IJSES 2(2) (2025)

International Journal of Science Education and Science

https://journals.balaipublikasi.id

Research Trends in Scaffolding Inquiry Models Integrated with Local Wisdom on Student Scientific Creativity: Bibliometric Analysis 2020-2025

Ferniawan[1*], Agus Ramdani[1,2], Joni Rokhmat[1,3], A Wahab Jufri[1,2], AA Sukarso[1,2]

[1] Doctoral Study Program in Science Education, University of Mataram, Mataram, Indonesia.
[2] Biology Education Study Program, University of Mataram, Mataram, Indonesia.
[3] Physics Education Study Program, University of Mataram, Mataram, Indonesia.

Received: May 19, 2025
Revised: August 14, 2025
Accepted: September 25, 2025
Published: September 30, 2025

Corresponding Author:
Ferniawan
ferniawan213@gmail.com

DOI: 10.56566/ijses.v2i2.381

Abstract: Higher education has an important role in developing students' scientific creativity to face the challenges of the 21st century. One approach that has received attention in improving scientific creativity is the scaffolding inquiry model integrated with local wisdom. However, research related to the trend and direction of the development of the scaffolding inquiry model integrated with local wisdom on student scientific creativity is still limited. This study aims to provide a bibliometric review of the research trends of the scaffolding inquiry model integrated with local wisdom on student scientific creativity during the period 2020-2025. Data was obtained through Google Scholar using analysis tools such as Publish or Perish and Dimensions.ai, resulting in 1,000 documents selected based on PRISMA guidelines. Analysis was conducted using bibliometric methods and content analysis, supported by VOSviewer software to visualize keyword trends and research patterns. Research trends showed variations in the number of annual publications, with a significant spike in 2021 and a decline in subsequent years. Bibliometric analysis shows the dominance of publications in the form of books and monographs, highlighting the need for further exploration in this topic. Although the publication trend shows a decline in recent years, the scaffolding inquiry model integrated with local wisdom remains important to enhance students' scientific creativity. The integration of local wisdom in learning can create a more contextualized and innovative learning experience, support the development of scientific creativity skills, and fit the needs of 21st century education. Further research in the future is expected to explore more deeply the potential of technology and local wisdom in enric hing this learning model.

Keywords: Scaffolding Inquiry Model; Local Wisdom; Scientific Creativity; Bibliometric Analysis.

Introduction

Higher education plays an important role in fostering students' scientific creativity, which is essential to meet the challenges of globalization (Bi *et al.*, 2020; Higuera-Martinez *et al.*, 2023; Sun, Wang, & Wegerif, 2020). Innovations in learning approaches are critical to students' scientific creativity, which includes the ability to think originally, generate new ideas, and design scientific solutions (Ilinskaya, 2021; Reche & Perfectti, 2020; Sternberg *et al.*, 2020) . Several learning strategies have been proven effective in fostering scientific creativity (Kırıcı & Bakırcı, 2021; Sun *et al.*, 2020).

Scientific creativity reflects students' ability to think original, generate new ideas, and design scientific solutions to real problems based on scientific reasoning

How to Cite:
Ferniawan, F., Ramdani, A., Rokhmat, J., Jufri, A. W., & Sukarso, A. (2025). Research Trends in Scaffolding Inquiry Models Integrated with Local Wisdom on Student Scientific Creativity: Bibliometric Analysis 2020-2025. *International Journal of Science Education and Science*, 2(2), 112–121. https://doi.org/10.56566/ijses.v2i2.381

and methods (Morgan *et al.* ;, 2023 *Xu et al.*, 2022). Therefore, innovations in learning approaches are urgent to foster this ability optimally (Chang *et al.*, 2023; Wang et al., 2023).

One learning approach that has received attention in the development of scientific creativity is the inquiry model with *scaffolding* (Lin et al., 2023; Mamun, 2022). This model emphasizes the active involvement of students in the learning process through observation, problem formulation, hypothesis formulation, experimentation, and conclusion drawing with gradual support from lecturers or facilitators (Li *et al.*, 2024; Wen *et al.*, 2023). The inquiry approach equipped with *scaffolding* has been proven effective in improving students' higher order thinking skills, including critical and creative thinking (Mamun, 2022; Nasri *et al.*, 2023; Wang *et al.*, 2024).

Along with the development of contextual and culture-based learning paradigms, the integration of *local wisdom* in science learning is increasingly being applied (Mudjid, *et al.*, 2022; Ting, 2023) . Local wisdom not only enriches the learning context, but also instills social, cultural, and ecological values relevant to students' lives (Blezer *et al.*, 2023; Lim *et al.*, 2024) . Combining the scaffolding inquiry model with local wisdom makes learning more meaningful, contextual, and effective in fostering students' scientific creativity and socio-cultural values. This approach is highly recommended for creating relevant and transformative learning experiences (Chu *et al.*, 2023; Lin *et al.*, 2023; Schmitt *et al.*, 2023; Wang *et al.*, .2023).

Although this approach has been widely applied in various learning contexts, in-depth studies of the trends and directions of research on the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity are still limited (Karamustafaoğlu & Pektaş, 2023; Yang *et al.*, 2023). Not many studies have systematically traced how this topic has developed over time, both in terms of publication quantity, author collaboration patterns, and thematic focus of research (Chu *et al.*, 2023; Karamustafaoğlu & Pektaş, 2023; Li et al., 2024; Nasri et al., 2023) . Therefore, a bibliometric analysis is needed to map the development, direction, and contribution of research related to these topics in the last five years.Based on this urgency, this study

aims to examine the trend of scientific publications on the *scaffolding inquiry model integrated with local wisdom on student scientific creativity* during the period 2020-2025 using a bibliometric approach. The results of this study are expected to make a scientific contribution to the development of innovative culture-based learning models, as well as a reference in designing learning policies and practices in higher education that are more relevant and transformative.

