access” or free download status, where 50 articles were selected, which meant discarding 511 articles. At the eligibility stage we used the subject area criteria “social science”. There were 27 articles that met the criteria, or 23 articles were excluded. Excluded articles fall into the environmental science subject area; energy; agricultural and biological sciences; engineering; biochemistry, genetics and molecular biology; computer science; earth and planetary sciences; business, management and accounting; psychology; pharmacology, toxicology and pharmaceutics;

**Table 1.** Types of research on local wisdom, sustainability, & education themes

No	Research type	Amount	References
1	Qualitative	7	Aswita et al. (2018), Chang and Kuo (2021), Kurnia et al. (2022), Nugroho et al. (2023), Puji et al. (2022), Rizal et al. (2022), & Smith et al. (2020)
2	Quantitative	2	Purnomo et al. (2023) & Sarbaini et al. (2022)
3	Mix-method	1	Kiwfo et al. (2021)



**Figure 2.** Authors who focus their studies on themes of local wisdom, sustainability, & education (Source: Authors’ own elaboration, using VOSviewer software)

neuroscience; medicine; economics, econometrics and finance; and arts and humanities. In the final stage, namely included, we review the existing articles, ensure that the articles are in accordance with the theme discussed and have a connection to “education”, and ensure that the full text can be accessed. Based on this, we only found 10 articles that met the criteria (excluding 17 articles that did not match).

## RESULTS

### Publication Trends on Themes of Local Wisdom, Sustainability, & Education Research Types

Table 1 presents data regarding trends in the types of research used by researchers in research on the theme “local wisdom, sustainability, and education”. Table 1 shows that research on the theme “local wisdom, sustainability, and education” was predominantly carried out using a qualitative approach (seven articles). There are two quantitative studies and one mixed-method study.

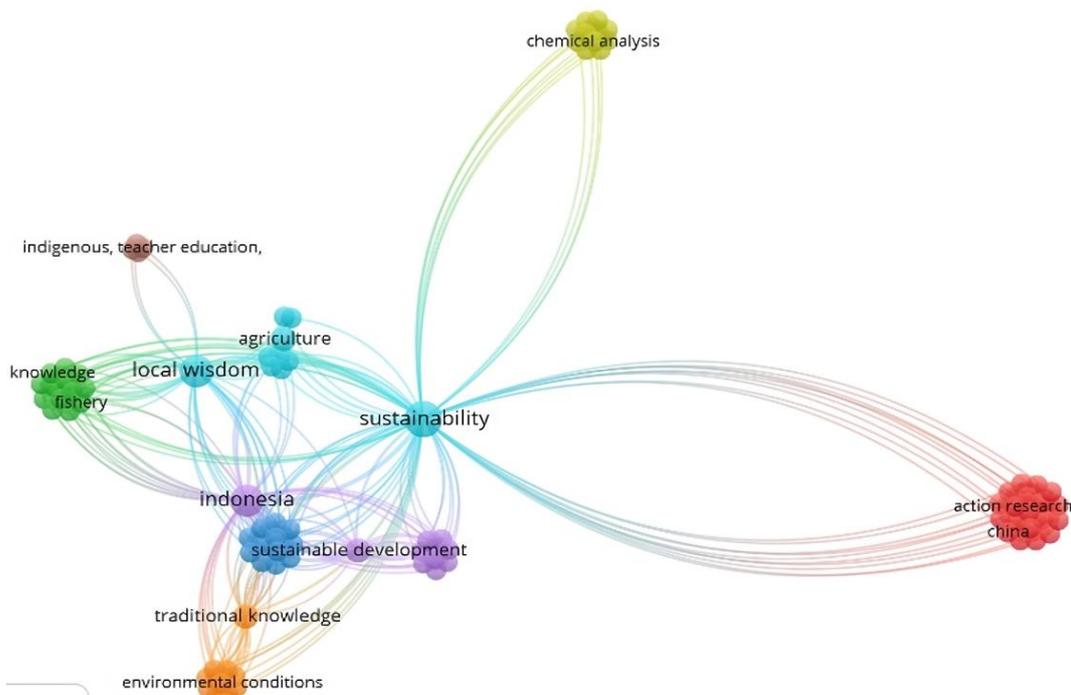
Based on Figure 2, it can be seen that there is no dominant author in the study of “local wisdom, sustainability, and education”. All authors are also not related to each other.

