Literature Review: Trends in the Development of Natural and Social Science Learner Worksheets in Primary Schools between 2019-2025

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Abstract: This study aims to analyze trends in the development of student worksheets in natural and social science learning at the primary school level during the 2019–2025 period. The method used is a literature review with a PRISMA approach applied to 25 selected articles out of 998 obtained through Publish or Perish. The PRISMA approach was implemented to transparently and systematically screen and select relevant articles through a flow diagram consisting of four stages: identification, screening, eligibility assessment, and inclusion. The results show that the most dominant learning model used in the development of natural and social science student worksheets is inquiry, followed by discovery learning, STEM, CTL, and the scientific approach. The developed worksheets have been proven effective in improving learning outcomes, conceptual understanding, critical thinking skills, and scientific literacy, as well as students' motivation and learning independence. The implications of this study are significant for educators and material developers in designing innovative student worksheets that align with students' needs, are consistent with the Merdeka Curriculum, and are relevant to the demands of 21st-century learning.

Abstrak: Penelitian ini bertujuan untuk menganalisis tren pengembangan lembar kerja peserta didik dalam pembelajaran Ilmu Pengetahuan Alam dan Sosial di sekolah dasar pada periode 2019–2025. Metode yang digunakan adalah *literature review* dengan pendekatan PRISMA terhadap 25 artikel terpilih dari 998 artikel yang diperoleh melalui *Publish or Perish*. Pendekatan PRISMA diterapkan untuk menyaring dan memilih artikel yang relevan secara transparan dan terstruktur melalui diagram alur yang terdiri atas beberapa tahapan, yaitu *identification*, *screening*, *eligibility*, dan *inclusion*. Hasil kajian menunjukkan bahwa model pembelajaran yang paling dominan digunakan dalam pengembangan lembar kerja peserta didik Ilmu Pengetahuan Alam dan Sosial adalah *inkuiri*, diikuti oleh *discovery learning*, STEM, CTL, dan pendekatan saintifik. Lembar Kerja Peserta Didik yang dikembangkan terbukti efektif dalam meningkatkan hasil belajar, pemahaman konsep, keterampilan berpikir kritis, literasi sains, serta motivasi dan kemandirian belajar peserta didik. Implikasi kajian ini penting bagi pendidik dan pengembang bahan ajar dalam merancang lembar kerja peserta didik yang inovatif, selaras dengan kebutuhan peserta didik, sejalan dengan Kurikulum Merdeka, serta relevan dengan tuntutan pembelajaran abad ke-21.

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A. Introduction

Basic education is a crucial stage in shaping the character and intellectual abilities of students, as well as laying the foundation for mastering the fundamental concepts required for the next level of education. In the context of the Merdeka Curriculum, the integration of Natural Sciences and Social Sciences in elementary schools aims to provide a comprehensive and contextual understanding of natural and social phenomena (Kemendikbud RI, 2022). This integration is based on the age of elementary school students, who tend to see everything in a holistic and integrated manner. In addition, students are still in the stage of concrete, holistic, and comprehensive thinking, but not yet in the stage of detailed thinking; therefore, the integration of sciences is expected to prompt students to manage the natural and social environment as a whole (Sari, Fitria et al., 2024).

The primary issue in science education in elementary schools is the low level of critical thinking and student engagement, which is often attributed to the use of inadequate teaching materials. Student worksheets are a crucial teaching tool in science education in elementary schools, as they enable students to engage in hands-on activities relevant to the material being studied, thereby increasing their involvement in the learning process (Susanti et al., 2024). In supporting this learning transformation, student worksheets serve as a strategic medium that not only presents information but also encourages active student engagement through interactive and meaningful learning activities, thereby improving students' conceptual understanding and critical thinking skills (Anggriani et al., 2024).

Student worksheets contain instructions, steps, and practice questions designed to guide students in discovering concepts independently or in groups, thereby developing critical and creative thinking skills (Pramudiyanti et al., 2024). The use of student worksheets increases student activity and motivation in learning because they are directly involved in the learning process, both individually and in groups. Student worksheets also serve as an evaluation tool that measures the extent of students' understanding of the material learned, as well as provides opportunities for students to reflect on the learning outcomes achieved (Resi et al., 2023). Therefore, there is a need to develop student worksheets for learning.

The development of student worksheets for science subjects in elementary schools is essential to enhance the quality of learning, making it more active and meaningful. Student worksheets, designed to be interesting and tailored to the needs of students, can facilitate a more interactive and contextual learning process, allowing students to not only receive information passively but also be actively involved in learning activities. Research by Trirahayu et al (2024) highlights the importance of developing student worksheets that encourage active engagement in the learning process. In addition, Dermawan & Malik (2024) show that student worksheets designed with a contextual approach can improve students' understanding of learning materials. The development of interactive and contextual student worksheets is a crucial requirement in efforts to enhance the quality of science learning in elementary schools.