Method

This research is a descriptive-analytical research that aims to understand and describe research trends related to the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity. The method used is *bibliometric analysis* and *content analysis of* scientific publications during the period 2020 to 2025.
Data sources were obtained from documents indexed in *Google Scholar* with the help of *Publish or Perish* and *Dimensions.ai* software. Document searches were conducted using a combination of keywords such as: "*Scaffolding inquiry model*, *local wisdom*, *scientific creativity*". The data collection process followed the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) protocol, including the stages of identification, screening, and evaluation of document quality.

An initial 1000 documents were collected, and then selected based on topic relevance, number of citations, and suitability to the research objectives. The selection was done to avoid duplication, irrelevant documents, and publications that did not meet academic standards.
Bibliometric analysis was conducted to identify publication trends, distribution of publication types, most prolific authors, most used journals or proceedings, and most frequently occurring keywords. This analysis was assisted by *VOSviewer* software to visualize the interrelationships between keywords and patterns of connection between research themes (Hallinger & Chatpinyakoop, 2019).

In addition, *content analysis* was conducted to describe the research focus, the dominant methodological approach, and the research contribution to the development of students' scientific creativity in the context of integrated local wisdom. The results of the analysis are expected to provide a comprehensive picture of the direction, trends, and potential for further development of the *scaffolding* inquiry model integrated with local wisdom in higher education**.**

Result and Discussion

This study aims to describe the research trends of the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity at for the period 2020-2025. Publication data was obtained through *Google Scholar* and *Dimensions.ai*, then analyzed bibliometrically and visualized using VOSviewer software. Figure 1 below shows the research trend of *scaffolding* inquiry model integrated with local wisdom in an effort to improve student scientific creativity in the period 2020-2025.

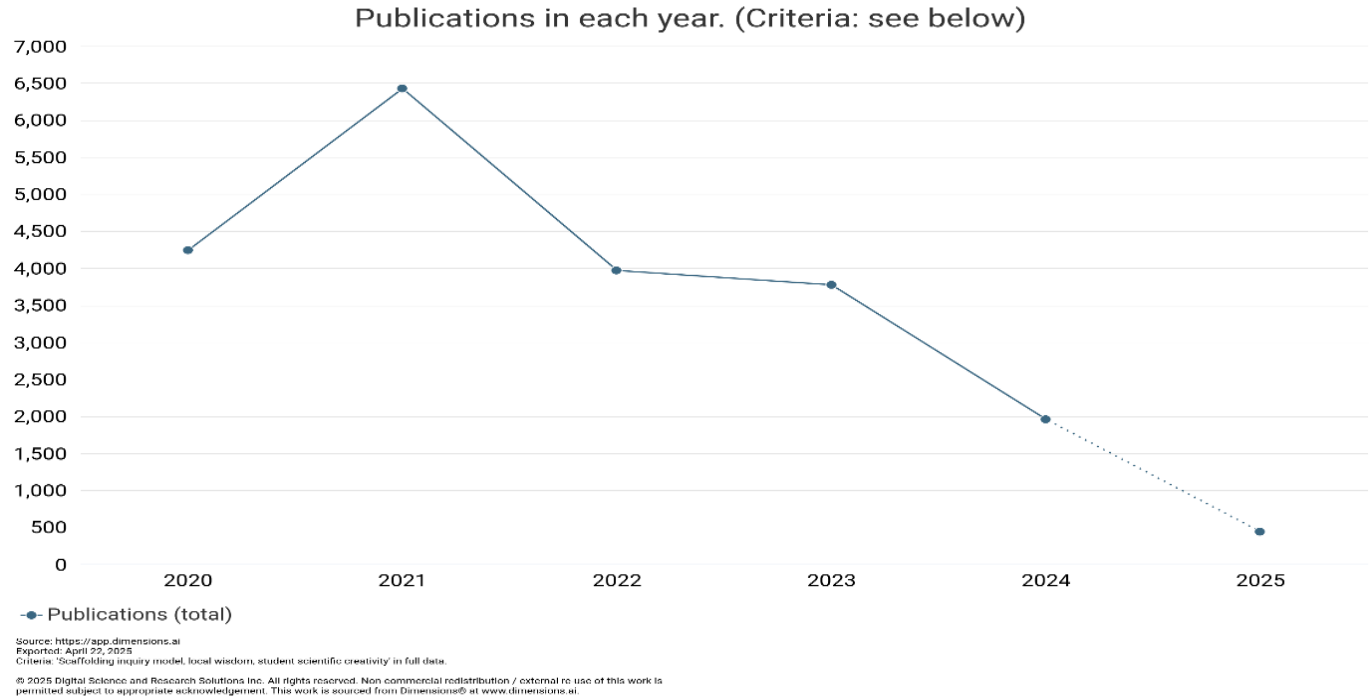

Figure 1. Research trends in the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity in the period 2020-2025.

Figure 1, represents the pattern of appearance of scientific publications that discuss the research trends of the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity during the period 2020 to 2025. Based on data from the Dimensions.ai platform, there is a significant variation in the number of publications each year In 2020, publications amounted to around 4,300 documents. The following year, 2021, showed a substantial increase with more than 6,500 publications. This phenomenon reflects the surge in researchers' interest in developing pedagogical approaches that are based on local contexts and oriented towards strengthening scientific thinking capacity at the higher education level.