### Keywords

Trends and keyword relationships are visualized in Figure 3. Figure 3 shows that local wisdom theme has links with knowledge, fishery, teacher education, environmental conditions, Indonesia, and sustainable development. Sustainability is related to agriculture, chemical analysis, action research, and Indonesia. In this way, local wisdom and sustainability “meet” in Indonesia and sustainable development words.

### Research collaboration

The status of author collaboration in publishing articles is presented in Table 2. Based on this data, we can conclude that research and publications on the theme “local wisdom, sustainability and education” might not be common at collaborated internationally.



**Figure 3.** VOS-viewer display for type of analysis “co-occurrence→keywords” (Source: Authors’ own elaboration, using VOSviewer software)

**Table 2.** Status of author collaboration in publishing articles

Research collaboration	Number of collaboration	References	Number of authors	Country origin
International collaboration	0	-	0	-
Collaboration in a country	4	Chang and Kuo (2021) Kiwfo et al. (2021) Rizal et al. (2022) Sarbaini et al. (2022)	2 13 14 4	Taiwan Thailand Indonesia Indonesia
Collaboration in an institution	6	Aswita et al. (2018) Smith et al. (2020) Puji et al. (2022) Purnomo et al. (2023) Kurnia et al. (2022) Nugroho et al. (2023)	3 3 3 4 6 12	Indonesia Australia Indonesia Indonesia Indonesia Indonesia

**Table 2** shows that research collaboration is still carried out on a local scale (both institutions and countries). There is no international collaboration in research and publications on the theme “local wisdom, sustainability, and education”. Publications on theme “local wisdom, sustainability, and education” are still dominated by authors from Asia (especially Indonesia) and have not received attention of researchers/author(s) from Europe, America, and Africa.

**Contributions & Recommendations**

We reviewed all articles (10) and tried to explore and find valuable information that describes aspects of research contributions and recommendations. The results of the review are presented in **Table 3**. **Table 3** provides information regarding the important contributions and recommendations of each article. This information is very important as a basis for other researchers who are interested in this theme. The **Table 3** provides two important pieces of information:

1. Contributions and recommendations for research on “local wisdom, sustainability and education” related to sustainable agriculture, sustainable watershed management, implementation of the environmental education curriculum, and development of teacher professionalism.
2. contributions and recommendations related to “local wisdom, sustainability and education” are oriented to all aspects of education (both formal and informal education). However, the main target is formal education.

**DISCUSSION**

**Publication Trends**

*Research types*

This SLR data shows that research on local wisdom, sustainability and education tends to use the qualitative type.

**Table 3.** Contributions & recommendations for each article to science education

No	Reference	Recommendation	Contribution	Target
1	Aswita et al. (2018)	This research provides an overview of environmental preservation on local wisdom (customary regulations regarding habits, obligations, & taboos that serve as community guidelines & can be taught to younger generation) to support realization of sustainable tourism.	Ecological, social, & religious intelligence formed by local wisdom can be further researched in preserving environment to build sustainable tourism.	Society in general (formal, informal, & non-formal education)
2	Smith et al. (2020)	This research produced three layers of regenerative practice, which are presented as integral to a holistic approach (including local wisdom) that can be aligned with & supported by teacher professional standards.	There is a need to implement regenerative education by teacher institutions that can provide updates to global sustainability agenda.	Teachers & teacher institutions (formal education)
3	Chang and Kuo (2021)	This research produces a framework that educators can apply & use as a reference when they face challenges & opportunities of rural sustainability.	Universities must provide rules & regulations to support social responsibility-based teaching in supporting efforts to enrich rural sustainability.	Teachers & teacher education institutions (formal education)
4	Kiwfo et al. (2021)	This research produces a natural reagent test tool using guava leaves (a form of local wisdom) to determine iron in water, which can be applied co-curricularly.	Teachers & lecturers need to use this kit in laboratory mode or ask students to use it independently at home, so that it is truly tested.	Teachers, lecturers, & students (formal education)
5	Kurnia et al. (2022)	Results of this research can be used to assess level of local wisdom of community regarding coastal tourism management practices.	Educational programs about coastal resources are needed.	Relevant ministries & local communities (non-formal education)
6	Rizal et al. (2022)	This research provides information that land conservation carried out by local farmers plays a role in supporting realization of concept of sustainable agriculture.	Scientific understanding of stakeholders in context of local wisdom needs to be strengthened so that they can consider sustainable land use.	Society in general (formal, informal, & non-formal education)
7	Sarbaini et al. (2022)	Results of this research contribute to theoretical debate about integration between customary law & law & can help policy makers in formulating sustainable agricultural development policies.	There is a need to establish & implement policies regarding sustainable agricultural land management.	Relevant ministries, universities, & local communities (formal & non-formal education)
8	Puji et al. (2022)	This research stimulates & improves knowledge, skills, & attitudes towards sustainable environmental policies & practices based on local wisdom in elementary school curriculum.	There is a need to implement an environmental education curriculum starting from elementary school level.	Local government & schools (formal education)
9	Nugroho et al. (2023)	This research provides an overview of local wisdom-based socio-technical steps related to sustainable river watershed management.	Spatial analysis will further strengthen argument regarding existence of local wisdom & impact of its integration into sustainable watershed management	Researcher in higher education (formal education)
10	Purnomo et al. (2023)	This research explores role of biotechnology learning in independent curriculum (which also includes local wisdom) to achieve SDGs.	In implementing independent curriculum, pre-service teachers are asked to develop projects in the field of biotechnology & apply problem solving skills.	Pre-service teacher (formal education)