The development of high-quality science worksheets for students needs to be carried out systematically and based on research in order to produce products that are valid and

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practical for use in classroom learning. The development of student worksheets cannot be done carelessly, as the quality of these worksheets significantly determines the success of the learning process. Quality student worksheets must meet several criteria, namely that they align with the applicable curriculum, including clear learning outcomes and objectives, so that the material presented is relevant and focused on the needs of students. Additionally, student worksheets should be oriented towards student activities, allowing students to learn actively and be directly involved in the learning process. The use of language appropriate to the developmental level of students is also crucial, ensuring that the material is easily understood and does not cause confusion. Additionally, the preparation of student worksheets is based on a scientific approach or a specific learning model (Pratama & Simamora, 2024; Rohalina et al., 2025).

From 2019 to 2025, research on the development of student worksheets in science learning in elementary schools demonstrated significant improvement in both quantity and quality. These studies not only emphasize the feasibility and readability of student worksheets but also their effectiveness in improving various 21st-century skills such as critical thinking, creativity, collaboration, and communication (Wulandari et al., 2022). This finding aligns with research conducted by Sari & Winanto (2024), which demonstrates that the developed student worksheets are feasible, effective, and practical for enhancing critical thinking skills and improving learning outcomes in the subject of changes in the form of substances. Additionally, the development of student worksheets utilizes learning approaches and models tailored to the needs of students. Research by Lestari et al (2025) shows that STEM-based student worksheets can significantly improve the critical thinking skills of fourth-grade elementary school students in science learning. Furthermore, research by Elfitriyah & Haeruddin (2025) states that the development of PBL-based student worksheets has been proven to improve science learning outcomes and the collaboration skills of fifth-grade students with high validity and practicality. Syakuroh et al (2022) show that the development of guided inquiry-based student worksheets is effective in science learning in elementary schools.

Based on relevant studies, it is clear that the development of student worksheets that integrate innovative learning approaches and models is highly effective in supporting science learning in elementary schools. Therefore, this literature review aims to answer several key questions related to the development of science student worksheets in elementary schools, namely (1) how to analyze trends in the development of science worksheets 2019-2025, (2) critical appraisal, (3) literature review results, and (4) matrix of literature data analysis. These questions will be answered through a more in-depth analysis of various relevant previous studies. The benefits of this literature review are to provide theoretical and practical contributions to educators and teaching material developers, enabling them to develop innovative, contextual, and relevant student worksheets tailored to the needs of today's students.

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B. Method

This research method uses the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach. The PRISMA approach is used to screen and select relevant articles in a transparent and structured manner, utilizing a diagram or flowchart that explains the process of study inclusion and exclusion. The combination of these two approaches can provide a comprehensive description of scientific developments, research gaps, and future research directions, based on valid and verified data. Data sources were obtained through article searches using the Publish or Perish (PoP) software.

The PRISMA flow consists of the main steps of identification, screening, eligibility, and inclusion, which are used to guide the article selection process systematically and transparently. In the identification stage, researchers search for articles from various databases and relevant literature sources. Next, the screening stage involves filtering articles based on their titles and abstracts to eliminate those that do not meet the criteria. The eligibility stage involves assessing the suitability of articles by reading the full text to ensure they are relevant to the research objectives. Finally, in the inclusion stage, articles that meet all the criteria are selected for further analysis in the review (Page et al., 2021). The PRISMA flow diagram is shown in Figure 1 below.

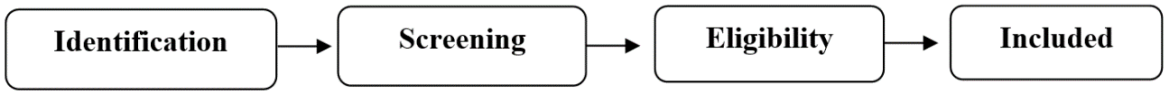

Figure 1. PRISMA Literature Review Flowchart

The following diagram illustrates the stages of article selection carried out in this study based on the PRISMA flow, as shown in Figure 2 below.