Entering 2022, a downward trend began to appear, with the number of publications dropping to around 4,000. The figure declines slightly again in 2023 to around 3,800, and continues to decline until it reaches around 2,000 documents in 2024. The predictive data for 2025 indicated by the dotted line shows the potential for further decline, with the estimated publications falling below 1,000.

Several things can trigger the decline in publication trends, including a shift in research focus to other contemporary themes, constraints in funding or facilitation of field research in implementing learning models that integrate local wisdom systematically in inquiry-based learning

Despite a decline in the number of publications in recent years, this learning approach still has a relevant and strategic position in the context of higher education. The integration of local wisdom into the *scaffolding* inquiry model not only strengthens students' cultural sensitivity, but also forms higher-order thinking skills that are in line with 21st century learning needs. Table 1 below displays research on the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity, based on the type of publication.

Table 1. Research on *Scaffolding* Inquiry Model Integrated with Local Wisdom Based on Publication Type

Publication Type	Publications
Chapter	23.622
Edited Book	12.110
Monograph	8.569
Article	1.948
Proceedings	155
Preprint	75

Table 1, shows the distribution of the number of publications based on the type of source that discusses the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity. *Chapter* publication type occupies the top position with 23,622 documents, followed by *Edited Book* with 12,110 documents, *Monograph* with 8,569 documents, and *Article* with 1,948 documents. The last two categories, *Proceedings* and *Preprints*, show lower numbers, 155 and 75 documents respectively.

The highest number of publications in the *Chapter* category shows that researchers tend to convey their ideas through collective writing in one volume. This

format allows for a broad exploration of the theme from various perspectives, especially in discussing the integration of local culture with scientific learning approaches.

The *Edited Book* type comes in second place, showing the importance of the contribution of many authors in compiling various studies into a single scientific work. This kind of compilation provides a comprehensive picture of the direction of local values-based learning strategy development.

The large number of *Monographs* indicates an interest in in-depth, focused study of a particular topic. Usually written by a single author or a small team, this format allows for a more detailed and reflective examination of one particular learning approach.

Article category, shows a lower number. This indicates that topics with *scaffolding* inquiry models and local wisdom are still widely discussed through long narrative forms before being formulated briefly in journal articles. Meanwhile, the presence of *Proceedings* and *Preprints*, although limited, shows that this topic is starting to enter the realm of scientific forums and early publication channels.

This data illustrates that learning with the *scaffolding* inquiry model integrated with local wisdom has received wide attention from the academic community. The dominance of book-based publications reflects the need for wider and deeper space in explaining ideas and research results. This pattern also shows that strengthening students' scientific creativity through the integration of local wisdom is an important part of developing relevant and meaningful education. Table 2 below displays ten (10) main sources that are trending in research on the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity.

Table 2. Ten (10) Trends in Main Sources of Research on *Scaffolding* Inquiry Model Integrated with Local Wisdom on Student Scientific Creativity (2020-2025)

Name	Publications	Citations	Citations Mean
Behavioral and Brain Sciences	366	4.000	10.93
Lecture Notes in Computer Science	341	1759	5.16
Encyclopedia of the UN Sustainable Development Goals	212	261	1.23
American Anthropologist	145	284	1.96
Perspectives on Politics	144	145	1.01
NWU Self-Directed Learning Series	118	208	1.76
Communications in Computer and Information Science	115	421	3.66
Journal of the Royal Anthropological Institute	109	332	3.05
Advances in Social Science, Education and Humanities Research	88	87	0.99
Lecture Notes in Networks and Systems	80	205	2.56

Table 2, shows the ten main publication sources that discuss the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity. *Behavioral and Brain Sciences* with 366 publications and 4,000 citations, an average of 10.93 citations per article, reviews how *scaffolding* in learning can improve students' cognitive abilities and creativity by using local knowledge. *Lecture Notes in Computer Science* with 341 publications and 1,759 citations, averaging 5.16 citations per article, highlights the application of technology to support local wisdom-based learning through interactive online platforms. *Encyclopedia of the UN Sustainable Development Goals* with 212 publications and 261 citations, averaging 1.23 citations per article, showing the integration of local wisdom in learning to support the achievement of SDGs, facilitating social and environmental issues. *American Anthropologist* with 145 publications and 284 citations, averaging 1.96 citations per article, discusses the application of traditional knowledge in deep inquiry-based learning about culture and social values. *Perspectives on Politics* with 144 publications and 145 citations, an average of 1.01 citations per article, highlights how political policies can influence education and learning based on local contexts. *NWU Self-Directed Learning Series* with 118 publications and 208 citations, an average of 1.76 citations per article, focuses on self-directed learning by integrating local wisdom to student creativity. *Communications in Computer and Information Science* with 115 publications and 421 citations, averaging 3.66 citations per article, explores the use of technology to connect local knowledge with global science. *Journal of the Royal Anthropological Institute* with 109 publications and 332 citations, averaging 3.05 citations per article, discusses integrating traditional knowledge in curriculum development and scientific learning. *Advances in Social Science, Education and Humanities Research* with 88 publications and 87 citations, averaging

0.99 citations per article, discusses local wisdom-based educational practices that enhance students' scientific creativity. *Lecture Notes in Networks and Systems* with 80 publications and 205 citations, an average of 2.56 citations per article, reviews how network technology can introduce the concept of local wisdom in network-based learning, increasing student creativity through the exploration of local ideas.