There is a strong reason, because the existing topics tend to involve dimensions that are difficult to measure quantitatively. Local wisdom concepts are often complex and of course depend on the particular local cultural context. Research on sustainability and education and the integration of the two involve different perceptions, values and meanings for individuals, which are appropriate if approached through qualitative methods (Budiaman et al., 2023; Ii et al., 2023; Jundiani, 2018; Wibowo et al., 2021). A qualitative method provides the

possibility of exploring new theories and in-depth understanding of how culture and social context influence sustainability and education practices, which have an important position in developing policies that are appropriate to local culture and sustainable education (Aspers & Corte, 2019; Collins & Stockton, 2018; Hesse-Biber, 2010; Korstjens & Moser, 2017).

That said, what needs to be noted is that although qualitative research has many advantages in gaining in-depth understanding of topics such as local wisdom,

sustainability, and education, it is also important to use quantitative methods (Sanggrangbano & Firmansyah, 2020; Supriyatno, 2018; Taufik et al., 2022), or even combining a qualitative with a quantitative method (mix- method) (Anshari & Juanda, 2020; Pornpimon et al., 2014; Subali et al., 2015). The mixed-method, in particular, could be useful in obtaining stronger and more comprehensive evidence. The combination of these two types of approaches can provide deeper insights and stronger data to support the establishment and implementation of sustainable policies and actions.

### Author

As referred to elsewhere, there was no dominant author in research on local wisdom, sustainability and education or the integration of the three. This is very natural, considering that this field is highly interdisciplinary, involving a variety of different themes, approaches and local contexts (Iwinska et al., 2018; Williams et al., 2020; Zidny et al., 2020; Zinsstag et al., 2011). Research in the fields of local wisdom, sustainability and education continues to develop progressively over time, followed by the emergence of new views and contributions from various researchers (Indah & Rohmah, 2022; Muhammad et al., 2022; Priamantono, 2020). However, in the future we hope that the diversity of views combined in one research and collaboration between researchers with various expertise will be one of the main strengths to install and promote a deeper understanding of these topics.

### Keywords

The local wisdom theme has links with knowledge, fishery, teacher education, environmental conditions, Indonesia and sustainable development. Meanwhile, sustainability is related to agriculture, chemical analysis, action research and Indonesia. Local wisdom and sustainability meet in Indonesia and sustainable development words.

Local wisdom is related to knowledge because it represents knowledge, values and practices that have been passed down from generation to generation in a particular society or community. Knowledge in the form of local wisdom includes an understanding of nature, culture, and ways of living in harmony with the environment and traditional values. However, local wisdom is a form of local knowledge that contains experience, wisdom, and ways of adapting to unique environmental conditions over a long period of time (Arifiani et al., 2019; Dahliani, 2015; Rohman et al., 2022). Therefore, local wisdom not only reflects knowledge gained from direct experience, but also describes how local communities implement it in real terms to protect the environment, maintain culture, and live their daily lives sustainably (Antweiler, 1998; Firdaus et al., 2023; Mazzocchi, 2006).