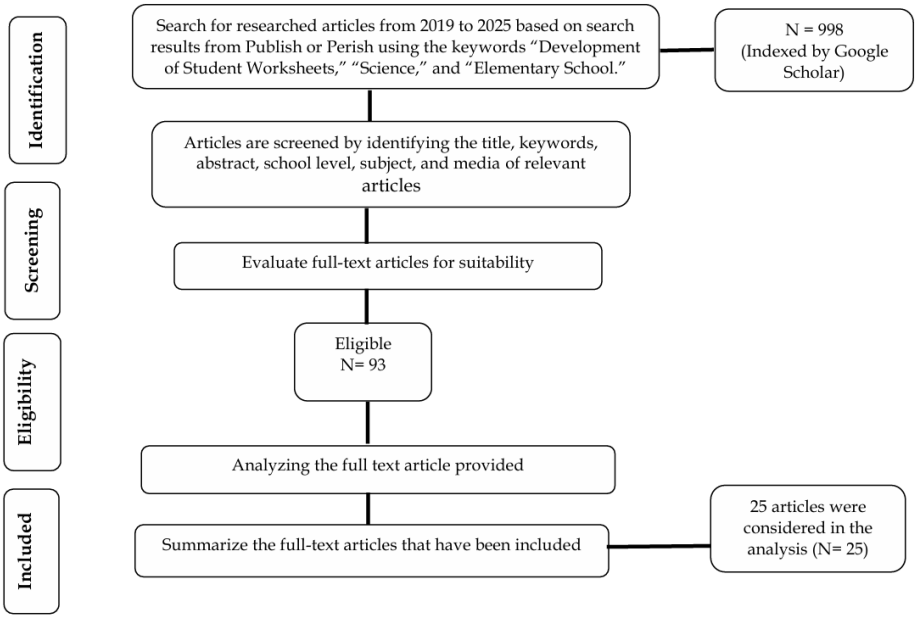

Figure 2. PRISMA Flow

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Figure 2 illustrates the PRISMA flow diagram, which describes the article selection process in systematic literature reviews. In the identification stage, 998 articles were searched using the Publish or Perish search engine with the keywords "Development of student worksheets, science, and Elementary Schools" indexed by Google Scholar for the period 2019-2025. Next, at the screening stage, articles were filtered based on the relevance of their titles, keywords, abstracts, school levels, subjects, and media used. Relevant articles were then evaluated for eligibility through a full-text assessment, resulting in 93 articles that met the criteria. From this number, further analysis of the article content was conducted, and finally, 25 articles were considered and included in the final stage for in-depth analysis.

C. Result

1. Data Analysis

The researchers began by highlighting 998 articles indexed in Google Scholar's Publish or Perish. These articles were then filtered again to obtain 93 articles discussing the development of LKPD. After identification, 25 articles were found to be suitable for review because they examined the impact of LKPD development in elementary schools. The results of the analysis of these 25 articles are presented in Figure 3 below.

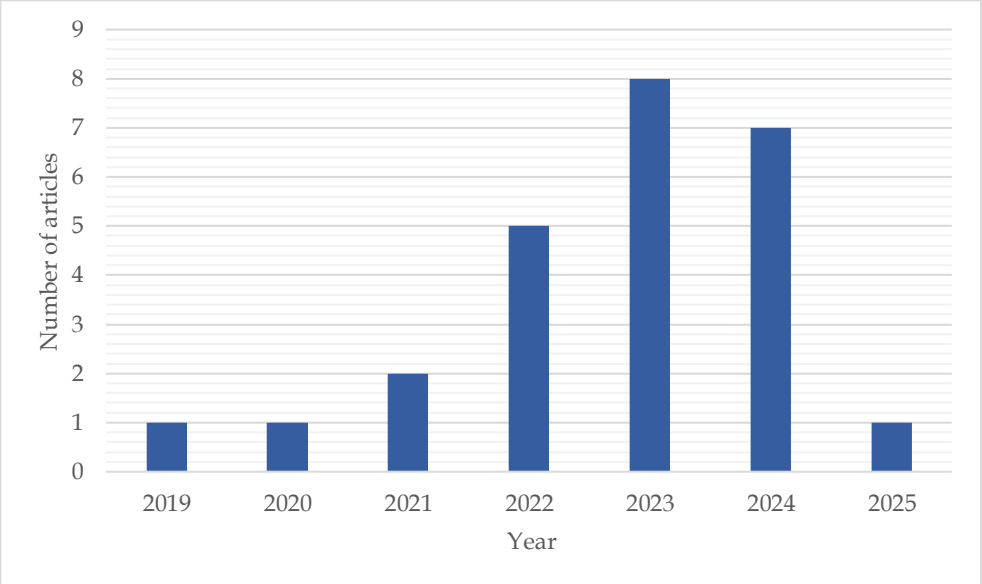

Figure 3. Result of Journal Analysis 2019-2025

2. Critical Appraisal

Each article was critically analyzed, taking into account methodological quality, research design, instrument suitability, and data validity. Selected articles are critically analyzed using a critical appraisal approach to evaluate the quality and relevance of the research. Aspects evaluated include the clarity of research objectives, the suitability of the research design to the research questions, sampling techniques, the validity and reliability of the instruments, the data analysis techniques used, and the consistency between the

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results and conclusions. This evaluation was conducted to ensure that the articles used in this study were suitable as scientific references. Articles that passed the selection process had clear objectives, appropriate research designs, and presentations of results that supported the conclusions reached.