The *scaffolding* inquiry model integrated with local wisdom on students' scientific creativity has received significant attention in scientific publications. The dominance of *Behavioral and Brain Sciences* and *Lecture Notes in Computer Science* highlights the importance of *scaffolding* and technology in supporting local wisdom-based learning. Although the number of publications is not always dominant, highly cited sources such as *Communications in Computer and Information Science* show a significant impact on the development of students' scientific creativity. This trend shows a growing interest in research that combines local knowledge with global issues, which is increasingly relevant in today's higher education context. Table 3 below displays ten (10) trends in article titles with the highest number of total citations and average citations per year in research on *scaffolding* inquiry models integrated with local wisdom on student scientific creativity.

Table 3. Ten (10) Trends in Highest Cited Article Titles (2020-2025)

Title	Authors	Years	Cite	Pear year
Models of teaching	Joyce, B., & Calhoun, E.	2024	19906	199906.00
Components of Education 4.0 in 21st century skills	LI González-Pérez, MS Ramírez-Montoya	2022	781	260.33
Reinventing project-based learning: Your field guide to real-world projects in the digital age	S Boss, J Krauss	2022	712	237.33
Learning partnerships: Theory and models of practice to educate for self-authorship	MBB Magolda, PM King	2023	527	263.50
The development of learning innovation to enhance student learning	P Kwangmuang, S Jarutkamolpong, et al.	2021	426	106.50
High-impact ePortfolio practice: A catalyst for student, faculty, and institutional learning	B Eynon, LM Gambino	2023	286	143.00
Effect of problem based learning on critical thinking skills	S Amin, S Utaya, S Bachri, et al.	2020	268	53.60
Inquiry in education, Volume I: The conceptual foundations for research as a curricular imperative	MW Aulls, BM Shore	2023	249	124.50
Creative pedagogies: A systematic review	T Cremin, K Chappell	2021	213	23.53
Inquiry-based practice in social studies education	SG Grant, K Swan, J Lee	2022	201	67.00

Table 3, shows that the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity. The analysis displayed in the table shows ten articles with the highest number of citations and average citations per year that have a significant influence in the development of this learning model. Among all the references analyzed, Joyce and Calhoun's (2024) work entitled *Models of Teaching* ranked the highest with a total of 199906.00 citations and an average of 19906.00 per year. This confirms the position of the work as the main theoretical foundation in the innovation of learning models that emphasize exploratory and constructivist approaches. In addition, González-Pérez & Ramírez-Montoya's (2022) article on *Components of Education 4.0 in 21st Century Skills* is highly relevant with 781.00 citations and an average of 260.33 per year, as it discusses 21st century skills and educational technologies that are important contexts in the integration of local values into modern learning. Boss & Krauss (2022) in *Reinventing Project-Based Learning* reinforce the idea of the importance of project-based learning, with 712.00 citations and an average of 237.33 per year, which is highly compatible with contextual, collaborative and local wisdom-based approaches.

Magolda & King's (2023) article *Learning Partnerships: Theory and Models of Practice to Educate for Self-Authorship* received 527.00 citations with an average of 263.50 per year, emphasizing the importance of *self-authorship* and student autonomy in partnership-based learning which is an important foundation for scaffolding. Kwangmuang, Jarutkamolpong, and colleagues' (2021) work on *The Development of Learning Innovation to Enhance Student Learning* received 426.00 citations and an average of 106.50 per year, suggesting that innovative learning strategies are globally relevant in building higher order thinking skills. Eynon & Gambino (2023), through the idea of portfolios as a reflective tool in *learning outcomes*, contributed 286.00 citations and an average of 143.00 per year, showing the urgency of documenting process-based learning in a *scaffolding* approach. Amin and colleagues (2020), with 268.00 citations and an average of 53.60 per year, provide

strong support for the effectiveness of creative approaches in improving learning outcomes, in line with the goal of developing students' scientific creativity. Aulls & Shore (2023), which promotes inquiry as a curriculum approach, recorded 249,00 citations and an average of 124.50 per year, while Cremin & Chappell (2021) with 213,00 citations and an average of 23.53 per year showed the importance of creative pedagogy as a link between local wisdom and scientific creativity. Grant, Swan and Lee's (2022) article closes the list with 201,00 citations and an average of 67.00 per year, underscoring the role of social context in Indigenous-integrated STEM learning.

Overall, the above suggests that the combined approach of modern pedagogical innovations and indigenous values is not only theoretically relevant, but also supported by evidence. The large number of citations in the main references shows that topics such as inquiry, scaffolding, scientific creativity, and learning that integrates local wisdom are important and relevant issues at the global level. Therefore, the results of this analysis provide a strong basis for designing learning models that not only meet the needs of the times, but also consider the local context, which enriches students' learning experience scientifically. Table 4 below presents ten (10) keyword trends with the highest frequency and relevance in research on inquiry models scaffolding integrated with local wisdom to enhance students' scientific creativity.

Table 4. Ten (10) Keyword Trends with Highest Frequency and Relevance.