The connection between local wisdom and fishery is reflected in the community's knowledge about fish resources, including migration patterns, fishing seasons and traditional fishing technology (Bidayani et al., 2023; Kadir et al., 2021; Maulidyna et al., 2021). Local wisdom also includes ethical and sustainable values, helping communities deal with environmental changes, as well as developing customary rules to maintain ecosystem balance. Apart from that, local wisdom can empower communities in managing fisheries resources, promote cultural preservation, and encourage joint management to support the sustainability of fish resources and the holistic welfare of local communities (Sobaya et al., 2023; Touwe, 2020).

Local wisdom also has a close connection with teacher education because in the context of education, local wisdom can be a valuable resource for developing curriculum, learning methods, and students', prospective teachers' and teachers' understanding of the environment and culture of the place, where they dedicate themselves as educators. Teachers who understand local wisdom tend to have the advantage of being able to communicate better with their students, being able to integrate local values and knowledge into their learning practices, and effectively connecting learning with students' social and environmental realities (Abidinsyah et al., 2019; Hasanah, 2018; Pamenang, 2021; Parmin et al., 2016). Thus, incorporating local wisdom in teacher education, especially science teachers, has great potential to strengthen relevance, sustainability and recognition of cultural and environmental values in the learning process, which in turn can have a positive impact on sustainable education and preservation of local culture (Ilhami et al., 2019; Ramdiah et al., 2020; Suryanti et al., 2020).

Local wisdom clearly has a strong connection to environmental conditions because it often reflects the traditional knowledge and practices of communities in adapting to their local environment. Local wisdom, for example, can include knowledge about sustainable ways of managing natural resources, understanding the dynamics of local ecosystems, and strategies for overcoming specific environmental challenges (Abas et al., 2022; Aminpour et al., 2021; Head, 2022). Therefore, local wisdom can be a source of inspiration for efforts to preserve nature and mitigate climate change, as well as help local communities to act and interact more wisely and sustainably with the environment around them.

Meanwhile, in another highlight, sustainability is closely related to agriculture. This is of course natural considering that agriculture is a key sector that directly influences important aspects of sustainability, such as the use of land, water, natural resources and the environment. Sustainable agriculture seeks to maintain a balance between meeting current needs and ensuring (not compromising) the ability of future generations to

meet their own needs (Czyżewski et al., 2021; Pretty, 2008). The practices involved here are, for example, good soil management, maintaining biodiversity, wise use of pesticides and fertilizers, and reducing agricultural waste. Sustainability in agriculture also contributes to food security, reduces negative impacts on the environment, and supports the economy of agrarian communities (Gamage et al., 2023; John & Babu, 2021; Muhie, 2022). Therefore, sustainable agriculture is one of the main elements in achieving global goals related to sustainability.

Simulations also show that sustainability is closely related to chemical analysis. Chemical analysis can provide information that is very important for measuring and understanding the impact of chemical use on the environment and human health (Kosnik et al., 2022; Schuijt et al., 2021; Vandenberg et al., 2023). In the context of sustainability, chemical analysis is used to monitor and measure levels of water, air and soil pollution, as well as identify dangerous compounds in products received by consumers. This is important to ensure that industrial, agricultural and human consumption practices are in line with sustainability principles, including reducing hazardous waste, using safer chemicals, and where necessary transforming to natural chemicals. By using chemical analysis, we can develop better strategies and policies to maintain and improve environmental sustainability and human health (Damalas & Eleftherohorinos, 2011; Ebi et al., 2017).

Sustainability and local wisdom have a special relationship in the context of education in Indonesia because Indonesia has a diversity of cultures, traditions and environments. This diversity is spread throughout the archipelago. In education in Indonesia, it is important to acknowledge, understand and respect local wisdom that exists in various regions, tribes and communities. This includes an understanding of traditional ways of sustainability that have been practiced by local communities for centuries or generations (Arifiani et al., 2019; Astri, 2011; Nurhidayah et al., 2022; Ruslan & Irham, 2022; Sudarmin, 2014).

It is believed that integrating local wisdom in education can help students and educators understand how to utilize local knowledge to overcome environmental and social challenges that continue to emerge simultaneously. This integration can support sustainable education programs by providing a strong foundation for students to develop an understanding of sustainability, safeguard their cultural heritage, and implement practices that support sustainability in their daily lives. Thus, Indonesia, with its rich and abundant local wisdom, is very worthy of being a relevant and important place to carry out education that is oriented towards local wisdom and sustainability so that it is able to face the challenges of sustainability (Jumriani et al., 2021; Lubis et al., 2022).