3. Literature Review Result

Based on a review of 25 selected articles, it was found that the development of science worksheets in elementary schools during the 2019-2025 period focused intensively on the development of inquiry-based, CTL, STEAM, and science learning worksheets that integrate digital technology. Research conducted during this period consistently demonstrates that innovative and contextual learning media, such as e-LKPD, effectively enhance learning outcomes, critical thinking skills, and science literacy among elementary school students. This trend aligns with the needs of 21st-century learning and the Merdeka Curriculum, although its implementation still faces challenges, including teacher readiness and infrastructure issues. Overall, the development of Natural and Social sciences has resulted in improvements in the quality of learning that are relevant to the local context and integrate technology, based on strong empirical results from various previous studies.

4. Matrix of Literature Data Analysis

The data analysis matrix summarizes the findings of each article based on four main components: article title, author, journal, and research results. This matrix provides a structured overview of the patterns of findings that emerge in the literature review. To learn more about the effectiveness of science worksheet development, I recommend reading the analysis results from the 25 articles listed in Table 1 below:

Table 1. Results of Article Analysis

Title	Authors	Journal	Research Result
Development of science LKPD based on inquiry training on HOTS-science literacy skills	1. Dini Rozali 2. Retno Dwi 3. SuyantiRosmala Dewi	Inovasi Kurikulum	The Science LKPD based on Inquiry Training was found to be valid and practical for use as an alternative teaching material to enhance the HOTS-science literacy of grade 5 elementary school students.
Pengembangan E-LKPD Berbasis Contextual Teaching and Learning Menggunakan Aplikasi Canva di Kelas IV Sekolah Dasar	Nureva	Attractive: Innovative Education Journal	There are differences in learning outcomes when using the CTL-based LKPD, assisted by the Canva application, compared to using LKPD by taking the questions from the class IV Science book at SDN 2 Segalamider.

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Title	Authors	Journal	Research Result
Pengembangan E-LKPD Berbasis CTL pada Kurikulum Merdeka Muatan IPAS	1. Iftakhul Kalimatul Jannah 2. Oktaviani Adhi Suciptaningsih	JIIP (Jurnal Ilmiah Ilmu Pendidikan)	CTL-based digital worksheets on science learning are highly valid and practical, making them suitable for use as teaching materials in Kurikulum Merdeka.
Pengembangan E-LKPD Berbasis Inkuiri Berbantuan Articulate Storyline Tema 6 Subtema 1 Pembelajaran 1 Kelas IV SD Negeri 018092 Lobu Rappa T.A 2022/2023	1. Mariana Olandri Simbolon, 2. Lala Jelita Ananda 3. Naeklan Simbolon 4. Arifin Siregar 5. Laurensia M. Parangin-Angin	Journal of Student Development Information System (JoSDIS)	The results of the media effectiveness test, as obtained through the pretest, showed an average of 33.33 with the "Not Complete" completeness criterion, while the posttest yielded an average of 88.125 with the "Complete" completeness criterion. The product developed is highly feasible, practical, and effective for use in elementary school learning.
Pengembangan E-LKPD Berbasis Inkuiri Terbimbing Materi Transfer Energi Antar Makhluk Hidup Meningkatkan Hasil Belajar IPA	1. N.K.A.T. Ayuningtias 2. I.N. Sudiana 3. I.B. Putrayasa	PENDASI: Jurnal Pendidikan Dasar Indonesia	The evaluation results, based on classical completeness, were 98%, indicating that the implementation of guided inquiry-based E-LKPD was highly effective in improving student learning outcomes.
Pengembangan E-LKPD Berbasis SETS Untuk Meningkatkan Aktivitas Belajar Siswa Sekolah Dasar	1. Ela Suryani 2. Zulmi Roestika Rini	Scholaria: Jurnal Pendidikan dan Kebudayaan	The results showed that the SETS-based e-worksheet was valid, practical, and effective in increasing students' learning activities.
Pengembangan E-LKPD Interaktif Berorientasi Model Pembelajaran Flipped Classroom Pada Pembelajaran IPA Siswa Kelas V SD Negeri 67 Palembang	1. Suci Sellia Hilmar 2. Ali Fakhrudin 3. Patricia H. M. Lubis	Pendas: Jurnal Ilmiah Pendidikan Dasar	*E-LKPD, which is designed explicitly for flipped classrooms, is highly valid, applicable, and effective. This interactive E-LKPD, designed for the flipped classroom, can be used to support learning.*
Pengembangan Lembar Kerja Peserta Didik Berbasis Inkuiri Terbimbing Terhadap Kemampuan Berfikir Kritis Peserta Didik Kelas IV SD/MI	1. Oktariayani 2. Media Roza 3. Remiswal	Jurnal Tarbiyah al-Awlad	Guided inquiry-based LKPD is suitable for use because it has been categorized as valid, practical and effective for training critical thinking in