Terms	Occurrences	Relevance
Knowledge	22	0.21
Development	41	0.18
Creativity	79	0.08
Scaffolding	79	0.07
Inquiry	148	0.05
Model	165	0.03
Student	216	0.02
Problem	49	0.12
Approach	31	0.13
Learning	58	0.15

Table 4 shows the ten most frequently used keywords in research on the *Scaffolding* Inquiry Model Integrated with Local Wisdom on Student Scientific creativity, with the highest relevance. Knowledge has a frequency of 22 and a relevance of 0.21, indicating that knowledge, especially locally based, is very important in enhancing students' scientific creativity. Development appeared with a frequency of 41 and a relevance of 0.18, illustrating the importance of the development process in local wisdom-based learning, especially in building critical thinking and problem-solving skills. Creativity appeared 79 times with a relevance of 0.08, showing that creativity is very important in improving students' scientific quality. *Scaffolding* also appeared 79 times with a relevance of 0.07, which shows the importance of applying learning scaffolding to support the learning process gradually. Inquiry with a frequency of 148 times and a relevance of 0.05 illustrates the inquiry-based approach as the main element in local wisdom-based learning. Model appears 165 times with a relevance of 0.03, emphasizing the application of the *scaffolding* inquiry model integrated with local wisdom as an effective approach. Student appears 216 times with a relevance of 0.02, indicating that students are the main focus in this study, with the aim of improving their creativity and scientific skills. Problem with a frequency of 49 times and relevance of 0.12 shows the importance of problem solving in the context of local wisdom-based learning. Approach appeared 31 times with a relevance of 0.13, emphasizing the use of a *scaffolding* inquiry-based approach in learning. *Learning* appears 58 times with a relevance of 0.15, indicating that the learning process itself is a key aspect in improving students' scientific creativity.

Based on the results obtained, the keywords *Knowledge*, *Development*, and *Creativity* indicate that this research focuses on developing students' scientific creativity through a local wisdom-based learning approach. *In addition, the keyword Scaffolding Inquiry highlights the important role of learning methods that support students in building knowledge gradually and developing* scientific creativity skills. Overall, the *scaffolding* inquiry model integrated with local wisdom in learning is proven to enrich the learning experience and increase students' scientific creativity. Figure 2 below is the result of bibliometric mapping for the keyword network "*Scaffolding inquiry* model, *local wisdom, student scientific creativity*", related to the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity.

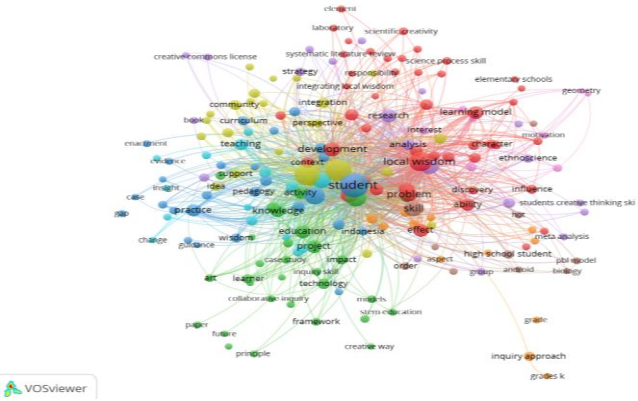

Figure 2. Network Visualization of Research Trends (2020-2025)

Figure 2, shows the results of the Network visualization of keywords in the study *scaffolding* inquiry model integrated with local wisdom on student

scientific creativity. This visualization illustrates the relationship between various concepts that frequently appear in research, providing insight into the trends and main focus of studies in this field. The network consists of several clusters grouped based on the relationship between keywords, with different colors to facilitate understanding. The following is a discussion of each cluster:

1) **Red cluster** keywords in this cluster include *ability*, *addie model*, *application*, *approach*, *challenge*, *character*, *character education*, *concept*, *creative thinking*, *critical thinking ability*, *critical thinking skill*, *development*, *discovery*, *effect*, *effectiveness*, *element*, *elementary school*, *elementary schools*, *inquiry model*, and *learning model*. This cluster focuses on developing students' critical thinking skills and creativity through the application of an inquiry-based learning model. The use of ADDIE model and educational character-based approach shows how theory and practice can be integrated to improve learning effectiveness, especially in the context of elementary education.

2) **Blue cluster** keywords in this cluster are *activity*, *case study*, *child*, *classroom*, *collaborative inquiry*, *creative way*, *education*, *framework*, *future*, *impact*, *inquiry process*, *inquiry skill*, *knowledge*, *learner*, *models*, *paper*, *pedagogical model*, *principle*, and *project*. This cluster highlights the importance of learning activities, case studies, and collaborative approaches to enhance students' inquiry skills. Through the application of pedagogical models and frameworks applied in the classroom context, project-based learning is expected to develop students' critical thinking skills and problem solving abilities more effectively.

3) The **green** cluster includes keywords such as *case*, *characteristic*, *collaboration*, *communication*, *creativity*, *critical thinking*, *enactment*, *engagement*, *evidence*, *gap*, *guidance*, *higher education*, *innovation*, *need*, *pedagogy*, *role*, *science learning*, *school*, *scaffold*, *students ability*, *task*, *tool*, and *wisdom*. This cluster focuses on collaboration, creativity and communication in the development of *scaffolding-based* learning. The use of tools and tasks in science learning and the application of guidelines in teaching illustrate how innovations in higher education can improve students' skills in science.

4) **Yellow Cluster** In this cluster, the keywords involved are *community*, *course*, *creative problem*, *digital technology*, *environment*, *IBL (Inquiry-Based Learning)*, *idea*, *implementation*, *information*, *innovation*, *need*, *pedagogy*, *practice*, *role*, *scaffold*, *school*, *science learning*, *student*, *student ability*, *task*, *tool*, and *wisdom*. This cluster emphasizes the application of digital technology in problem-based learning, especially in the context of inquiry-based learning oriented towards creative problem solving. The use of digital technology supports the creation of a more interactive and innovative learning environment, enabling more effective and thorough learning.