### **Research collaboration**

The theme of local wisdom has a very important value in maintaining and preserving local culture and traditions in various communities throughout the world. However, there are at least four reasons why this theme may not be an issue that world researchers collaborate on as much as other themes. First, the research priorities are different for each scientist. Research in the social sciences and humanities is often influenced by different priorities in each country or region. The government as a stakeholder and funding and scientists themselves may focus more on economic, political or scientific issues, rather than local wisdom. This could lead to a lack of attention to this theme in the global research sphere (Grove, 2018; Hyland-Wood et al., 2021; Oey-Gardiner, 2010).

Second, lack of resources. Research on local wisdom often requires in-depth studies that involve active participation in local communities, direct observation, and interactions with members of those communities. This requires considerable resources, time and funds. Therefore, resource factors tend to be a strengthening reason why global collaboration does not occur (Haldane et al., 2019; Morrison-Smith & Ruiz, 2020; Rashid et al., 2019).

Third, globalization and modernization. Globalization and modernization tend to require societies around the world to adopt more global cultures, values and practices. This can lead to the marginalization of local wisdom in this process, considering it as a theme that is not profitable now and, in the future, so that it becomes less of a research focus (Mulyono, 2017; Naredi & Rahmawati, 2022).

Fourth, complexity and diversity. Each local culture and society has its own unique wisdom, which means it is very complex and diverse. This makes research in this area challenging, as there is no one-size-fits-all approach (Curtis et al., 2019; Made et al., 2021; Tran, 2017). Therefore, researchers may pragmatically prefer to focus on topics that are more limited, easier to measure, and have the potential for quicker publication.

The theme of "local wisdom" is mostly researched by Asian researchers because this region has a very diverse culture and tradition. Countries in Asia often support research and preservation of local wisdom as part of efforts to promote national and regional culture, face social and economic challenges, and maintain cultural identity. Factors such as a large population, regional collaboration, and global attention to Asia also play a role in driving this research. Nevertheless, this theme has global relevance and attracts the interest of researchers from all over the world in an effort to preserve cultural diversity and understand the adaptation of local communities to changing times (cf. Antons, 2013; Buenavista et al., 2018; Menon, 2022; Savage, 2012; Tetelepta et al., 2023). In this regard, it is

important to note that in Europe and America many researchers and activists are still active in studying, preserving and promoting local wisdom in various parts of the world (e.g., Chacón-Duque et al., 2018; Tom et al., 2019; Zavaleta-Cortijo et al., 2023). They play an important role in maintaining cultural diversity and traditions and understanding how to adapt in the modern context, so that the hope for local wisdom studies in the future is still wide open.

### Contributions & Recommendations

There is a complex relationship and mutual influence between sustainable agriculture, local wisdom and education. Sustainable agriculture relates to the principles of wise use of natural resources, environmental conservation, and sustainable living, while local wisdom relates to knowledge and practices that operate traditionally and have been proven to have sustainable value (Castilo, 2016; Khamung & Program, 2015; Prayoga et al., 2020; Sukayat et al., 2023). Education is believed to have an important role in preserving and transmitting local wisdom, while also educating the community to be in harmony with traditional values. Educational institutions are a forum for producing young people who master and appreciate local knowledge. Education also plays a role in educating farmers to implement the principles of sustainable agriculture (Huambachano et al., 2022; Pamenang, 2021)

The relationship between sustainable river watershed management, local wisdom and education is very close. In the field, there is a lot of local wisdom about how to manage river watersheds wisely. By integrating local wisdom in river watershed management, we can utilize local wisdom that has been proven for centuries (Anau et al., 2019; Bakti et al., 2017; Syafri et al., 2020). Education plays an important role in disseminating this knowledge to society, especially the younger generation, so that they can respect, understand and follow sustainable practices in watershed management. Through education, we can create awareness of the importance of preserving river watersheds and develop innovative solutions that combine local wisdom and the latest science in sustainable management of river watersheds (Ahmed et al., 2020; Khiri et al., 2023).