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Title	Authors	Journal	Research Result
			students in grade IV SD / MI.
Pengembangan Lembar Kerja Peserta Didik Berbasis Inkuiri Terbimbing Berbantuan Multimedia untuk Meningkatkan Keterampilan Proses Sains dalam Pembelajaran IPA di Kelas IV	1. Putri Nuriantisyah 2. Endang Widi Winarni 3. Irwan Koto	Jurnal KAPEDAS-Kajian Pendidikan Dasar	Guided inquiry-based LKPD assisted by multimedia is effective (moderate) to improve science process skills.
Pengembangan Lembar Kerja Siswa Berbasis Keterampilan Proses Pada Pembelajaran IPA Materi Cahaya Kelas V SD	1. Siti Kholizah Panjaitan 2. Safrida Napitupulu	PENDALAS: Jurnal Penelitian Tindakan Kelas dan Pengabdian Masyarakat	The results showed that the Student Worksheet developed was feasible to use, based on validation by media experts, with an average score of 3.51 in the "Good" category, and teacher validation, with an average score of 3.55 in the "Good" category.
Pengembangan LKPD Berbantuan Liveworksheet Untuk Menigkatkan Pemahaman Konsep IPA Siswa Kelas IV SD	1. Juniar Maulani 2. Jajang Bayu Kelana 3. Asep Kurnia Jayadinata	Jurnal Profesi Pendidikan (JPP)	LKPD, utilizing the inquiry model and Liveworksheets, can enhance the ability to understand science concepts. The improvement in students' cognitive learning outcomes yielded a gain value of 0.67, indicating that the improvement falls within the moderate category.
Pengembangan LKPD Berbasis Discovery Learning Pada Tema Panas Dan Perpindahannya Subtema Suhu Dan Kalor Kelas V Sekolah Dasar	1. Asdelina Lubis 2. Sukmawarti	Jurnal Penelitian Pendidikan MIPA	LKPD, based on discovery learning about temperature and heat, is suitable for teaching to V-grade elementary school students.
Pengembangan LKPD Berbasis Discovery Learning Berbantuan Canva Pada Kelas V Sekolah Dasar	1. Lulu Nailul Muna 2. Petra Kristi Mulyani	Prima Magistra: Jurnal Ilmiah Kependidikan	A worksheet based on discovery learning, assisted by Canva on heat and displacement, received an excellent response from the teacher, with 100%, and an excellent response from students, with 98.6%.