5) **Purple cluster** keywords in this cluster include *analysis*, *article*, *bibliometric analysis*, *book*, *chapter*, *creative commons license*, *inquiry*, *integration*, *investigation*, *knowledge building*, *model*, *opportunity*, *outcome*, *participant*, *perspective*, *reflection*, *responsibility*, *stage*, *support*, and *wise*. This cluster focuses on bibliometric-based research methodologies and article analysis to evaluate and understand the implementation of inquiry-based learning models. Reflection and implementation show the importance of using data-driven analysis to assess the effectiveness of this learning model.

6) **Orange cluster** keywords in this cluster include *authentic inquiry*, *change*, *example*, *experience*, *exploration*, *insight*, *instruction*, *level*, *research*, *strategy*, *student worksheet*, *thinking*, *meta analysis*, *students creative thinking*, and *primary school*. This cluster emphasizes change in learning practices by applying authentic experiences in the inquiry process. The focus on exploration and student learning experiences at the primary school level emphasizes the development of creative thinking skills that can improve the quality of their understanding of scientific concepts.

7) **The brown color** cluster contains keywords such as *aspect*, *grade*, *grades k*, *inquiry approach*, *perception*, *scaffolding strategy*, *scientific inquiry*, *students problem*, *teaching material*, *stem*, and *validity*. This cluster shows the importance of the *scaffolding* approach in science teaching, which pays special attention to the development of students' inquiry skills and the validity of the STEM learning approach. The application of *scaffolding* strategies is expected to strengthen students' understanding of more complex scientific concepts.

8) The **pink cluster** relevant keywords in this cluster are *android*, *biology*, *constructivism*, *high school student*, *improvement*, *pbl model*, *skill*, *student creativity*, and *systematic review*. This cluster focuses on developing students' skills at the high school level through constructivism approach and project-based learning (PBL) model. The use of Android and other digital devices in biology learning provides support for project-based approaches that can enhance students' scientific creativity and critical thinking skills.

9) The **dark green** cluster involves keywords such as *effort*, *form*, *geometry*, *interest*, *mathematics*, *teacher*, *traditional game*, and *understanding*. This cluster focuses

on the application of traditional game-based approaches in math and geometry learning, which aims to increase students' interest and understanding of geometry and math concepts in a more fun and contextualized way.

This research trend shows that the development of critical thinking skills, scientific creativity, and problem-solving abilities is very relevant in facing the challenges of 21st century education. By integrating technology and local wisdom, this learning approach can create a more innovative, interactive, and contextual learning experience, which prepares students to face global dynamics in the world of science. Figure 3 below is the result of visualizing the overlay of research trends on the *scaffolding* inquiry learning model integrated with local wisdom on student scientific creativity.

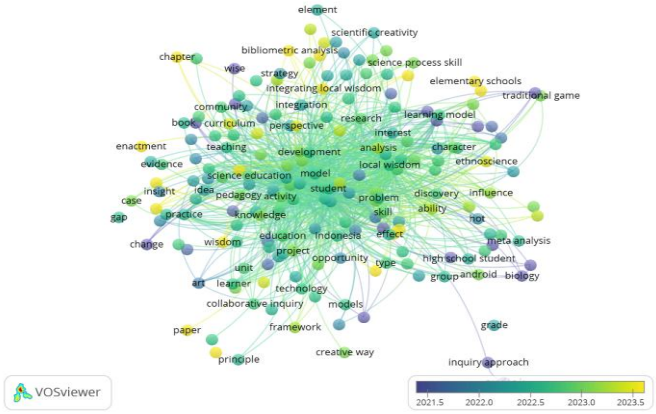

Figure 3. Overley visualization of research trends (2020-2025**).**

Figure 3 shows an overlay visualization that illustrates the temporal trend of research related to the *scaffolding* inquiry learning model integrated with local wisdom on student scientific creativity. This visualization uses a color scale to indicate the year of appearance of keywords in the research, with dark blue representing older research (2021-2022) and yellow indicating more recent research (2023-2025). Keywords such as "*element*", "*model*", "*student*", and "*research*" are in a central position in the network, reflecting the close connection with other relevant topics such as *local wisdom*, *pedagogy activity*, and *knowledge*. The turquoise color of some of these keywords indicates that the research focus on these topics has grown over the past few years. Keywords such as *technology*, *learning model*, and *ethnoscience* appear in light color, indicating that the attention to research in these areas has increased in recent years. The emphasis on *technology* indicates a shift towards using digital tools to enhance learning that is relevant to students' local contexts. Research is also increasingly focused on measuring the impact of learning models, with keywords such as *effect*, *opportunity*, and *meta-analysis* appearing in yellow. This indicates efforts to evaluate the effectiveness of the *local wisdom-integrated* inquiry model on students' scientific creativity. Increased attention to the development of students' *critical thinking* and *problem-solving skills* is indicated by the appearance of keywords such as *development*, *problem*, and *critical thinking* in bright colors, reflecting the importance of strengthening students' critical thinking skills through local-based approaches and scientific methods.