There is an era of connection between local wisdom and curriculum implementation in environmental education. This means that local wisdom can be an important content that needs to be considered in environmental education (Asrial et al., 2021; Effendi, 2019). Local wisdom is a valuable resource that is expected to enrich students' understanding of their relationship with nature, teach conservation values, and explore traditional practices in preserving the environment (Badeni & Saparahuningsih, 2022; Budiawan et al., 2021; Esmail et al., 2023; Hilman & Sunaedi, 2018; Jahja, 2016; Sunari & Nurhayati, 2023; Widianingsih et al., 2023). Efforts to introduce students

to local wisdom adopted by society, for example in protecting ecosystems, sustainable agriculture and natural resource management, can be done through environmental education. This effort can help students develop an understanding of environmental problematic challenges (Chu & Karr, 2017; Gale & Hill, 2016; Primayanti & Puspita, 2022). Apart from that, the integration of local wisdom in the curriculum also encourages awareness to appreciate cultural diversity and the global environment and allows students to integrate traditional values with modern scientific concepts to create more effective sustainable solutions (da Silva et al., 2023; Uge et al., 2019).

In the context of developing science teacher professionalism, local wisdom can be a valuable resource to help science teachers integrate sustainable approaches in teaching and learning activities. Science teachers who understand local wisdom can teach students about sustainability principles that exist in local culture. Science teachers can help students relate scientific theories to local wisdom while helping them understand the importance of conserving nature (Adah Miller et al., 2023; Fiel'ardh et al., 2023; Jaelani & Hasbi, 2022; Lasekan & Godoy, 2020). In addition, the professional development of science teachers who emphasize a sustainable approach to learning can contribute to increasing students' understanding of environmental issues, helping to create a generation that is aware and concerned about environmental sustainability (Aulucci, 2023; W Leal Filho et al., 2018).

The integration of local wisdom, sustainability and education is realized in various educational contexts, including formal, non-formal and informal education. In formal education, institutions such as schools and universities can design curricula that include subjects about sustainability and integrate local wisdom concepts into existing subject matter (Druker-Ibáñez & Cáceres-Jensen, 2022; Gamage et al., 2021; Triastari et al., 2021). Extracurricular programs that focus on sustainability and local culture can also provide students with practical experience in applying local wisdom in a sustainability context (El-Batri et al., 2019; Hendrickson, 2018; Rushton & Batchelder, 2020). On the other hand, non-formal education, such as training and workshops, can be a powerful platform for disseminating sustainable knowledge and practices based on local wisdom, especially in rural communities, where traditional knowledge is often at the core of agricultural and environmental sustainability (Adams et al., 2020; Pavlova & Singh, 2022). Meanwhile, in informal education, individuals can access information about local wisdom and sustainable practices through literature, social media, and community interactions, all of which can increase awareness and understanding of the importance of preserving cultural and natural heritage (Giliberto & Labadi, 2022; Hasan et al., 2022; Menkshi et al., 2021; Mladenović, 2023).

By utilizing these three educational contexts effectively, we can build a society that is more knowledgeable about the value of sustainability and local wisdom. This will encourage the adoption of sustainable practices in everyday life, which in turn will help protect the environment and preserve local culture for future generations.

## CONCLUSIONS

This SLR provides interesting results regarding research or publications on the theme “local wisdom, sustainability, and education”. First, the dominant research was conducted using a qualitative approach or method. Second, there is no dominant author, and all authors are not related to each other. Local wisdom and sustainability “meet” in the word Indonesia, showing Indonesia’s position and urgency in this study. Third, this theme is still not an interesting issue asking for international cooperation. Collaboration or research collaboration is still carried out on a local scale (both institutions and countries). Fourth, there are two important pieces of information:

1. Contributions and recommendations related to sustainable agriculture, sustainable watershed management, implementation of the environmental education curriculum, and development of teacher professionalism.
2. Contributions and recommendations are aimed at all aspects of education (both formal, non-formal and informal education). However, the main target is formal education.

These findings can be a consideration or baseline for researchers to study the theme “local wisdom, sustainability, and education” according to their respective backgrounds and objectives.

**Author contributions:** All authors have sufficiently contributed to the study and agreed with the results and conclusions.

**Funding:** This study was supported by the Universitas Negeri Yogyakarta-Indonesia through the Dissertation Research Scheme (Decree Number: T/6.3.15/UN 34.9/PT.01.03/2023).

**Ethical statement:** The authors state that the article does not require an ethics committee approval as it is a subject of comparison between theories and review of literature. Searching for data on Scopus is done using an official subscription account, namely the Universitas Muhammadiyah Malang-Indonesia.

**Declaration of interest:** No conflict of interest is declared by the authors.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

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