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Title	Authors	Journal	Research Result
Pengembangan LKPD Berbasis Lingkungan untuk Meningkatkan Pengetahuan Siklus Air dan Dampaknya Melalui Pembelajaran IPA pada Siswa Kelas V	1. Laila Sofiatun Janna 2. Endang Widi Winarni 3. Irwan Koto	Jurnal KAPEDAS-Kajian Pendidikan Dasar	The results of the gain score were moderate, with the control class at 47% and the experimental class at 59%. Thus, knowledge of the water cycle and its impacts using an environmentally based LKPD is declared effective.
Pengembangan LKPD Berbasis STEM Dalam Meningkatkan Hasil Belajar Siswa Pada Pembelajaran IPAS Di Kelas V SD Negeri 106184 Sekip	1. Anggya Putri 2. Putri Juwita	Pendas : Jurnal Ilmiah Pendidikan Dasar	A STEM-based LKPD product on the subject of science, specifically magnetism, electricity, and technology for life, is highly feasible and suitable for use in the science learning process for grade V elementary school students.
Pengembangan LKPD Berbasis STEM Materi Siklus Air pada Siswa Kelas V Sekolah Dasar	1. Karmila Nur Safitri1 2. Tri Wahyuningsih 3. Erna Suhartini 4. Yudo Dwiyono 5. Andi Asrafiani Arafah	Jurnal Pendidikan MIPA	This STEM-based LKPD on the water cycle is suitable for use as a learning aid for students.
Pengembangan LKPD IPA Berbasis Etnosains Pada Materi Bunyi Dalam Meningkatkan Literasi Sains Peserta Didik Sekolah Dasar	1. Nursina Sari 2. Rr. Dwi Pebriana Ulandari 3. Sumardi 4. Kandi 5. Muhammad Erfan	Jurnal Ilmiah Profesi Pendidikan	The development of ethnoscience-based science worksheets on sound is suitable for use in the school learning process.
Pengembangan LKPD IPA Berbasis STEM pada Tema 1 Indahnya Kebersamaan Materi Bunyi Kelas IV Sekolah Dasar	1. Nabila Nur Annisa 2. Erna Suhartini 3. Muhammad Ramli Buhari 4. Andi Asrafiani Arafah	Jurnal Pendidikan MIPA	LKPD yields highly valid results, indicating that LKPD products are well-suited for use in learning activities.
Pengembangan LKPD IPA Menggunakan Website Canva.com Materi Alat Indra Pada Manusia Terhadap Literasi Sains Peserta Didik Kelas IV SDN 95/96 Binjai	1. Umi Dara Anggraini 2. Suci Perwita Sari	Genderang Asa: Journal Of Primary Education	The LKPD demonstrates an increase in students' science literacy, as assessed by the N-Gain test, which yielded a score of 0.78, placing it in the high category.
Pengembangan LKPD IPAS Berbasis Saintifik Untuk Meningkatkan	1. Nurul Hasanah 2. Ade Evi Fatimah Lubis	Jurnal Penelitian Pendidikan MIPA (JP2MIPA)	Character-based LKPD in subjects is said to be feasible and effective for improving

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Title	Authors	Journal	Research Result
Kemampuan Berpikir Tingkat Tinggi Siswa Sekolah Dasar	3. Kiki Pratama Rajagukguk 4. Hidayat		the learning outcomes of grade IV students at SD Negeri 054914 Kota Lama Secanggang.
Pengembangan LKS Berbasis Inkuiri Terbimbing Untuk Memberdayakan Literasi Lingkungan Siswa Kelas V SDN 5 Babadan Kecamatan Ngajum	1. Diana Kusumaningrum 2. Yuli Ika Tanti	Autentik: Jurnal Pengembangan Pendidikan Dasar	The quality of guided inquiry-based worksheets to empower students 'environmental literacy can be viewed from the total feasibility aspect and is very suitable for use in learning, and these worksheets can empower students' environmental literacy.
Pengembangan LKS IPA Berbasis Scientific Pada Siswa Kelas V Sekolah Dasar	1. Elya Rosalina 2. Asep Sukenda Egok	JOEAI (Journal of Education and Instruction)	The development of science-based worksheets for class V students at SD Negeri 3 Lubuklinggau can be concluded to have achieved an overall score of 0.88 in the high category, as determined by three validators: language experts, material experts, and media experts.
The Multimedia Innovation in the 21st Century: The Development of e-LKPD Based on Scientific Inquiry in Science Class	1. Encep Andriana 2. Putri Syafiila Daffa Fauzany 3. Trian Pamungkas Alamsyah	Journal of Innovation in Educational and Cultural Research	E-LKPD science-based on scientific inquiry obtained material validation results of 95.38% in the "very feasible" category, language validation results of 93.63% in the "very feasible" category, and media validation results of 81.64% in the "very worthy" reasonable category.
Pengembangan Lembar Kerja Siswa (LKS) Bermuatan Karakter Untuk Meningkatkan Hasil Belajar IPA	1. Berwina Ngalemisa Br Tarigan 2. Anak Agung Gede Agung 3. Desak Putu Parmiti	Journal of Education Technology	Character-included Worksheets are proven to be significantly effective in improving science learning outcomes.
Pengembangan LKPD Berbasis Berpikir Ilmiah pada Mata Pelajaran IPA Materi Sifat-Sifat Bunyi di SD/MI	1. Khairun Nisyah Dalimunthe 2. Nirwana Anas	Didaktika: Jurnal Kependidikan	Scientific thinking-based LKPD is effective and can be utilized in the learning process for fourth-grade elementary school students. The suitability of the learning media has been

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Title	Authors	Journal	Research Result
			reviewed by subject matter experts, media experts, and fourth-grade students at IT Nur Athifah Elementary School for the 2024-2025 academic year.

D. Discussion

Based on a review of 25 selected articles, it was found that the development of Natural and Social Science worksheets in elementary schools during the 2019-2025 period focused intensively on the development of inquiry-based, CTL, STEAM, and Natural and Social Science learning worksheets that integrate digital technology. The most widely used learning model or approach is the inquiry model, which can be implemented in various forms, including inquiry training, guided inquiry, and science inquiry. This indicates that the inquiry approach is the primary choice for developing science students' worksheets because it is considered effective in fostering critical thinking skills, curiosity, and problem-solving abilities in elementary school students.