The trend of this research shows that the *scaffolding* inquiry model integrated with local wisdom continues to grow, with a focus on technology integration, development of *critical thinking skills*, and *scientific creativity of* students. This reflects the need for a learning model that is relevant to the challenges of the 21st century and contextualized with the integration of local wisdom. Going forward, research will continue to explore the potential of technology and local wisdom in enhancing students' scientific creativity, opening up great opportunities for the development of more effective learning models at various levels of education. Figure 4 below is the result of visualizing the density of research trends on the *scaffolding* inquiry model integrated with local wisdom on student scientific creativity

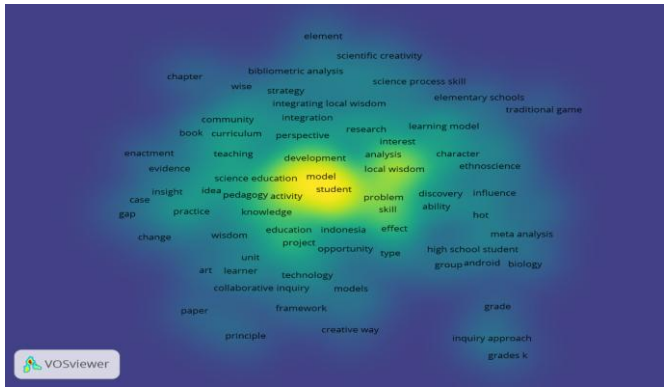

Figure 4. Visualization of research trend density (2020-2025).

Figure 4 visualizes the density of research themes related to the *scaffolding* inquiry learning model integrated with local wisdom on students' scientific creativity. Theme density is indicated by color, where bright yellow indicates keywords with high frequency in the literature, while dark blue indicates low frequency. Keywords such as "*model*", "*student*", "*research*", and "*development*" appear in bright yellow, indicating that these themes appear most frequently in the research. The high density of these keywords indicates that the main focus of the research is on developing learning models that engage students and pay attention to local wisdom towards their scientific creativity. Keywords such as "*technology*", "*problem-solving*", and "*learning model*" have medium density (bluish green), indicating that this trend is growing. The emphasis on "*technology*" indicates the integration of digital tools that support local wisdom-based learning and inquiry models. This trend reflects

the development of technology-based approaches relevant to students' local contexts and the importance of scientific creativity in 21st century education. Keywords such as "*meta-analysis*", "*physics*", and "*effectiveness*" are colored dark blue, indicating that these topics are relatively rarely discussed, providing opportunities for further research development. This research can be focused on evaluating the effectiveness of the *scaffolding* inquiry model integrated with local wisdom on increasing students' scientific creativity.

This density visualization provides an overview of the development of research focusing on the *scaffolding* inquiry model integrated with local wisdom. This trend suggests that future research will increasingly explore the potential of technology and local wisdom in enhancing students' scientific creativity at various levels of education.

Conclusion

The conclusion of this study shows that the scaffolding inquiry model integrated with local wisdom plays an important role in increasing students' scientific creativity. Based on bibliometric analysis and data visualization, it was found that there is a variation in the number of annual publications, with a significant spike in 2021 and a decline in subsequent years. Despite the decline in the number of publications, the topic remains relevant and important at the global level, with a focus on developing critical thinking, creativity, and problem-solving skills that fit the needs of 21st century education. The research also revealed that the integration of local wisdom in learning models can create a more contextualized and innovative learning experience. The dominance of publications through books and monographs indicates the need for more in-depth exploration in this topic, while the most frequent keyword trends emphasize the importance of knowledge, development, and creativity in learning with the integration of local wisdom. Further research is expected to emphasize the use of technology to support learning that is more effective and relevant to students' local context.

Acknowledgements
With deep gratitude, I praise and thank God Almighty for His gifts and blessings, which have enabled me to complete this article. My deepest gratitude goes to my beloved mother, whose prayers, love, and support have been the greatest source of strength and motivation for me. I would also like to thank my supervisor, Co-Supervisor 1, Co-Supervisor 2, and the lecturer of the Scientific Publication 2 course for their guidance, advice, and invaluable support. Thank you also to everyone who has helped, both directly and indirectly. May all your kindness be rewarded, and may this article be of benefit to the readers and serve as a small step toward my contribution to the world of knowledge.

Author Contributions
All authors contributed to writing this article.

Funding
No external funding.

Conflicts of Interest
No conflict interest.

References

Bi, H., Mi, S., Lu, S., & Hu, X. (2020). Meta-analysis of interventions and their effectiveness in students' scientific creativity. *Thinking Skills and Creativity*. https://doi.org/10.1016/j.tsc.2020.100750

Blezer, S., Abujidi, N., & Sap, H. (2023). Urban living labs as innovation infrastructure for local urban intervention acceleration and student social learning: the impacts on community wellbeing in Heerlen. *Frontiers in Public Health*. https://doi.org/10.3389/fpubh.2023.1242151

Chang, C. Y., Du, Z., Kuo, H. C., & Chang, C. C. (2023). Investigating the Impact of Design Thinking-Based STEAM PBL on Students' Creativity and Computational Thinking. *IEEE Transactions on Education*. https://doi.org/10.1109/TE.2023.3297221.