In addition to inquiry, other models that are also frequently used include Discovery Learning and STEM, each with three publications, as well as CTL (Contextual Teaching and Learning) and Scientific, which appear in two publications. Meanwhile, other models such as SETS, Flipped Classroom, Character, Process Skills, Contextual, Ethnoscience, and Science Literacy only appear once in the publications analyzed. This indicates that, despite the variety of learning models, the primary focus of research on the development of natural and social science worksheets in elementary schools remains dominated by approaches that actively train the inquiry and discovery process.

The dominance of the inquiry approach in the development of science student worksheets is also reinforced by the results of research by Arimbawa & Suniasih (2022), which states that guided inquiry-based student worksheets are very effective in improving the learning outcomes and science process skills of elementary school students, and are considered valid and practical for use in science learning. In addition, research by Hidayah et al (2025) also demonstrates that the application of the inquiry model in developing student worksheets can significantly enhance student activity and understanding.

The inquiry learning model is the most dominant approach in the development of student worksheets in natural and social sciences for elementary schools, as it encourages students to play an active role in the learning process. This approach emphasizes student involvement in discovering and building conceptual understanding independently through exploration, investigation, and discussion, thereby increasing learning motivation and critical and creative thinking skills. Recent studies show that the application of the inquiry model in science subjects significantly improves student learning outcomes, problem-solving skills, and the ability to work in groups (Rafli et al., 2025). In addition, guided

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inquiry-based student worksheets have also been proven to be valid, practical, and effective in improving students' critical thinking skills (Kholisoh et al., 2024).

The development of natural and social science student worksheets, apart from using the inquiry approach, also frequently uses the discovery learning and STEM approaches. Discovery Learning emphasizes the process of independent knowledge discovery, which can significantly foster curiosity and motivation to learn among students. Research conducted by Sulistiana et al (2024) demonstrates that the implementation of Discovery Learning-based science worksheets on the topic of changes in the form of objects in fourth-grade elementary school is efficacious in improving student learning outcomes. Meanwhile, the STEM approach integrates science, technology, engineering, and mathematics in learning, thereby helping students develop skills relevant to the needs of the 21st century (Wulandari et al., 2022). This is supported by research from Octaviani et al (2024), who developed STEM-based worksheets on science material in elementary schools, demonstrating that this approach can enhance students' critical thinking skills.

The CTL (Contextual Teaching and Learning) model and scientific approach also emerged as options in several publications based on an analysis of 25 selected journals. CTL emphasizes contextual learning, helping students connect lesson material with their real-life experiences. Research by Jannah & Suciptaningsih (2023) indicates that the development of CTL-based student worksheets in the independent curriculum of elementary schools can enhance students' conceptual understanding in science and mathematics learning. Meanwhile, regarding the scientific approach, Nurhidayah (2024) states that the scientific approach in developing student worksheets emphasizes the scientific process, such as observing, questioning, gathering information, reasoning, and communicating. Arum & Syafi'ah (2024) developed student worksheets based on the scientific approach assisted by Liveworksheet on the subject of force in the fourth grade of elementary school, proving that this approach is highly valid for use in science learning based on the results of validation by media experts, subject matter experts, and language experts. Thus, both approaches remain relevant because they emphasize contextual and scientific process-based learning, which can help students connect the subject matter with their real-life experiences.

The results of the analysis of 25 selected journals indicate that the dominance of the Inquiry model in the development of natural and social science student worksheets confirms that learning that fosters critical thinking, problem-solving, and active exploration skills is the primary focus in primary education. The inquiry model has been proven effective in improving learning outcomes, providing students with more opportunities to think critically and engage in discussion (Malna, 2022). In addition, other models such as Discovery Learning, STEM, CTL, and scientific learning provide alternatives that can be adapted to the characteristics of students and school conditions. With the development of innovative learning media, the application of these models can significantly improve the quality of science learning and prepare students to face future challenges.

The aspects that were most frequently reported to have improved were science learning outcomes and understanding of science concepts. This finding aligns with the

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results of Muna & Mulyani (2023), who state that the use of student worksheets based on innovative learning models significantly enhances student learning outcomes and concept understanding. Furthermore, critical thinking and science literacy skills were reported to have improved in three studies. This improvement is supported by research by Wulandari et al (2022), which shows that student worksheets designed with a scientific approach can effectively stimulate students' critical thinking and science literacy skills. Additionally, research by Ernawati & Suryantari (2025) suggests that effectively developed student worksheets can enhance students' critical thinking skills. Sari, Ulandari et al (2024) state that student worksheets that are developed effectively improve students' critical thinking skills. Sari, Ulandari et al (2024) developed science student worksheets based on ethnoscience, which are suitable for use in science learning and can enhance students' science literacy in elementary schools.

Another aspect that has also improved is higher-order thinking skills (HOTS), as well as interest and motivation to learn. Research by Nadifatinisa & Sari (2021) revealed that integrating HOTS questions and engaging activities into student worksheets can increase student motivation to learn and analytical skills. Meanwhile, aspects of process skills, character, student engagement, and independent learning were each assessed in separate studies. Although the frequency was lower, research has shown that interactive and contextual student worksheets also contribute to the development of soft skills, such as character, engagement, and independence, in students.

Overall, this suggests that the development of student worksheets has a significant impact not only on cognitive aspects but also on the affective and psychomotor aspects of students. Research by Hafild et al (2024) demonstrates that the development of science worksheets to support learning in the Merdeka Curriculum is both valid and practical, as well as effective in enhancing student engagement in the learning process. These findings reinforce the recommendation that future development of student worksheets should emphasize the integration of various 21st-century skills, such as critical thinking, science literacy, and character development, to support holistic learning that is relevant to the demands of the Merdeka Curriculum (Darling-Hammond et al., 2020).

E. Implication

The results of this study provide a significant theoretical contribution to the development of science-based worksheets for elementary school students. The dominance of learning models such as inquiry-based learning, discovery learning, and STEM confirms the relevance of constructivist and active learning approaches, which can enrich learning theory. These findings also fill a gap in research related to the effectiveness of these models in the context of developing student worksheets, thus forming the basis for the development of new theories that integrate 21st-century skills more systematically. Therefore, this study not only reinforces the scientific foundation but also creates opportunities for more comprehensive future research in this field.

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In practice, the use of student worksheets based on innovative learning models can increase student engagement in the learning process. This is evident in the improvement in students' conceptual understanding and critical thinking skills, which are essential aspects of 21st-century learning. Teachers and instructional material developers can use these findings as a guide to design more effective and engaging student worksheets, as well as to tailor learning methods to the needs of students. In addition, the results of this study also emphasize the importance of training and professional development for teachers, enabling them to implement innovative learning models optimally.

The policy implications of this study are significant for schools, governments, and curriculum developers, especially in the context of implementing the Merdeka Curriculum. Schools should be encouraged to provide high-quality student worksheets that align with innovative learning models, aiming to improve 21st-century skills. Governments and policymakers must create regulations and support that facilitate teacher training, the provision of educational resources, and the development of adaptive and responsive student worksheets that are aligned with curriculum changes. Appropriate policies will ensure the implementation of sustainable active learning and have a positive impact on the quality of education at the elementary level.

F. Limitation and Suggestion for Further Research

The primary limitation of this study is that the analysis only covers articles indexed in the Publish or Perish database for the period from 2019 to 2025. This has the potential to limit the validity and generalization of the results because there may be relevant studies outside these criteria that are not accessible and analyzed. Furthermore, the descriptive nature of the analysis approach has not enabled an in-depth exploration of the factors that determine the effectiveness of science student worksheets. Therefore, the results of this study should be viewed as a preliminary overview that requires further investigation. These limitations affect the ability to identify key variables that determine the success of student worksheets, so caution is necessary when applying the findings to a broader context.

For further research, it is recommended to not only expand the scope of the database and time frame but also adopt a more comprehensive methodological approach, such as meta-analysis or experimental studies, to identify factors that influence the effectiveness of student worksheets. In addition, further research can focus on developing technology-based student worksheet models or more specific inquiry integration, as well as exploring new issues in basic science education, such as hybrid learning or the use of artificial intelligence. These recommendations will enrich the field of research with more innovative and thematic approaches while providing more concrete practical contributions to the development of teaching materials in the future.

G. Conclusion

Based on a literature review of 25 selected articles from 2019 to 2025, the trend in the development of natural and social science worksheets for elementary school students

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exhibits a strong tendency toward the integration of various innovative learning models and approaches. The most dominant learning models and approaches applied in the development of science student worksheets are inquiry, followed by Discovery Learning, STEM, CTL, and Scientific. The development of student worksheets has been proven to have a positive impact on student learning outcomes, conceptual understanding, critical thinking skills, science literacy, and learning motivation. Therefore, the development of science student worksheets needs to continue to be directed towards contextual innovation, adaptive to technological and curriculum developments, and responsive to student needs in the era of the Merdeka Curriculum.

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