Chu, C., Dewey, J. L., & Zheng, W. (2023). An Inorganic Chemistry Laboratory Technique Course using Scaffolded, Inquiry-Based Laboratories and Project-Based Learning. *Journal of Chemical Education*. https://doi.org/10.1021/acs.jchemed.3c00547

Hallinger, P., & Chatpinyakoop, C. (2019). A bibliometric review of research on higher education for sustainable development, 1998-2018. *Sustainability (Switzerland)*. https://doi.org/10.3390/su11082401

Higuera-Martinez, O. I., Fernandez-Samaca, L., & Alvarado-Fajardo, A. C. (2023). PBL Intervention for Fostering Creativity in First-Year Engineering Students. *IEEE Transactions on Education*. https://doi.org/10.1109/TE.2023.3292997

Ilinskaya, N. I. (2021). Creativity Development As The Main Function Of Higher Education Institution. *Arts Education and Science*. https://doi.org/10.36871/hon.202101001

Karamustafaoğlu, O., & Pektaş, H. M. (2023). Developing students' creative problem solving skills with inquiry-based STEM activity in an out-of-school learning environment. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022-11496-5

Kırıcı, M. G., & Bakırcı, H. (2021). The effect of STEM supported research-inquiry-based learning approach on the scientific creativity of 7th grade students. *Journal of Pedagogical Research*.

https://doi.org/10.33902/JPR.2021067921.

Li, Z., Oon, P. T. E., & Chai, S. (2024). Examining the impact of teacher scaffolding in the knowledge building environment: Insights from students' interaction patterns, social epistemic networks, and academic performance. *Education and Information Technologies*. https://doi.org/10.1007/s10639-024-12535-z

Lim, L., Bannert, M., van der Graaf, J., Fan, Y., Rakovic, M., Singh, S., … Gašević, D. (2024). How do students learn with real-time personalized scaffolds? *British Journal of Educational Technology*. https://doi.org/10.1111/bjet.13414

Lim, L., Bannert, M., van der Graaf, J., Singh, S., Fan, Y., Surendrannair, S., … Gašević, D. (2023). Effects of real-time analytics-based personalized scaffolds on students' self-regulated learning. *Computers in Human Behavior*. https://doi.org/10.1016/j.chb.2022.107547

Lin, X. F., Hwang, G. J., Wang, J., Zhou, Y., Li, W., Liu, J., & Liang, Z. M. (2023). Effects of a contextualised reflective mechanism-based augmented reality learning model on students' scientific inquiry learning performances, behavioural patterns, and higher order thinking. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2022.2057546

Mamun, M. A. Al. (2022). Fostering self-regulation and engaged exploration during the learner-content interaction process: the role of scaffolding in the online inquiry-based learning environment. *Interactive Technology and Smart Education*. https://doi.org/10.1108/ITSE-11-2021-0195

Morgan, R. M., Kneebone, R. L., Pyenson, N. D., Sholts, S. B., Houstoun, W., Butler, B., & Chesters, K. (2023). Regaining creativity in science: insights from conversation. *Royal Society Open Science*. https://doi.org/10.1098/rsos.230134

Mudjid, R. M., Supahar, Putranta, H., & Hetmina, D. S. (2022). Development of Android Physics Learning Tools Based on Local Wisdom Traditional Game Bola Boy as a Learning Source. *International Journal of Interactive Mobile Technologies*. https://doi.org/10.3991/ijim.v16i06.27855

Nasri, N. M., Nasri, N., Nasri, N. F., & Talib, M. A. A. (2023). The Impact of Integrating an Intelligent Personal Assistant (IPA) on Secondary School Physics Students' Scientific Inquiry Skills. *IEEE Transactions on Learning Technologies*. https://doi.org/10.1109/TLT.2023.3241058

Reche, I., & Perfectti, F. (2020). Promoting Individual and Collective Creativity in Science Students. *Trends in Ecology and Evolution*. https://doi.org/10.1016/j.tree.2020.06.002

Schmitt, L., Weber, A., Venitz, L., & Leuchter, M. (2023). Preschool teachers' pedagogical content knowledge predicts willingness to scaffold early science learning. *British Journal of Educational Psychology*. https://doi.org/10.1111/bjep.12618

Sternberg, R. J., Todhunter, R. J. E., Litvak, A., & Sternberg, K. (2020). The relation of scientific creativity and evaluation of scientific impact to scientific reasoning and general intelligence. *Journal of Intelligence*. https://doi.org/10.3390/jintelligence8020017

Sun, M., Wang, M., & Wegerif, R. (2020). Effects of divergent thinking training on students' scientific creativity: The impact of individual creative potential and domain knowledge. *Thinking Skills and Creativity*. https://doi.org/10.1016/j.tsc.2020.100682

Ting, D. H. (2023). Understanding knowledge transfer and knowledge management through social learning. *Journal of Knowledge Management*. https://doi.org/10.1108/JKM-04-2022-0246

Wang, C. Y., Gao, B. L., & Chen, S. J. (2024). The effects of metacognitive scaffolding of project-based learning environments on students' metacognitive ability and computational thinking. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-12022-x

Wang, K., Zhu, C., Li, S., & Sang, G. (2023). Using revised community of inquiry framework to scaffold MOOC-based flipped learning. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2022.2071948

Wang, S., Sun, Z., & Chen, Y. (2023). Effects of higher education institutes' artificial intelligence capability on students' self-efficacy, creativity and learning performance. *Education and Information Technologies*. https://doi.org/10.1007/s10639-022-11338-4

Wen, Y., Wu, L., He, S., Ng, N. H. E., Teo, B. C., Looi, C. K., & Cai, Y. (2023). Integrating augmented reality into inquiry-based learning approach in primary science classrooms. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-023-10235-y

Xu, F., Wu, L., & Evans, J. (2022). Flat teams drive scientific innovation. *Proceedings of the National Academy of Sciences of the United States of America*. https://doi.org/10.1073/pnas.2200927119

Yang, F. J., Su, C. Y., Xu, W. W., & Hu, Y. (2023). Effects of developing prompt scaffolding to support collaborative scientific argumentation in simulation-based physics learning. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2022.2041673